A history of Dakota Gasification Company and the Great Plains Synfuels Plant

The New SYNFUELS ENERGY ENERGY ENERGY



BY STAN STELTER INTRODUCTION BY FORMER PRESIDENT JIMMY CARTER

\$24.95

FROM THE AUTHOR

As a native North Dakotan and former newspaper reporter, I enjoyed very much putting together this history at the request of Dakota Gasification Company. It's been truly a labor of love assembling this part of North Dakota's energy story. It provides an overview of the events leading up to building the Great Plains Synfuels Plant and the efforts to keep it operating.

I am in debt to many people in this effort, although I take responsibility for any misinterpretations or errors. In particular, I would like to thank former North Dakota Govs. William Guy and Arthur Link for their thoughts and advice; Al Lukes, Dakota Gasification Company chief operating officer, for his encouragement; Mark Foss, Dakota Gasification Company general counsel, for his time and comments; and Floyd Robb, Basin Electric's communications manager, for his support in the project. And I want to express my gratitude to Carey Bittner for his amazing graphic ideas and hard work that gave life to chapters and words.

Like others in North Dakota in the 1970s, I questioned whether energy development was a good thing. Would this be a "one-time harvest" of lignite that would harm the environment? Could the state truly benefit from energy development? These and other questions faced North Dakotans during that period. It was a time of promise and apprehension: a promise of a better future and apprehension of what energy development would do to the environment, to communities and to the people. That led to sometimes heated debate among North Dakotans. My inclination then was that massive energy development would do irreparable damage to the state, and I felt that those involved were wrong.

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My view has since changed. There can be a balance between meeting our energy needs and maintaining our environment. With government and citizens watching over the



process, energy development has been done in a responsible way in North Dakota.

On a personal note, I want to dedicate this work to my late classmate and friend, Dennis Huber, a boilermaker and North Dakota native. He, like hundreds of other native sons and daughters, worked to make this plant and other energy facilities a reality. Through their efforts, rural America became energized and a better place to live and work.

> Stan Stelter Mandan, ND

A native North Dakotan, Stan Stelter has an education degree from the University of North Dakota. After a brief teaching stint, he spent 15 years as a reporter for the Bismarck Tribune and then the next 10 years in communications for Basin Electric Power Cooperative. He now works as a freelance writer and communicator.



The New SYNFUELS ENERGY PIONEERS

t would seem that history is, indeed, repeating itself. During the 1970s, we went through a series of so-called energy crises. We found ourselves at the mercy of the Organization of Petroleum Exporting Countries. Today America again has become too dependent on foreign oil, and that means we are jeopardizing our national security.

During my Administration, I initiated a number of measures to wean our nation from relying too much on OPEC oil. Those actions included creating the Department of Energy, limiting the importing of oil, focusing on energy conservation, and developing alternative sources of energy, such as solar, nuclear, geothermal power and synthetic fuels.

We wanted to move America toward energy independence, using domestic fuels like coal and natural gas rather than oil from the Middle East. The coal gasification project in North Dakota became part of that effort.

That project, known today as the Great Plains Synfuels Plant and owned by Dakota Gasification Company, faced many trials. Largely through the efforts of rural electric cooperatives, it has persevered. Its existence today should help to remind us of our goal to gain energy independence.

This history of the synfuels plant and energy in North Dakota reflects the tough battles fought by many to build this unique energy facility and make it a success today. Such a history can serve as a reminder of what our energy goals had been in the past, and what they should be in the future to preserve America's national security.

Francing Carter





The New SYNFUELS ENERGY PIONEERS

A history of Dakota Gasification Company and the Great Plain Synfuels Plant

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DESIGN & ARTWORK BY CAREY BITTNER

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Preface

he history of the Dakota Gasification Company and Great Plains Synfuels Plant really is a story about people with vision.

The people who conceived this plant in the late 1970s had a vision about the energy future of the United States. They could see that we had a finite amount of oil and gas for this country to run on. They knew that we were depending too much on foreign supplies of energy. And they knew the United States had a vast energy supply that could be tapped – about a third of the world's known recoverable coal reserves. Estimates predicted that our country had an estimated 250-year supply of coal. In fact, looking at America today, the use of that coal has been a primary driver of this country's economic success. More than half of the electricity in this country is generated with coal. Because of reasonably priced energy based on coal-generated electricity, we now have the world's greatest economy. We also have developed the cleanest



coal-fired power plants in the world.

When the synfuels plant was still on the drawing boards, America was being called the "Saudi Arabia of coal." The visionary people who moved this plant from blueprints to reality saw that this country's vast coal reserves could provide an answer to the problems with America relying on foreign oil. They envisioned a battery of energy plants that could turn coal into natural gas, thereby moving America toward energy independence.

Foreword

"I like the dreams of the future better than the history of the past." Thomas Jefferson

This is a story about history and about dreams.

... The dreams of the past culminated in the building and operation of America's only commercial-scale coal gasification facility, the Great Plains Synfuels Plant. The dreams for the future will determine what will be written in the 21st century about this unique synthetic fuels plant now owned and operated by Dakota Gasification Company.

Faced with controversy and confusion many times over nearly three decades, the synfuels plant has become a survivor, largely due to its resourceful management, skilled staff and unwavering support by the U.S. Department of Energy, North Dakota leaders and Congressional delegations. Predictions of its success and demise have been reported time and again in national newspapers, trade journals and other media. Some have called this energy plant a "boondoggle," terming it the last gasp of President Carter's synthetic fuels program of the 1980s. On the other hand, recent U.S. Energy secretaries have called the synfuels plant a world-class energy facility and a model for future energy plants.

The plant's genesis lies in the energy crisis of the 1970s when Americans felt the tightening grip from oil-producing nations of the Middle East. It is the only project operating today that is tied to the Federal Nonnuclear Energy Research and Development Act of 1974, which was enacted to spur developments that could help the United States achieve energy independence. Under President Carter's administration, the synthetic fuels program became a national priority.



Prologue

Dinosaurs and buried treasure

he prairies of the Northern Plains offer a beauty that long-time prairie dwellers love. There's beauty in the mix of vast grasslands, sparse woodlands, and meandering rivers, accentuated from above by a blue sky. To hardy Plains residents, the winters often portrayed as harsh and bitter are simply part of the change in nature's picture here. The snow-swept landscape, howling winds and subzero temperatures all are part of this region's cleansing beauty.

It is this beauty that generations of North Dakotans have valued, despite how the region is viewed by others. It is the love for the prairies that have kept them on this place on Earth that others consider lonely and lifeless. And it is this love for the land and lifestyle that has molded generations of Northern Plains dwellers, who take pleasure in their independence and balk at the notion of being controlled by outsiders.

Beneath these plains lies another kind of treasure that man eventually learned to use. It is lignite, which some call a rock that burns. Lignite is a low-grade coal, meaning it has lower heating value than other coals. Water makes up about a third of its weight.

The lignite in central and western North Dakota and eastern Montana make up a part of the Fort Union Group, aging from the Paleocene period some 60 million years ago. As the last of the great seas drained away, this area became a hot and humid subtropical swamp. Dinosaurs roamed the region as did other creatures, huge creatures such as gigantic crocodiles and the extinct champsosaurs. Vegetation flourished along with the great lizards and reptiles, big and small. However, it was the explosion of plant life that would prove advantageous for man, who first arrived on the scene after another 60 million years.

Plants absorbed energy from the sun and converted it to organic material, some of which became coal. Over time, the billions of tons of dead and decaying plants became part of the sediment deposited by streams in western North Dakota. The combination of pressure, time and bacteria turned the organic material first into peat and then into lignite. If the process continued longer, the lignite would become a higherranking coal, bituminous or anthracite.



This process can take hundreds or even thousands of years. It is estimated that up to 150 years is needed for enough material in the primordial swamps to make a single foot of bituminous coal.

With the geologic changes in the millions of years since the Paleocene period, the coal beds became overlain with dirt. This "overburden" resulted from erosion by glaciers, streams and lakes that appeared and disappeared while the Rocky Mountains were being formed in the western United States. Explorers Meriwether Lewis and William Clark used Fort Mandan along the Missouri River in central North Dakota as their quarters in the winter of 1804-05 during their expedition to the Pacific Ocean. The recreated fort and other facilities near Washburn draw thousands of tourists to North Dakota.

(Photo courtesy of Horizons Magazine)

One of the largest lignite deposits in the world

As a result, huge beds of lignite up to 40 feet thick now lie beneath the prairies in parts of this region. Western North Dakota's lignite deposit – estimated at 350 billion tons – ranks among the largest in the world. Based on today's mining rates, that is enough to last 1,000 years or more.

No evidence exists that Plains Indians used coal. The first recorded use of lignite from present-day North Dakota came in the winter of 1804-05 as the



noted explorers, Meriwether Lewis and William Clark, made their way up the Missouri River. At Fort Mandan in central North Dakota (just 50 miles east of the synfuels plant site today), they reportedly used lignite to heat a blacksmith's forge. In their journal, these famous explorers also noted they were using a large coal pit to mend Plains Indians' hatchets and to make axes to trade for corn.

In the frontier period, little use was made of lignite, either by riverboats or military outposts. By the late 1800s, rails were being laid

westward across North Dakota, and steam locomotives used lignite as a fuel source. More importantly, homesteaders found the "rock that burns" valuable because trees were scarce in this region.

Actual mining of lignite extends back to about 1873 when small mines developed along rail lines, roads and trails. By 1900, North Dakota had 73 mines operating, many of them so-called "wagon mines" because area farmers and ranchers would often bring their own wagons to be filled with coal. However, there were large underground mines employing hundreds of men with their operations extending thousands of feet beneath the prairie.

North Dakota boasted about its lignite, as evidenced by many town names associated with the fuel in the state. At one time, a Fargo businessman planned for a grand 60-acre community to be called Energy in McLean County. Energy never developed, and its only office building closed in 1911.

By the 1920s, the number of mines grew to about 250, divided almost equally between underground and surface strip mines.

Steam shovel revolutionized mining

With the advent of the steam shovel in the 1920s, mining in North Dakota was revolutionized. Mining had been largely underground. But these huge shovels

Underground mines as well as small "wagon mines" were common in North Dakota in the late 1800s and early 1900s. These miners were working at a mine at Arnegard in 1913. – many coming from the Panama Canal – made it possible to remove large amounts of overburden through surface mining. The profitability of surface strip mines increased, and underground mines gradually closed. Many communities at that time built their own small power plants using lignite to generate electricity.

The lignite industry in North Dakota grew rapidly in those years, but coal prices fell as the country felt the grip of the Great Depression.

Cheap hydroelectric power soon became available. Natural gas and oil were discovered in the state. All of these developments resulted in a decreasing demand for lignite. To promote the use of this native fuel source, the North Dakota Legislature authorized more research on the use of lignite. The North Dakota Research Foundation was created in 1943 to investigate the feasibility of converting lignite into other products. That led the U.S. Bureau of Mines to set up a pilot gasification plant at the University of North Dakota School of Mines in 1949. And, two years later, a lignite laboratory was established — a lab now known as the UND Energy & Environmental Research Center.

A prediction appearing in a state newspaper then suggested there was potential for producing synthetic fuels from lignite, forecasting what would happen in the state three

decades later. According to this post-World War II story, North Dakota lignite may bring a synthetic industry to the state, making oil, gasoline, diesel fuel and other liquid fuels from lignite.

As North Dakota grew so did the demand for electricity. And this growth in farms, ranches and towns prompted a major resurgence in the use of lignite.

A relatively poor quality coal, lignite first was known as the "rock that burns." However, an industry began developing as the use of lignite rose in North Dakota.

A growing need for energy

Chapter 1

F armers and ranchers throughout the Midwest and other parts of rural America had gone without electricity until rural electric cooperatives finally turned the lights on in the 1930s. For many years, hydroelectric plants located on the Missouri River met the needs of rural residents.

However, by the late 1950s it was apparent that the demand for electric power in the region would outstrip the capability of those hydro plants. At a gathering in the Midwest in 1958, a federal Interior Department official told consumer-owned electric utilities that the federal hydroelectric generating capacity might not meet regional power requirements beyond the next year. That spurred the utilities and their rural patrons to action, forming the Mid-West Electric Consumers Association. This group produced ideas that led to the federal Bureau of Reclamation extending its power commitments in the region in the mid-1960s.



Leland Olds, a former chairman of the Federal Power Commission, advocated consumer-owned power. In the 1950s, he suggested rural electric systems should pool their needs and resources, building giant lignite-fired electric generating plants that could be integrated with the existing hydroelectric facilities.



(Top photo) Groundbreaking near Stanton, ND, on June 22, 1963, for the first generating unit of Basin Electric's Leland Olds Station: (from left) Art Jones, Basin Electric president; ND Sen. Quentin Burdick; ND Gov. William L. Guy; Norman Clapp, head of the Rural Electrification Administration; Mrs. Leland Olds; Ken Holum, of the U.S. Dept. of Interior; and John Olds, son of Leland Olds. (Bottom photo) A construction worker helps to build the first unit at the Leland Olds Station, a project that cost \$36 million.

Resolving this problem of supplying power to the region finally came from a man who championed consumer-owned power. Leland Olds, former chairman of the Federal Power Commission (predecessor to the Federal Energy Regulatory Commission), had developed a vision of building large consumer-owned steam generating electric power plants in the region and integrating them with the existing federal hydro plants - a "hydrothermal" marriage. A member of President Franklin Roosevelt's Administration, Olds had been part of the development of the Tennessee

Valley Authority. He could see a similar plan working for the Missouri Valley region. "The secret of giant power lies in establishing a single regional power supply system that can build and integrate such plants as a source of bulk power supply for all systems in the region," Olds told public power representatives at a meeting in South Dakota in 1959. His ideas focused on building such a lignite-fired plant in central North Dakota.

Not everyone agreed with Olds, but, in 1961, representatives of 67 rural electric cooperatives from eight states demonstrated their acceptance by forming Basin Electric Power Cooperative. By getting together in a regional



generation and transmission cooperative, these farmers and ranchers could build large-scale, lignite-fired electric generation plants to supplement the power they were getting from the federal hydroelectric system. They saw it as helping to control their own destinies.

Compared to building many smaller plants, a large lignite-fired electric plant would be more economical by not having to haul lignite, building fewer transmission lines and requiring less capital.



Groundbreaking for the first of these huge generating facilities came in June 1963 along the Missouri River near Stanton, ND. Named the Leland Olds Station in the honor of the future-thinking public power advocate, the facility being built by Basin Electric was to be the first giant lignite-fired power plant in the Western Hemisphere. Firing lignite coal in huge boilers proved troublesome, but Basin Electric engineers developed methods to counter the boiler fouling from burning lignite. The headaches were many and frustrating, recalled Rich Fockler, then a Babcock and Wilcox service engineer. Fockler, who retired as Basin Electric's vice president for Operations and Engineering, later recalled he suggested, tongue-in-cheek, that they could fill the boilers with concrete, chisel them off and leave it as a monument to the troublesome lignite.

(Top photo) Construction on the first unit at the Leland Olds Station was nearing completion in 1965. The 216megawatt unit began commercial operation in 1966, becoming the largest lignite-burning power plant in the Western Hemisphere at the time. (Bottom photo) Basin Electric added a second unit to its Leland Olds Station in 1975. At the initial turbine roll for the 440-megawatt Unit 2 were (from left) plant staff members Robert Boettcher, Kent Janssen, Richard Fockler, and Vern Smith, along with James Grahl, general manager, and a representative of the turbine manufacturer.

As a result of the early work by Basin Electric engineers, a number of changes were made in subsequent lignite-fired electric units, such as installing gigantic boilers. Some of those new boilers would qualify as the tallest in the world.

Over the next two decades, central and western North Dakota would be the scene for the development of a dozen large electric generating facilities and lignite mines.



ANG COAL GASIFICATION COMPANY

MEMBER OF THE AMERICAN NATURAL RESOURCES SYSTEM



Energy picture changing

In the late 1960s, America's energy picture looked like it might be changing drastically. Industry and government leaders were predicting that the nation

would be running out of natural gas in the near future. A Department of Interior official forcasted that a natural gas shortage would occur in the U.S. by 1985. Coal, he said, would fill the gap in the next two decades.

Leaders in the natural gas business were already taking action. Planners at American Natural Gas Company (ANG) of Detroit – now American Natural Resources Company or ANR – began exploring what alternatives there might be to continue serving their customers in Michigan and Wisconsin.

ANG had looked at several options. One idea was to join in building a natural gas pipeline from northern Alaska. That plan failed largely due to environmental issues. Another idea was to liquefy natural gas in Algeria and Nigeria and ship the fuel back to the United States. That never materialized.

But a third option – coal gasification – did take hold. Coal gasification is the process of crushing and cooking coal to extract natural gas. It was not a new process, but it hadn't been used to any extent in the United States. ANG engineer Noel Mermer would become the prime gasification proponent for the Detroit company, according to Arthur L. Seder Jr., formerly ANR's president and chief executive officer. Mermer joined an ANG task force to survey the coal and water resources throughout the country.

Their surveys finally led ANG to focus on western and central North Dakota as the best prospective site for coal gasification. The reason lies in the



combination of vast amounts of lignite and water, good railroad connections and excellent labor supply. It was that combination that led to building electric generating plants in this region starting in the 1950s. ANG's task force found one more advantage in North Dakota. It was within a reasonable distance to economically pipe the natural gas to customers in Michigan and Wisconsin.

Thus, western North Dakota became the target site to begin a coal gasification industry that was to fill the nationwide energy gap expected in the not-toodistant future.

American Natural Gas (ANG) engineer Noel Mermer (left), meets with Art Seder (center), president of ANG, and another official in the 1970s in Beulah. Mermer was the prime proponent of gasification for the Detroit-based energy company and helped to site the project near Beulah. ANG moved quickly. First, it acquired lignite reserves. By early 1972, an ANG subsidiary, Michigan-Wisconsin Pipeline Company, reached an agreement with North American Coal Corporation of Cleveland to dedicate 1.5 billion tons of lignite in North Dakota to ANG. The agreement, in the view of a North American official, was "protection against a national shortage of natural gas." In the agreement, North American retained rights to mine the coal. Less than a year later, the two expanded their agreement giving Michigan-Wisconsin rights to another 1.2 billion tons of lignite in the state.

Rumors about big plans

As the nation became more and more dependent on foreign oil, rumors about coal gasification in North Dakota circulated in the early 1970s. And, frustratingly for North Dakotans, nothing firm could be substantiated. Because of America's growing dependence on oil, a study was initiated by electric utilities and the Bureau of Reclamation to look at using domestic fuel resources, namely coal. Thus, one of the early indications of major energy development came with the release of this1971 report, called the "North Central

Power Study." It identified 42 sites on the Northern Plains – 21 in Montana, 15 in Wyoming, 4 in North Dakota and one each in South Dakota and Nebraska – for electric generation and coal conversion plants. The report indicated that 13 of those plants would be capable of generating 10,000 megawatts or more. The report's projections for use of water, land and coal on the Northern Plains went far beyond what many imagined, stunning environmentalists and others.

In late 1972, the first plans for a coal gasification plant in North Dakota surfaced from a Missouri River Basin Commission meeting in Bismarck. In that proposal, four coal gasification plants costing \$80 million were listed as possibly being built in the state.

At about that time, Michigan-Wisconsin's plans were confirmed when ANG's Seder called on Gov. William L. Guy at the state Capitol. During his 12-year term that ended in 1973, Gov. Guy had promoted economic development and had been instrumental in bringing large-scale coal-fired electric generation to North Dakota to help the region's farmers and ranchers.

Recalling the meeting in late 1972 with Seder, Gov. Guy said the discussion



William L. Guy promoted economic development as North Dakota's governor in 1961-73. In a 1972 meeting at the North Dakota Capitol, Art Seder of ANG unveiled plans to Gov. Guy for a flagship coal gasification plant in the state.



Map from the 1971 North Central Power Study



centered on energy issues and the prospect of the United States facing higher prices and tightened supplies from foreign oil suppliers. Seder said industrial customers were pressing his company to ensure future availability of natural gas that was reasonably priced. Because some of these customers were also defense contractors and weapons manufacturers, the issue involved national security. So, the federal government began encouraging any efforts to ensure energy independence, Guy noted.

Seder revealed to the governor that his company was pursuing plans to develop large-scale coal gasification to serve their industrial customers. And he floated the idea of locating the "flagship" plant in North Dakota. Asked what the position of state government might be, Guy responded that it probably would be supported, if the corporate sponsors demonstrated a high level of responsibility and paid their own way.

Seder then made a prediction: If that first plant proved successful, rapid expansion of coal gasification would occur in the region including North Dakota, Montana and Wyoming.

The "Pioneer Family" statue (foreground) on the grounds of the North Dakota State Capitol (background) is dedicated to honoring the pioneers of the region. An inscription on the back of the statue reads, in part, "With sureness of purpose, with daring and venture and from generation to generation, the pioneering spirit moves always forward and onward to greater goals." North Dakota was now on a course to become America's pioneer in using lignite coal for making natural gas.

President Orders 15% Cut in Fue day, to take effect Dec. 7, forbidding coal-burning power

WASHINGTON (AP) - President Nixon says he is cuttin WASHINGTON (AF) — Freshoent Aiton says ne is cutting 15 per cent from deliveries of gasoline and home heating of is per cent from deuveries of gasoutie and nome neating of to stave off severe fuel-shortage damage to the nation's

economy The moves will mean homes six degrees cooler than nor-mal this winter and not enough gasoline to go around. To start saving gasoline. Nixon asked filling stations to stop selling it on Sundays, and pledged be would order such a ban once Congress gives him the authority. The television address Sunday. Nixon said deliveries where ut 15 per cent, industries will be

ants from switching to out. Nixon pledged to take the following steps as soon as Convixon predged to take the tonowing steps as soon as gress passes emergency legislation authorizing them: gress passes emergency registation authorizing them; • A ban on gasoline sales from 9 p.m. on Saturdays to adopt such a ban voluntarily in the meantime, beginning Dec. 1

Dec. 1. • Establishment of nationwide highway speed limits of 50 niles an hour for automobiles and 55 miles an hour for long-distance trucks and buses. • Bans on ornamental residential lighting and on non-es-sential commercial lighting.

Bans on ornamental residues for general aviation, im-sential commercial lighting. Reductions of fuel deliveries for air taxis and industrial fly-net euton fuel for air taxis and other business flying

Local Gasoline Stations to Close on Sundays

By BILL TILLOTTSON Special Assignments Editor

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scal motorists will have to stock up on aline before 9 p.m. Saturday if they plan

weekend driving. Rohde, president of the Bismarck-idan Gasoline Dealers Association, said Down Come Speed Signs rsday that local service station operators e agreed to close from 9 p.m.

"We feel this is necessary to avoid higher taxes on gasoline or rationing," Rohde said, "We would like to avoid this if at all possible." He said the local station operators are advising their customers to write to the president and to North Dakota congressmen

banned weekend driving the administration has not made this recommendation for the United States.

Stopping gas sales on Sunday would restrict the longer trips, ho dard in

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Membership in the Bismarck-Mandan Gasoline Dealers Association involves service stations in the two communities, although there are two truck stop operators who are members, Rohde said.

Truck stop operators met in Mandan earlier this week to discuss the fuel situation and there were some suggestions that stations keep their diesel fuel islands open on Sunday for over-the-road truck operations.

However, industry sources indicated that probably most of the truck stops will close on Sunday because of reduced supplies of diesel fuel.

NUMBER OF

By BILL TILLOTTSON Special Assignments Editor

State Highway Department crews Tuesday morning began

to remove speed limit signs on highways in the state in advance of enforcement of reduced limits. The new limits — 60 miles per hour on interstate routes, 55 ine new timus - to mites per noar on interstate routes, 55 miles on other highways - go into effect Wednesday under an emergency energy conservation executive order issued by

Gov. Arthur A. Link on Nov. 21.

After a meeting called by the governor Monday afternoo a meeting called by the governor Monday afternoon The Highway Commissioner Walter R. Hjelle, The Dopon and Highway Patrol Superintendent Monday Dependent of the Mons, as well as the new timits at interstate parts of eatry into the parts we felt in place. Atty

proclaimed limits if a driver did not exceed the posted limits," Otson said. However, he said that with the signs removed and in view of the emergency powers given to the governor and in view of the emergency powers given to the governor under the North Dakota Disaster Act of 1973 that drivers could be

North Dakota Disaster Act of 1973 that drivers could be supped after Wednesday for exceeding the new limits. Uison said that voluntary compliance with the new restrictions would be a key in whether they will work. "I hope all motorists will recognize there has been a reduction in speed limits for a good reason and that they will comply." Olson said.

The highway patrol superintendent shid that his men would edus enforcing the enforcement built and the set The highway patroi superintendent said that his men wound begin enforcing the reduced speed limits on Wednesday. The state officials who met Monday also agreed that the

The state officials who met Monday also agreed that the limits in the governor's executive order remain in force unless changed by Congress. President Nixon in an energy message Sunday proposed a 56-mile restriction for passenger vehicles and 55 miles for trucks and buses.

news and outers. Hjelle said last week that he would not change speed limit tijelie said tast week that ne would not enange speed innit signs until he knew for sure what the new limits would be because of trucks and buses.

DADA aces eastern v 1nvasion



Gasoline shortages, closed service stations and lower speed limits were in vogue during the energy crisis of the early 1970s. Attempting to conserve fuel, President Nixon asked service stations to close voluntarily on Sundays. Speed limits on highways were reduced to 55 mph. With energy short, Americans feared that gasoline rationing like that imposed in World War II would be resurrected.

(News stories courtesy of **Bismarck Tribune**)



Over the next few years, the United States would take several energy policy actions. One was the passage of the Federal Nonnuclear Energy Research and Development Act in 1974 to encourage projects that would help the country achieve energy independence. A Federal Energy Administration was created, and a national commitment emerged to produce more electricity and other energy from the nation's resources.

Energy alternatives quickly sprung up, including producing methanol from farm crops along with wind, solar, hydroelectric, oil shale, geothermal and

coal gasification. Using the vast coal resources in Wyoming, Montana and North Dakota looked to be the best answer to give America energy independence.

Looking at North Dakota's huge lignite reserves and water resources, an energy executive in the 1970s suggested the state appeared "vastly underdeveloped." But that was about to change.

Michigan-Wisconsin Pipeline Co., a subsidiary of American Natural Resources (ANR), already had begun putting together the resources to develop the first coal gasification plant in North Dakota. It had solidified an agreement with North American Coal Corporation for coal reserves, and North American formed a subsidiary, The Coteau Properties Company, to lease lignite as well as develop, construct and operate mines for ANR.

The other essentials – water and land – weren't going to be acquired as easily.

In the West, water is a scarce resource. The energy men from Detroit were about to get a lesson in the politics of water as they worked to get a permit from the North Dakota Water Commission. In the process, they became a pawn in the longstanding controversy between upper and lower Missouri River states over water rights.

American Natural had already formed its own synthetic fuels task force. Engineers from Michigan-Wisconsin – often called "Mich-Wisch" – came to

America looked to use domestic fuels like coal to reduce its dependence on foreign oil. That spurred development of more facilities like the Glenharold Mine (above), which provided lignite for Basin Electric's Leland Olds Station near Stanton, ND.



North Dakota to request a state permit for water from the Missouri River and Garrison Reservoir formed by the impoundment of the river by Garrison Dam. Those engineers, ANG's Art Seder recalled later, didn't "have much guidance as to how they ought to proceed because their first act was to request a water permit for four plants each twice the size of the one actually constructed."

Water for 22 gasification plants?

Actually, Michigan-Wisconsin's first application for a water permit in January 1973 was for 375,000 acre-feet of water. Company engineers said that amount of water would serve four gasification plants to be located at sites near Beulah, Dodge-Halliday, Washburn and Center in western North Dakota. (An acre-foot of water is enough water to cover one acre with one foot of water or about 326,000 gallons. Garrison Reservoir – later renamed Lake Sakakawea – has a storage capacity of more than 22 million acre-feet, and the annual water flow through Garrison Dam averages 16.5 million acre-feet.)

Because each plant's water use was estimated at 17,000 acre-feet, it was apparent that Michigan-Wisconsin's application for water was vastly inflated. The reason: reportedly the company was following a recommendation by a state Water Commission official who was hoping to bolster North Dakota's case in establishing ownership of Missouri River flows. Based on the belief that the river belongs to North Dakota on a "use-it-or-lose-it" basis, a larger application by Michigan-Wisconsin would help the state in justifying larger Asked about building a dam on the Missouri River for irrigation, a University of North Dakota professor reportedly advised in the early 1900s that the river couldn't be tamed. However, the Garrison Dam (below) north of Bismarck was built with completion in 1950, producing a reservoir with a storage capacity of about 22 million acre-feet. Energy companies sought to use more and more of the water from the reservoir for their proposed projects.



claims to Missouri water flowing within North Dakota's borders.

Michigan-Wisconsin's application for water actually was five times the amount needed for four coal gasification plants. However, a public hearing held in Beulah in early 1973 on Michigan-Wisconsin's application before the State Water Commission caused little commotion. At the hearing, the company predicted that each of the four proposed plants would employ 1,050 people with an annual payroll of \$12 million. That definitely appealed to local merchants and others in Mercer County, all hoping for jobs and money to flow from this massive energy development.

But the word soon spread about the huge request for water. North Dakotans became concerned about the size of the project, and opposition sprung from environmentalists, landowners and the railroad. An environmental group wanted the public hearing to be reopened, partly because of Michigan-Wisconsin's application for such a huge amount of water. An environmentalist told a newspaper, "It doesn't take a computer to divide 17,000 into 375,000 and arrive at a figure that says (the company) is asking for enough water to supply 22 plants yearly."

Gasification ideas seemed to be sprouting everywhere. And that begged lots of tough questions. How many plants could North Dakota support? What would be the impacts environmentally, socially and economically? How many plants will be built?

At the time, it appeared that perhaps 30 coal gasification plants might be built in western North Dakota. In one period, North Dakota had 24 industrial water use permits approved or pending for coal gasification and other coal conversion facilities. The rush to use lignite crept close to the state Capitol. A Texas natural gas utility reportedly had taken leases on 35,000 acres of coal within 20 miles of Bismarck.

Echoing the thoughts and fears of North Dakotans in the early 1970s, a state Public Service Commissioner said, "Large-scale development isn't coming. It's here." To this rural state, the figures made public concerning potential energy development were staggering:

- Building the gasification plants actually planned would cost \$6 billion.
- New jobs and the spin-off effects could attract 135,000 new residents.
- North Dakota's population would mushroom by 20 percent.

Coal development and strip mining soon became major issues for North Dakota as well as its leaders. Concerns about strip-mining and development flowed into the office of the new governor, Arthur Link, who took office in

Art Seder recalled: "Gov. Link was at first not very impressed with city slickers from Detroit coming up here and messing up the landscape." January 1973. "Please don't let this happen to our state," wrote one woman. Her letter contained an article titled, "These Murdered Mountains" featuring the results of poor mining techniques in Kentucky. Another constituent sent the governor a national magazine story, titled, "Can We Survive Strip Mining?"

Hearing those voices of concern, Gov. Link, a farmer himself, decided that a

'When the landscape is quiet again'

Ve do not want to halt progress. We do not plan to be selfish and say "North Dakota will not share its energy resources." No ... we simply want to insure the most efficient and environmentally sound method of utilizing our precious coal and water resources for the benefit of the broadest number of people possible. And when we are through with that and the landscape is quiet again when the draglines, the blasting rigs, the power shovels and the huge gondolas cease to rip and roar! And when the last bulldozer has pushed the last spoil pile into place, and the last patch of barren earth has been seeded to grass or grain. Let those who follow and repopulate the land be able to say ... Our grandparents did their job well, This land is as good and, in some cases, better than before. Only if they can say this will we be worthy of the rich heritage of our land and its resources.

Let those who follow and re popu the land be able to way ----Our grandparente did their jak a This land is as good and in so Cases better than when they bef Only if they can say this will

Gov. Arthur Link penned part of a speech about strip mining while he and his wife, Grace, awaited his introduction at the North Dakota Association of Rural Electric Cooperatives meeting in Mandan in 1973. Link's message expressed his concern about preserving the land while allowing energy development.

(Photo courtesy of North Dakota REC Magazine)

cautious approach was the right strategy for North Dakota.

One of Gov. Link's first actions was to turn his Energy Council into a coal gasification task force to study the impacts from gasification. Though directing that the group take a positive approach, Gov. Link wanted the state to move slowly on coal development. He suggested, for instance, that the State Water Commission approve just one water permit and place a moratorium on others. He wanted to give the state time to study the environmental, social and economic impacts from one plant before moving ahead with building these huge industrial facilities covering hundreds of acres.

Gov. Link also disagreed with the approach taken by Michigan-Wisconsin in justifying their plans. The company said North Dakota's coal reserves represented a crucial element in establishing American independence from foreign energy sources. Even with maximum development in North Dakota, Montana and Wyoming, the governor responded, the gasification plants could only provide a fraction of the nation's energy needs.

Some state officials felt Michigan-Wisconsin was in too much of a hurry. They said environmental issues needed study and a long-term energy development plan for the state should come first. That seemed to follow a sentiment familiar in the state's history, one of distrusting large corporations, particularly from the East. North Dakotans had a tradition of populism and independence. They didn't easily kowtow to outsiders with money. Years later, Seder acknowledged that sentiment, recalling that "Gov. Link was at first not very impressed with city slickers from Detroit coming up here and messing up the landscape."

Michigan-Wisconsin backs off

Michigan-Wisconsin soon recognized it had gone too far in its initial application for a water-use permit. Noel Mermer, the company's chief engineer, admitted to reporters that submitting the request for a total of 375,000 acre-feet of water was a "judgmental error." Seder had become the newly elected president of ANG Coal Gasification Company, which was the ANR subsidiary set up to handle the North Dakota project. He told state leaders he'd be pleased if just four plants were constructed in his lifetime.

Michigan-Wisconsin amended its water permit application, lowering it to 68,000 acre-feet of water for the four plants.

Headquartered in Detroit, Seder spent much of his time in North Dakota trying to answer questions and criticism of the project. The ANG

Art Seder became synonymous with coal gasification in North Dakota. Seder made many trips from his office in Detroit to the state, hoping to sell the gasification project. His approach resulted in being viewed by some in North Dakota as an energy executive who really cared about the local populace.

(Photo courtesy of **Bismarck Tribune**)



president promised that North Dakota would get prepaid taxes, possibly an allocation of natural gas from the proposed plant at Beulah and residents would be given preferences for jobs. Seder gave assurances that the company would work closely with the people of North Dakota on energy development.

As Michigan-Wisconsin proceeded, one of the other major gasification proposals for the state fell by the wayside. Natural Gas Pipeline Company of America announced a delay on its studies for a project in the Dunn Center area. It cited uncertainties over a Congressional bill that would curb surface mining of coal on federal lands. (The Natural Gas project, like others, would never materialize, and the company would later join the ANG project.)

The prospect of massive coal development in the state galvanized some opposition, including groups like the United Plainsmen, representing about 300 farmers and ranchers. Rural residents were worried about a huge influx of people, about changes to their lives and about strip mining and the impacts on the land and underground water. A state newspaper editorialized that the prospect of coal gasification posed a "question of confidence." According to the editorial, the main questions centered on mined land reclamation, air and water pollution, underground water resources and impacts on schools, roads and other public facilities. "Despite the promise of a grand economic shot in the arm, North Dakotans aren't rushing," the paper editorialized.

Still, there appeared to be general support in the state for such projects. A statewide poll showed that 77 percent of residents favored lignite development, but that overwhelming support rested on important caveats. North Dakotans wanted some assurance that land productivity would be

Gov. Arthur Link (fourth from left) presides at a 1974 meeting of the State Water Commission, which held the key -- a water permit-- to developing gasification and other major energy projects in the state. Other members included (from left) Al Kramer, James Jungroth, Richard Gallagher and Vern Fahy along with secretary Sharon Locken. Two other members are not shown on this photo.

(Photo courtesy of **Bismarck Tribune**)

reclaimed and that the gasification plants wouldn't pollute the air or water.

The fate of the first coal gasification plant in North Dakota rested initially with the state Water Commission. Without water acquired through a state permit, there could be no gasification of lignite in North Dakota.



At the time, the seven-member Water Commission included the governor, agriculture commissioner, two lawyers, a farmer, a banker and a farm sales executive. They were the gatekeepers on use of water within the state from the Missouri River and Lake Sakakawea.

It was a tough decision for an agricultural state. Farm prices in the early 1970s were high, but the number of farms was declining. Encouraging energy development would mean economic diversification, giving more hope for a better economic future. Yet, approving the development meant allowing an out-of-state company to use state resources with the prospect of environmental and other unforeseen impacts. That predicament weighed heavily on the state Water Commission. Remarked one commission member: "A guy in 1974 is being asked to exert the Wisdom of Solomon, only applied to the year 2000."

The deliberation took a year. Finally, the state Water Commission reached a compromise on Michigan-Wisconsin's application. Commission members approved just one permit for up to 17,000 acre-feet of water, which would support a single coal gasification plant for Michigan-Wisconsin. Attached to the permit were 18 conditions sought by Gov. Link. They included that the project must be environmentally acceptable, mined land must be returned to

It took about a year but the state Water Commission finally approved a water permit for one coal gasification facility near Beulah planned by Michigan-Wisconsin Pipeline Company. Shown below is the permit application as first received by the state in January 1973 and a news story about the approval in 1974.

(News story courtesy of Bismarck Tribune)

18 Conditions Put on One-Plant Ticket

Ks V ater H By STEVE SCHMIDT Corp., Cleveland, Ohio, at the rate of about 10 million tons a

Tribune Staff Writer

The North Dakota Water Commission Tuesday morning The North Dakota water contribution in the state of the s Lake Sakakawea in the Beulah-Hazen area.

Michigan-Wisconsin has said that 17,000 acre-feet of water is sufficient for one coal gasification plant capable of producing 250 million cubic reer or artuncial gas a day.

After little discussion, commissioners voted 5-1 in favor of granting the controversial gasification water permit based on 18 conditions recommended by Gov. Arthur A. Link, commission chairman.

The only commissioner opposing the recommendations was James Jungroth, Jamestown lawyer, who said he could not favor such a permit until he is convinced that reclamation of strip-mined land is possible.

Not present at the meeting in the highway department auditorium was Commission member Gordon Gray, Valley City businessman, who reportedly was delayed until the afternoon session

Under the conditions approved, Michigan-Wisconsin could divert water from only one site on Lake Sakakawea in the Beulah-Hazen area.

The Detroit gas utility has proposed diverting water from two other sites on Sakakawea and the Missouri River but the commission voted to defer action on permitting water from those points.

Michigan-Wisconsin, a subsidiary of American Natural Gas Co., Detroit, hopes to start construction in 1976 on a coal gasification complex costing up to a half billion dollars and employing nearly a thousand persons.

Lignite coal would be supplied by North American Coal

year

1/4 Sec.....

1/3

(3)

The applicant will be bound by all present and future sta

According to Arthur Seder, president of American Natural Gas, Michigan-Wisconsin and North American hope to occupy project offices in Bismarck's Gate City Savings land. Loan building by Mar. 1. Permit No.
He said Michigan-Wisconsin's plan is to make toul Divert gas that could be delivered if form article Dipeline that is expected to the provident of United Plainsmen Americ. Thom Swindler, Mott rancher had stid. Your responsibility is clear, a wate against granting a water perceited a water of comparison and water if "energy monopolies." are allowed to develop here.

tink said North Americher 92 applies Clevelag2 fas arred realistic the special committee's MICHIGAN was a special committee's of North Systematasians even if they exceed legal reclamation

develop here. He said there is no evidence that North Corra Skeles and Well to future go "hand in Ann" Avril the inclusive energy there outside Official Control appropriate varies energy there address of Northerents. Inclusive energy the source of the presentation of the presentat

commission of the subject to approval of the water Michigan Wisconsin must prepares we domprehensive en-wironmental statutories volumental statutories by the commission and subject to perioder review. The permit statutories with modify or vaid the permit state is filed, if a majority of the company much save/space that finalizing the 1461. Steel Officer winning approval to be done and if permit permit sources changes are the state at wholes the permit. (2) 1/ Sec. 1/2 Sec. 1/2

its original condition and the plant must benefit the state economically. Michigan-Wisconsin's other permits were deferred, never to be used.

After finally getting this critical permit, Michigan-Wisconsin immediately announced it hoped to start construction in 1976 on a coal gasification plant to be located on an estimated 1,000-acre complex. The plant's cost now had escalated to \$500 million.

Moving on other fronts

The project had been moving along on other fronts while the issue of water was being resolved.

A contract was finalized with Lurgi Mineraloeltechnik GMBH in Germany on a coal gasification process and proprietary equipment design. Germany, a country short on oil but long on coal deposits, had developed the gasification process in the 1930s to fuel its war machine in World War II.

The Lummus Company and Kaiser Engineers were hired as overall engineers while Woodward Clyde Consultants got the contract to do the environmental studies and prepare an environmental impact statement.

A task force involving ANG, North American Coal Corporation, and Lummus and Kaiser reviewed 11 potential sites for the gasification project between Washburn and Dickinson. Selected was a site several miles northwest of Beulah.

One of the remaining questions was whether North Dakota lignite was, in fact, suitable for gasifying. In the fall of 1973, the Lurgi lab in Germany came back with some bad test results. According to the lab, lignite from the state could not be gasified because of its qualities.

It was the first scare for ANG as it tried to develop coal gasification in North Dakota. But some ANG officials weren't satisfied. They arranged for 12,000 tons of North Dakota lignite to be shipped to the South African Coal, Oil and Gas Corporation (SASOL), which had been hired as a consultant to the project. SASOL, now known as Sasol Limited, had been making liquid fuels and chemicals through its coal gasification facilities at Sasolburg since the early 1950s.

Initially, the testing in Sasolburg confirmed the Lurgi results – lignite's clinkering appeared to make it unsuitable for gasification. An ANG engineer admitted things looked so bad that he and a fellow engineer looked at "job ads in a South African newspaper in case our company wouldn't pay our way back to the United States."

An ANG engineer admitted things looked so bad that he and a fellow engineer looked at "job ads in a South African newspaper in case our company wouldn't pay our way back to the United States." Developing the agreement and partnership with Basin, Seder later said, was a key point in acceptance of the coal gasification project in North Dakota. However, a SASOL engineer then came up with a solution. To counter the clinkering, he recommended installing a mechanical finger that rotated with the grate in the gasifier. It worked. Finally, this new \$2 million test had proven that lignite could be gasified into synthetic natural gas with a high heating value. Called substitute natural gas in the industry, this meant that this "coal gas" would be virtually the same as natural gas coming from the oil production process, the source for most of North Dakota's natural gas. The testing also helped ANG to determine that it would need less equipment for the North Dakota gasification facility, potentially saving \$60 million.

Meanwhile, ANG had been looking for another ingredient for its gasification project: a large amount of electric power. Company officials first approached the investor-owned utilities in the area but were rebuffed. Seder then approached Basin Electric. The Bismarck-based regional cooperative had determined it needed more electric generating capacity to meet the projected needs of its member rural electric cooperatives located in the surrounding eight-state region.

With those seemingly parallel needs, the two organizations hired an engineering firm in late 1973 to analyze the feasibility and cost savings of a joint project. Plans were to include using a single coal mine and adjacent sites while sharing a rail line and coal-delivery and water pipeline systems.

Kent Janssen, then Basin's manager of production, said ANG was planning to rebury smaller coal particles – coal fines – that couldn't be gasified. With a joint project, Basin could burn those fines at a new electric generating plant adjacent to the proposed gasification project.

A joint project would reduce the environmental impact, save coal and water and lower construction costs.

In December 1974, Seder and Art Jones, Basin's first president, announced through the media the "exciting concept" of a joint energy enterprise. Developing the agreement and partnership with Basin, Seder later said, was a key point in acceptance of the coal gasification project in North Dakota.

For Basin Electric, the agreement proved extremely valuable. It provided a site and a coal supply for the Antelope Valley Station, a new electric generating plant it expected to need.

But soon problems in financing the development of coal gasification began to appear.

Reports emerged in late 1974 that gasification developers were experiencing troubles in trying to raise capital to finance projects because traditional lenders were nervous about investing in an untried process.

It was the first sign of chronic financial headaches for a project anticipated by some to be the flagship for America's new coal gasification industry.

Basin Electric, Michigan-Wisconsin JOINT POWER FACILITIES EYED



Basin Electric and Michigan-Wisconsin Pipe Line Company are considering a partnership of coal gasification and electric power generation plants that would make both plants more efficient and save money and resources for gas and electric consumers, while resulting

in significant conservation of resources. Under a preliminary plan, Basin Electric and Michigan-

Wisconsin would build side-by-side plants in the Beulah, North Dakota area. Both plants would be fueled by lignite from the same mine with the gasification plant consuming the coarse coal and the electrical plant burning the coarse coar and the electrical plant burning the "fines" resulting from the gas plant's handling operation.

The agreement, of course, depends on a final decision

by Michigan-Wisconsin to go ahead with its plant. Final feasibility studies are still underway, and the company has delayed a scheduled filing with the Federal Power Commission. The announcement of the possible joint enterprise was

made December 13 by Basin Electric President Arthur Jones and Arthur R. Seder, Jr., president of American Natural Gas Company, the parent firm of Michigan-Wis-Both called it an "exciting concept that would save

coal, water and construction costs."

The plan under study, the first of its kind in the nation, calls for Basin Electric to const kilowatt generating up

Seder and Jones estimated that the total water needs of the joint complex would be about 30,000 acre feet-less than the plants would need if constructed Success of the joint plan, they said, would depend on three factors:

1. A final determination by the American Natural System that gasification is indeed economically feasible. 2. A determination that all social and environmental impacts of the joint project could be satisfactorily met.

3. A determination of water availability. Jones said that Basin Electric would go ahead with

one generating unit on the Beulah site even if Michigan-Wisconsin's plans fell through. "In that case," Jones said, "we would proceed with our current plan to put one plant on line in June, 1979, in

order to meet our member cooperatives' requirements in the eastern region of our service area. "We would plan to have the second unit operational in November, 1980, if Michigan-Wisconsin proceeds. Oth-

erwise, the second plant would be delayed until 1984." the following economies:

Jones and Seder said that a joint plant could realize 1. A more efficient use of coal-fully utilizing both coarse grades and the finer particles of lignite too small

for gasification.

2. Savings on shared facilities such as rail lines, coal delivery systems and a single water pipeline system. 3. Smaller water consumption because (a) the steam. once generated, could be put to two purposes and (b) the amount of water needed for cooling would be reduced.

4. Savings on equipment because a combined pollution control system could serve both plants. 5. Increased by-product utilization because anti-pollut-

ant systems, working for both plants together, would produce sulphur in amounts that would be commercially

These increased efficiencies, they said, would help both companies hold down rates for their customers. The plan, if undertaken, will require two electrical generating units with one serving as a back-up if the other should need repairs.

Basin Electric first presented a proposal for steam supply to Michigan Wi



30 years of natural gas from coal ... maybe

With that headline in a company publication back in 1975, American Natural Resources (ANR) told the story of how a coal gasification project came to be proposed in North Dakota.

The story in ANR's *Venture* magazine shows the view of energy from that first national energy crisis period. And it gives a glimpse of how this huge project – still to be built in North Dakota – was portrayed within the corporate walls in Detroit.

Here is what the 1975 corporate magazine story reported in these areas:

Coal

"Coal. It's been gone for years now as a home heating fuel of any consequence, to the gratification of those who remember basement bins, clumsy clinkers and stuck stokers. Heavy, lumpy, smoky coal. Forgotten and scorned for a generation and then – like a toad kissed by a princess – suddenly being hailed by an oil-short nation as the new glamour fuel, the potential savior of the energy crisis. Maybe."

North Dakota site

"Long before the energy crisis, but in anticipation of it, American Natural took options on 3.7 billion tons of coal in North Dakota." (The magazine reported that these huge lignite reserves were located next to a huge water supply in North Dakota.) "It was the perfect combination for engineers wondering what to do if the (American Natural) System ever began to run short of natural gas," says Noel Mermer, now American Natural Gas Service Company Vice President for Synthetic Fuels and a pioneer pusher of coal gasification."

Using the Lurgi process

"Coal gas simply had to be produced by a more efficient process and brought up to natural gas quality. Mermer found an engineering company that said it could be done: Lurgi Mineralotechnik, of Frankfort (sic) Germany. Lurgi, heir to Germany's successful wartime experiments with coal gas production, was sure that the right combination of steam, heat, catalysts and pressure would do the job of making synthetic gas as good as natural gas."

Up against political history

(To get water for the project, Mermer took the lead in filing an application with the North Dakota Water Commission in 1973 – the first ever for a gasification plant. The magazine cited a political almanac describing the state's cultural isolation and its economic fate being dependent on eastern grain companies, railroads and banks.)

"As a result, the state had a history of populism and an understandable distrust of sizeable corporations, especially 'eastern' corporations. Now here came a company from the east that proposed to build the biggest industrial plant in the state, that proposed to mine 500 acres a year by surface methods, that proposed to create 1,000 permanent plant jobs in a rural county where the biggest town had a population of 1,600. As the magnitude of the project struck home, the prevailing view on the new coal gasification industry was expressed by Governor (Arthur) Link in two words: 'Go slow'."

Public relations

(To deal with the public and move the project forward, Michigan-Wisconsin Pipeline Co., the subsidiary handling the gasification project, put together a group.) "Thus an impromptu task force was formed and at an early meeting (Arthur) Seder (ANR's chairman), who himself grew up on the Northern Plains, laid down the ground rules. American Natural would campaign hard for its project with the people and the people's government. But it would be done on the basis of facts – all the facts, good and bad. And it wasn't going to be done with some slick, expensive advertising campaign. It was going to be done the hard way - in face-to-face meetings with citizen groups all over the state. North Dakotans, Seder concluded, don't like to have their lives influenced by people they haven't met and sized up."

North Dakota concerns

"As North Dakotans learned more about the project, their concerns became more focused. The first concern for a people with strong attachments to the land was reclamation. The state had had some ugly experiences with abandoned strip mines. What was American Natural going to do towards restoring the prairie? Secondly, they were worried about the socio-economic impact. How were the new people to be housed, schooled, supplied with sewers, roads and water?"

ANR's answers

"The honest answer to the first question (reclamation) was that no one really knew if strip-mined land could be restored to original production over the long term, 25 or 50 years. No one had tried it for that long. The Company did know that strip-mined prairie could, with fertilization and irrigation, be made into abundant grazing land in three years. Would the land hold up after it had been returned to nature for a generation or two? The chances were excellent that it would but no one could say for certain. So Seder's promise was this: The land would be returned to its original contour and the Company would cooperate with the state in developing the best possible reclamation techniques. Estimates were that the Company would spend some \$1,500 an acre for reclamation, even though the original value was only about \$300.

"The Company's answer to the impact costs was equally candid and helpful. Seder urged early planning, promised that a full socio-economic impact study would be funded by the Company and submitted to the state, and offered to pre-pay some taxes so local communities could get a head start in preparing for the new facilities."

Rising costs

(Michigan-Wisconsin and ANR sought to cut construction and operating costs that, along with

inflation, threatened the project's feasibility and its ability to attract investors.) "Mermer and Seder decided on a \$1 ¹/₂ million gamble that paid off handsomely. Some 15,000 (actually 12,000) tons of North Dakota lignite was railroaded to Superior, Wisconsin, and put aboard a freighter to Sasolburg, South Africa, site of an operating Lurgi gasification plant. The lignite performed well in its first commercial-scale test – so well that Mermer calculated that the ANG plant could meet its 250 million cubic feet per day goal with less equipment than originally thought. Estimated savings: \$60 million."

Expensive gas

"Coal will produce expensive gas. If current inflation rates continue and construction and projected operating costs keep going up at today's rates, coal gas could come out to \$4 per thousand cubic feet, maybe a little higher. It will be rolled in with cheaper natural gas before getting to the consumer, of course, so the impact will be softened. Even so, \$4 gas probably won't look nearly as expensive in 1981 (when the plant was scheduled to start up) as it did in 1974. Moreover, the start-up price of the gas will not increase and, in fact, will probably come down over a 20 or 30 year period."

Will it go?

"Will the coal gasification project go? The honest answer has to be 'maybe." But it is a very hopeful maybe."
A shaky start for gasification

Chapter 3





Congress worked on legislation in the mid-1970s that would have helped to get the synthetic fuels program off the ground. However, the legislation failed to pass the U.S. House.



Gov. Arthur Link and other state leaders were concerned about the impacts from stripmining lignite and massive energy development in the 1970s. Those concerns were underscored in a 1975 book, "One Time Harvest," written by journalist-activist Mike Jacobs. On the national front, a bill was introduced in Congress in 1975 that would have helped. It would provide federal loan guarantees to finance pioneering synthetic natural gas projects like the one proposed in North Dakota. It passed handily in the Senate, but the House defeated the bill by nearly a 2-to-1 vote.

Because of the financing problems and the expected socioeconomic impact locally, Art Seder, ANG Coal Gasification Company president, announced that its proposed project in North Dakota would be scaled down. The plant would be built instead in two identical phases. The first phase, producing 125 million standard cubic feet per day, would cost \$600 million, Seder said. And so the price tag for a full-size plant had escalated to \$1 billion.

Shortly, a second House measure to provide financial guarantees for synthetic fuels projects failed by a single vote after passing the Senate. Opposition came from conservationists as well as fiscal conservatives.

In North Dakota, concern over massive coal development was rising. Some people feared what Gov. Link called a "one-time harvest." They were concerned that strip-mining and energy development would forever change the land and leave it unsuitable for agricultural use.

Those doubts about energy development prompted journalist-activist Mike Jacobs to publish a book titled "One Time Harvest" in 1975. The following year both gubernatorial candidates campaigned on energy issues, including:

- That the mined land must be fully reclaimed;
- That air and water must not be degraded by coal conversion plants;
- That affected landowners must be justly compensated;
- That North Dakota's energy needs must come first; and
- That North Dakota must not be exploited.

At the local level, the financial uncertainty facing coal gasification affected the plant-siting process. The Mercer County Commission initially refused to grant a zoning change for 1,500 acres for the proposed plant site. Commissioners took the view that ANG must show that the synfuels plant is financially viable.

Sas p(

Some Mercer County residents became wary of big development. A petition drive to protest the plant's siting was signed by 1,500 county residents, about a third of the county's voters. The Mercer County Landowners Organization was formed to oppose not only the ANG plant, but, as the association indicated, the whole idea of "big industry bringing pipelines, railroads and power lines into the area."

ANG, the successor to Michigan-Wisconsin, had been purchasing the land for the site, and opposition tended to drive the land prices higher. In one case, a man who had 20 acres adjacent to the site objected to the project and reportedly received \$200,000 for his parcel, much higher than the average county value. Another traded his 320 acres for a 1,000-acre farm elsewhere in the state.

In early 1977, the Mercer County Commission finally approved a permit for the project, though making it subject to 21 conditions earlier attached by the county planning commission.

However, the question over land use persisted among state leaders. The site needed approval from the North Dakota Public Service Commission (PSC). Some farmers and environmentalists contended the gasification plant couldn't be located at the proposed site northwest of Beulah because a PSC rule forbid placing coal conversion facilities on land deemed "prime farmland." ANG argued that the proposed plant site had not produced the high crop yields required to qualify as prime farmland.

It looked like yet another roadblock. However, in November 1977, the issue was finally resolved. PSC members approved the site based on the fact that the site was purchased in 1975, a few months before the PSC rule went into effect.

The Mercer County Commission took some time before allowing the rezoning of 1,500 acres and a conditional use permit (shown below) for ANG's gasification project northwest of Beulah. That removed a major hurdle for ANG to move ahead on the project.

Following its regular meeting on June 172, 1976, the Mercer Coun ning Commission makes the following recommendations to the Board ty Commissioners:

1) That ANG's request for the rezoning of 1575.2 acres in T145N, A-1 to Industrial be granted.

All that part of Township one hundred forty-five north (Range eighty-eight west (R. 88 W.) of the fifth principal men (5th P.M.), Mercer County; North Dakota, described as follows The southwest quarter (SW%) of Section thirteen (13);

The southeast quarter (SE%) of Section fourteen (14);

All of Section twenty-five (25);

and All of Section twenty-four (24) except the following tract:

beginning at the southeast corner of said section twenty thence bearing N. 89°-52'-30" W. along the south line of section twenty-four (24) a distance of 793 feet; thence N. 0°-04" W. parallel to the east line of said section t four (24) a distance of 503 feet; thence bearing S. 89°-

ANG Coal Gasificati pany, hereinafter referred proposed gasification plant in (2) separate phases with an determinant period betw The initial condiuse permit shall apply only phases. production capacity of 125 cubic feet per average lirst the second pha require an additional co use permit. The conditi permit shall be granted unassignable except at by the Mercer Count Commission. 2) ANG shall emp

2) ANG shualion soil conservation reduce runoff and r reduce runoff at the

ANG Permit Controversy Ra

andowners Oppose Basin

ommission Change Asked

More Gas Plant Hearings Remai

A group called the Mercer County Landowners Organization formed to oppose ANG's plans. Members appeared at county meetings (above) to express their opinions and question ANG officials. On the national scene, another energy crisis brought on by the Middle East oil cartel renewed interest in projects like the coal gasification plant.

(News stories courtesy of Beulah Beacon)

payments to make to which of the many school districts. The said "We diske to see the money paid through taxes, we don't wish to art as the any emproprise to be

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Zoning Board Meets

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Taking on partners

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In the late 1970s, the United States faced another in the series of energy crises as OPEC forced oil prices up by cutting back on production. Once again, America saw lines forming at the gasoline stations. In the first summer weekend of 1979, more than half the nation's service stations were closed.

President Carter appeared on nationwide television to tell Americans that the latest energy crisis driven by the Middle Eastern oil cartel represented "the

moral equivalent of war." The goal of U.S. energy independence was renewed.

In Congress, a federal loan guarantee bill for the gasification project finally passed, but the bill was too weak to be effective. At that

> point, the new U.S. Department of Energy (DOE), a centerpiece of the Carter administration formed to coordinate national energy policy, urged ANG to develop another financing plan. Concerned about the inability of synthetic fuels projects to obtain

> > financing, DOE called a meeting of more than 30 of the nation's largest natural gas companies. DOE recommended forming a consortium of companies. This would allow DOE to support financing that was backstopped by a large number of rate-paying customers.

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With more companies brought in as sponsors, the plan also was to ask the Federal Energy Regulatory Commission (FERC) to issue a ruling that would allow the sponsors to recover their investment through a rate surcharge if the plant failed.

Sponsored by a consortium, the plant now would become a commercial-scale demonstration project with each partner taking small amounts of SNG from the plant. Based on this new plan, the Beulah plant would be considered a groundbreaker that, if successful, would make financing from within the industry easier.

In mid-1978, the formation of a new group – called the Great Plains Gasification Associates (GPGA) – was announced involving subsidiaries of the following companies:

- ANR;
- Peoples Gas Company, Chicago (later Natural Gas Pipeline Company of America);
- Columbia Gas Transmission System, Wilmington, DE (replaced within a few years by Pacific Lighting Corp. of Los Angeles);
- Tennessee Gas Pipeline Company (a subsidiary of Tenneco Inc.), Houston; and
- Transcontinental Pipe Line Corp., Houston.

Initially, each company was to own 20 percent of the plant and receive 20 percent of the SNG from the project.

The consortium approach was an attempt to break through the financing barriers that had postponed the advent of high-Btu commercial coal gasification in America. GPGA sought approval of a tariff provision from FERC, assuring potential lenders that all debt would be recovered in the unlikely event that the plant was not completed or abandoned.

With this approach, ANR said the project had become more than a corporate effort. "Now it is more in the nature of a national effort to introduce a new form of clean energy," Seder told a reporter. "Gasification, we feel, is the most economic and environmentally sound way to use the nation's

coal resources."



President Jimmy Carter waits to tell a nationwide TV audience in 1979 that the latest energy crisis created by OPEC was the "moral equivalent of war." Carter went on to outline steps to make America more energy independent.

(Photo courtesy of Jimmy Carter Library)



Great Plains Gasification Associates (GPGA) had been formed to transform the idea of a coal gasification plant into reality in North Dakota.

In 1980, energy experts predicted that by the year 2000 synthetic gas from coal could do many things, namely, saving the United States at least 500,000 barrels of oil a day, heating more than 10 million homes and providing an environmentally sound way to use America's vast coal reserves.

Ironically, the need for this new gas-from-coal was already being questioned because of major discoveries of natural gas elsewhere. As a result, natural gas prices were beginning to collapse, producing what became known as the natural gas bubble.

Still, GPGA kept moving ahead with its plan in North Dakota. The consortium of five interstate pipeline companies planned to come up with 25 percent of the project's financing while getting the remaining 75 percent from traditional lenders. GPGA sought to have those loans guaranteed by the federal Department of Energy (DOE).



(Photos opposite page) These were among the first stages of getting ready to build the Great Plains coal gasification project northwest of Beulah. Looking southeast, these 1979 photos show the coal dump site for the Freedom Mine as well as the raw water pond for the adjacent Antelope Valley Station.

(Top) Construction workers at the coal gasification site begin steel work. The main pipe rack starts taking shape with the installation of two large cooling water lines.

(Background) By November 1981, progress is being made on the massive foundation for the live coal storage building. Round-the-clock loads of concrete often were needed for this and other huge facilities at the gasification project.



Part of the puzzle was filled in late 1979 when the Federal Energy Regulatory Commission (FERC) approved the sale of synthetic natural gas (SNG) that would be produced from the project in North Dakota. This action allowed the consortium to impose a surcharge on their customers during the four years the plant is under construction. FERC, however, reduced the companies' initial rate of return from 15 percent to 13 percent. It also issued an order authorizing the construction of the plant. President Jimmy Carter then delivered a conditional letter of commitment from the DOE to award a loan guarantee of \$240 million, enough for a year of construction for the Great Plains project.

ANR chairman Art Seder (right) speaks during a ceremony in Washington, D.C., on July 18, 1980. At the ceremony, President Jimmy Carter (second from right) delivered a conditional letter of commitment for a \$240 million loan guarantee to finally get the gasification project construction under way. Also attending the ceremony were (from left) North Dakota Gov. Arthur Link and Sen. Quentin Burdick.

(Photo courtesy of ND State Historical Society)

But officials from ANR, the project manager for the consortium, had mixed feelings. They said the lower rate of return was a serious concern but then allowed it was in the "national interest" to move ahead with the project.

It was time to let the country know about this unique project. In July 1980, a nationwide announcement was made that work on America's first commercial-scale coal gasification plant was beginning. A two-page *Newsweek* ad said the billion-dollar plant would convert lignite into 125 million cubic feet of natural gas per day, enough to heat a quarter-million homes annually. "In demonstrating the feasibility of large-scale coal gasification in the U.S., the plant will provide a stream of valuable economic, environmental and technical data for future projects of its kind." With natural gas to begin flowing in 1984, the ad noted, a second phase to the plant could double production to 250,000 million cubic feet. That would be the equivalent of 40,000 barrels of fuel oil, which helps to decrease "our nation's dangerous dependence on foreign oil."

A groundbreaking ceremony was planned for August 1980 with President Carter at the top of the guest list. Invitations were to carry the new number "1" logo in patriotic red, white and blue. The logo emphasized that this was to be the first such project in the nation and part of the move toward American

The natural gas bubble

The nation was experiencing a shortage of natural gas in the 1970s. It was an artificial shortage, experts say, based on high inflation and federal efforts to deregulate natural gas, all exacerbated by extremely harsh winter weather in the late 1970s.

Natural gas supplies actually were becoming short by 1970, though not as a result of less reserves in the ground. Producers found they couldn't make money under federal regulations so they were no longer exploring, drilling and bringing new gas supplies to the market.

In response, Congress passed the Energy Act of 1978, which called for deregulation of natural gas by 1985. Under its provisions, higher wellhead prices renewed exploration and drilling for new supplies.

What followed – the collapse of the natural gas market and the beginning of the so-called natural gas "bubble" – no one had foreseen.

Higher inflation produced higher gas prices. Natural gas consumers balked. Large consumers began conserving and switching to other fuels. Suddenly, in the early 1980s, pipelines and distribution companies discovered they had too much gas on their hands. There wasn't enough of a market for them.

With the onset of the natural gas bubble, the markets collapsed, prices dropped and the economics underlying the nation's first coal gasification plant evaporated.



MILTON FRIEDMAN

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Projecting Energy Futures United States. Those policies sought to

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the "experts" are nearly unanimous in predicting that these developments are tem-porary: that the current glut will soon dis-appart and be replaced by renewed scarcity; that the price of oil, even after adjustment for inflation, will climb stradily and aradu-

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Political rather than economic develop will be scarce. ments will determine which outcome is reto 1978; r alized. If political instability in the Persian by 22 per Culf is restricted to Iran, the real price demand a or oil will continue to decline. On the other cidedly hand, internal disturbances in Saudi Arafor the p bia. Iraq or any other major oil-producing country, comparable with the Iranian rev-

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NEWSWEEK/SEPTEMBER 15, 1980

(Right) By September 1980, the announcement went nationwide about building America's first commercial-scale coal gasification plant in North Dakota. This enthusiastic two-page ad in Newsweek was sponsored by the American Gas Association. (Top) However, in the same magazine, economist Milton Friedman noted that a glut of crude oil was bringing oil prices down, and he was predicting that prices would continue to decline for some time. His predictions countered other experts who saw oil prices climbing through the 1980s. Friedman's forecast did not bode well for ANR and the other sponsors of the gasification project, who were counting on continued high oil prices to give them a profit.

(Reprinted with permission from Newsweek and AGA)

Exercising the Gas Option

pdate: e-scale coa ication beg in North Dakota

The new coal conversion facility will gasify 14,000 tons per day of local lignite coal to produce approximately 125 million cubic feet per day of natural gas.

GASIFIERS The first phase will produce enough natural gas to COAL TRUCK GAS LIQUOR DUMP 1984. After the completion of Phase I, the planned SEPARATION Phase II could double the facility's capacity to the energy equivalent of 250 million cubic feet of natu-OXYGEN PLANT

METHANATION

MAINTENANCE & WAREHOUSE

heat a quarter of a million homes annually by

ral gas per day-enough to heat a half million

BOILERS

STRETFORD PLANT

AGAAssoc ©1980

WATER

TREATMENT

homes annually.

RAW WATER

PONDS

ADMINISTRATION BUILDING



Great Plains project is near Beulah, North Dakota, as shown above. The venture is America's first large-scale synthetic fuels project.

A new era in energy began on July 28, 1980, with the announcement of our nation's first commercial-scale coal gasification project in Mercer County, North Dakota. The \$1.4 billion plant will process local lignite coal into approximately 125

million cubic feet of clean gas energy every day—enough to heat a quarter of a million homes annually. Converting coal into methane gas is the cleanest, most efficient and economical way to use our nation's vast coal reserves. And after years of testing, develop-

RECTISOL

PHENOLSOLVAN &

NH₃ RECOVERY

GAS LIQUOR SURGE TANKS

SHIFT

QII

ment and evaluation, this process is ready for commercialization. Synfuel is becoming a reality.

COAL STORAGE

COOLING

TOWERS

CHEMICALS & BY-PRODUCT STORAGE

FLARE STACK

HOLDING

PONDS

More Clean Energy for the Future The project's administrator and plant operator, American Natural Resources Company, will share the gas produced with four other companies: Peoples Energy Corp., Columbia Gas System, Inc., Tenneco, Inc., and Transco Companies, Inc. The significance of the Great Plains project goes beyond processing 14,000 tons of coal into approximately 125 million cubic feet of gas every day. In demonstrating the feasibility of large-scale coal gasification in the U.S., the plant will provide a stream of valuable economic, environmental, and technical data for future projects of its kind.

This information is essential to the creation of an entire new industry based on the utilization of America's vast coal resources, the world's largest in terms of currently recoverable reserves.

Coal for the Great Plains project will come

from four adjacent mining areas. Only 500 acres per year will be disturbed, and reclamation will be continuous.

Gas is scheduled to begin flowing in 1984. After that, the addition of a second phase could double the plant's capacity to the energy equivalent of fact non dou

250 million cubic feet per day.

Coal Gasification Helps Lessen Energy Dependence

250 million cubic feet of clean methane gas energy produced every day will be comparable in heating value to approximately 40,000 barrels of fuel oil—part of an increasing contribution gas can make to decrease our nation's dangerous dependence on foreign oil. And using gas instead of imported oil helps our nation's critical balance of payments problem.

> Part of the Solution New technologies like coal gasification will solve only part of America's energy problems. But they can make an important contribution nevertheless. Unconventional sources of gas, which additional expanded research can help make available, are potentially huge—and in some cases are virtually inexhaustible. When you consider the economic, environ-

mental, and efficiency advantages of gas, it becomes an energy option that makes increasing sense.

Gas: The future belongs to the efficient.

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(continued from page 31)

energy independence. But, with all the uncertainties, the groundbreaking was canceled. Construction began without any of that grand hoopla.

In the first year, GPGA spent \$9 million toward site preparation for Great Plains. With work under way, DOE came through with conditional approval of a \$1.5-billion loan guarantee for the project. However, that approval was contingent upon meeting environmental requirements and obtaining full funding through private sources or the newly formed Synthetic Fuels Corporation (SFC). SFC was a quasi-governmental corporation organized by the Carter Administration to underwrite loan and price guarantees for projects developing substitutes for oil and gas.

DOE also required that the project get a final order from FERC providing for

The evolution of a distinctive logo

The distinctive logo for the Great Plains Synfuels Plant can be traced back to American Natural Resources (ANR) of Detroit.

Deceptively simple in appearance, the logo represents a synthesis of ideas from sources inside and outside the company, as reported in American Natural's Venture magazine in 1980.

The idea began with a public affairs executive for American Natural who was considering what kind of sign should be set up at the site of the Great Plains project near Beulah, ND. "Everything looked rosy at that time," ANR vice president Jerry Kabel told Venture. "We had an order from FERC (Federal Energy Regulatory Commission) authorizing construction, and I was thinking about a sign."

At about that time, a construction contractor contacted him about something to put on workers' hardhats. The contractor had enclosed a rough sketch of a sign to be put up at the site.

Contacting a graphic artist at the company magazine, Kabel said

ANR designed a logo for the gasification project that included a boot (below). The boot design originally was to be used on invitations for the groundbreaking ceremony attended by President Carter. However, because of uncertainties, the ceremony never took place. Designers for the Detroit-based ANR worked on a logo (opposite page) that would be both patriotic and evoke pride in North Dakotans about the new energy plant.



he wanted a logo that "would evoke pride among workers, bring into play the national significance and identify everything with the name 'Great Plains'." Said Kabel: "I wanted to put across that this project was a kind of cutting edge."

The graphic artist said his biggest problem was the amount of information that was to be included in a single logo. He started out using earthen colors – yellows and browns – to show that the project was associated with the ground.

Even in the first drawings, the number "1" was prominent, reflecting the idea that the project was a first. The graphic artist managed to put all of the words into a "1", and Kabel said it resembled a sign used by a Detroit bank.

With project delays in early 1980, there was no pressure to produce a logo. During this time, Kabel, who had been a U.S. senator's press secretary, was going through a drawer full of political memorabilia when he noticed an old campaign button. He realized that the letters "U.S." could be eliminated by including a flag, which led quickly to a number "1" with a red, white and blue theme.

Talking with others led the group to the notion that the second stage of the Great Plains project might produce liquid fuels as well as natural gas. "This prompted them to change the rather unwieldy word 'gasification' to 'synfuels'," the magazine reported. Then came the idea for a waving flag design and others – and the new logo was born.

"The purpose of the Great Plains project is to make gas for consumers and to eventually increase earnings for the companies involved," Kabel told the magazine. "We could probably achieve both of these goals without a logo, but the logo will contribute to the morale of the people working on Great Plains. And, we hope it will help evoke pride in people from North Dakota for the plant."











the pass-through of the cost of SNG, which was projected to be higher than other natural gas on the market.

But consumer opposition to the FERC's order appeared almost as quickly as construction began in North Dakota. The states of Ohio, Michigan and New York as well as General Motors Corporation appealed, seeking price protection from the projected higher cost of natural gas produced at the gasification plant still under construction. A federal appeals court

subsequently threw out the FERC order, saying it had exceeded its authority in approving the financing plan.

In the next six months, the consortium worked on agreements with those opposing the FERC order. The agreement provided for putting various price caps into the purchase agreements, thereby keeping the pipeline companies from paying more for SNG than the more expensive alternatives available in the market.

Finally, with at least two consumer groups no longer opposed, FERC approved the settlement in Order No. 119, a huge regulatory step toward the project becoming a reality. It would allow the four pipeline companies purchasing the SNG from Great Plains to pass on the cost to their customers, a practice called "rolled-in pricing."

Based on meeting the requirement for a federal loan guarantee, ANR announced it would schedule more than \$150 million of work by the end of

1981.

However, that plan got hung up, too. The country now had a new, fiscally conservative president in Ronald Reagan. This new Administration vowed to get "government off people's backs" and thus wasn't enthusiastic about providing governmental support for projects of this kind. However, there was disagreement within the Administration. DOE Secretary James Edwards favored providing the guarantee; SFC chairman Ed Noble opposed it.

As a result, GPGA members were getting nervous. ANR chairman Arthur Seder threatened to terminate the gasification project. But, after two months, President Reagan ended the deadlock by approving a conditional loan guarantee for up to \$2 billion for construction.



Disagreements arose over supporting the gasification project in President Ronald Reagan's Administration, which took office in January 1981. With ANR threatening to abandon the project, Reagan finally approved a conditional loan guarantee.

(Photo courtesy of <u>Ronald Reagan Library)</u>







With the Great Plains coal gasification plant on track in 1981, the Bismarck Tribune carried an interview with Arthur Seder, former general counsel and then president and chief executive officer of American Natural Resources Company (ANR). These summaries and excerpts from the story provide insights to the development of the project. ANR and its partners later abandoned the project because of financial difficulties.

Seder's role in developing the project. The story suggested that Seder could be known as "Mr. Great Plains" for his familiarity and work, including trips to North Dakota and to Washington, D.C., to work with leaders as well as convincing his own board of directors to stay with the project. Seder credited Noel Mermer with the idea for the project and called him the 'sparkplug' for the plant. He also gave political leaders in North Dakota considerable credit for getting federal support. "If there's anything I contributed, it's a feeling that we've got to continue with this commitment," he said. (Photo courtesy of **Bismarck Tribune**)

Coal gasification: Spell it S-e-d-e-r

ANR's interests. The gas the company stands to receive from the project represents just a fraction of the supplies of American Natural, one of the country's 10 largest natural gas companies. What difference then does the project make? "When we first went into it, we thought ANR would be the sole sponsor of a full-sized plant. Now (with three other

partners), we're getting 30 percent of half of a plant (the original plans were cut in half). There was a change from looking at it as a gas supply for our company to looking at it as a prototypical plant for our company and our industry," he said.

What will the plant prove? "It will have demonstrated what it costs, what it produces, environmental consequences, socioeconomic consequences, problems arising during construction. Particularly important, and often overlooked, is the operators and operating techniques," he told the Tribune. He also hoped the successful operation would be helpful in convincing lenders for future projects.

A first for the industry. Seder said it will mean a lot for him and the company to be the first in the synthetic natural gas industry. "This will really be a goldfish bowl. It's both good and bad. You have a chance to do something meaningful. But you're also the one who hits the barbed wire first."



With the last hurdle cleared toward completing the plant, the relief was almost visible in the air in North Dakota and at GPGA. ANR announced that full-scale construction would begin in August 1981. Confided Seder: "We were literally hanging on by our fingernails."

ANR officials acknowledged that the Beulah plant would hardly make a dent in America's energy imports but maintained its existence would send a message to the Mid-East oil cartel that the technology could be used more extensively. In fact, said ANR officials, North Dakota could easily be home to 22 such plants.

The largest construction project in North America

Over the next year, the gasification site – the largest construction project in North America at the time – swarmed with activity. With a mix of laborers and equipment on the move, it looked like a giant beehive. Specialized craftsmen numbered in the thousands, from boilermakers, ironworkers and pipefitters to welders, electricians and carpenters. All went about their business amidst a mass of scaffolding, pipes, crushers, cranes, trailers, fences, tanks, forklifts, trucks and the ever-present three-wheelers. Recalled one ANG employee: Huge crawler cranes were used to construct the large tanks and vessels used in the gasification plant's processing phase.



"The organization was amazing. People moved around like ants at a barbeque."

Many construction workers were fearless. They worked high in skeleton buildings and structures, even during driving rain, bitter cold or falling snow. "Many could have performed well in a circus as they walked planks with the confidence of monkeys swinging through the jungle," said another ANG employee.

With all of this activity, slowly the steel sprouting from the oftenmuddy prairies of North Dakota was being transformed into the nation's first coal gasification facility.

At the same time, Basin Electric's Antelope Valley Station (AVS) was rising just a stone's throw from the gasification project. For both facilities, a critical element was Basin's construction of the joint water intake on Lake Sakakawea. To provide the tunnel for piping water, a mechanical drilling mole bored a 3,000-foot tunnel that was 180 feet below the lake's floor, connecting the offshore inlet shaft with the pumphouse shaft on shore. Digging the seven-foot diameter tunnel took about a year, finishing in late 1981. Water for both the gasification plant and adjacent electric generating plant would be delivered through a nine-mile pipeline from the intake structure to storage ponds on the AVS plant site.

(continued on page 45)



(Photo opposite page) Workers move up and down the special temporary stairs built as the gasification building was being constructed. (Illustration left and photos above) These graphics show how a drilling mole bored a concrete-lined tunnel about a half-mile long under Lake Sakakawea that would provide water for the gasification project and the Antelope Valley Station nearly 10 miles south of the lake. Also shown are the drilling platform on the lake and the completed pumphouse on the shore.



Great Plains' memoir: 109 degrees below zero

(The winter of 1981-82 in North Dakota was bone chilling and record setting, but construction on the coal gasification facility continued as noted in a story from ANR's Venture 1982 magazine. Following are excerpts from that story.)

The added expense of winter work is due partly to the technical problems that must be overcome. For example, you can't let fresh concrete freeze, explains Bob Schaffer, Great Plains superintendent of civil engineering. The concrete is mixed using hot water and trucked quickly to the construction site. There, carpenters have erected a temporary woodframe shelter covered with translucent plastic around the forms where the concrete is poured. It is ironic that these temporary buildings in the first big plant that will someday turn coal into gas are being warmed with propane heaters. The concrete has to be kept above 50 degrees for three days and then gradually exposed to the ambient temperature, says Schaffer.

Working in cold is nothing new to Kaiser Engineers, the contractor erecting buildings and preparing the plant site at Great Plains. And for the past decade, construction workers in North Dakota have worked during winters to build power plants. "It is considerably more expensive to work in the winter so it's logical to ask why we didn't just shut the job down when it got cold," says John Morris, manager of construction for Great Plains. "We have a big investment in supervisory personnel, equipment, materials and tools. It would cost even more to shut down. And we also have a schedule to maintain to finish the plant by December 1984."

> Last winter was one North Dakotans will be telling their grandchildren about, maybe their great-grandchildren. Several weather records fell, but what everybody remembers is that the wind chill factor hit 109 degrees below zero. Fifty below was common, hardly worth mentioning. Yet the Great Plains job went on and this summer's progress wouldn't be possible without the determination of the builders last winter.

Erecting structural steel is a tricky job, says Morris gesturing toward a steelworker perched on a girder 50 feet above the ground. "It's a matter of what an individual can stand outside. He decides if it's too windy and cold to work." Perhaps the most encouraging aspect of the winter program has been the response of the work force. Jack Carter, director of personnel for Kaiser, says it is normal for workers productivity to drop along with the temperature during the winter, and that's one reason winter work is more expensive. "If you keep absenteeism down to six or eight percent in the winter, that's considered normal," says Carter. "We saw about four or five percent in very severe weather."

This was not a moderate winter. Things were pretty mixed up with North Dakota weather this year, says Al Wheeler, a forecaster with the National Weather Service in Bismarck. He says the state had 48 straight days of below-zero temperature, the longest consecutive stretch of cold since the weather service began keeping records in North Dakota before the turn of the century. There were 25 inches of snow in January and the average temperature was four degrees below zero. Normally only seven-and-a-half inches of snow will fall in the peak snowfall month of March and the temperature in past years in January has averaged eight degrees.

Ed Ziegler and Bob Harris, two carpenters who worked all winter on Great Plains, are typical. Between them, by the end of February, they had missed three days. On one of those days, Ziegler was having dental work done and had arranged in advance to be off. They both missed the same day in January when a blizzard kept them from getting to work. But it wasn't for lack of trying. "We started out for Beulah," says Ziegler who drives 90 miles to work each day with some other workers from the Minot area. "But we couldn't see the road at all. We had to stop."



(continued from page 42)

Another critical element for the gasification plant was installing the 14 gasifier vessels. They were huge, each 40 feet high, 14 feet in diameter and weighing 170 tons. Seven were made in Japan and shipped to Duluth, MN, where they were railed to the plant site. The other seven were fabricated by Chicago Bridge & Iron in Memphis, TN. Though they required special handling, the giant gasifiers were installed without a major hitch.

Mornings and shift changes made for traffic congestion of the worst kind at the construction site. "It was like spaghetti pouring out of the gates," recalled a former Kaiser supervisor,

about the shift-ending traffic. Several long lines of pickup trucks and cars headed away from the plant site, all on a two-lane highway. Amazingly, few accidents were reported. In fact, construction of Great Plains resulted in just two on-the-job fatalities.

Impact from a boom

In North Dakota, the state and county governments and surrounding communities cooperated to make the synfuels plant and other energy projects possible. They spent millions of tax dollars and issued hundreds of thousands of dollars in bonds to finance the sewer, water, and street extensions and expansion of schools, hospital services and highways.

At one time, construction was going on concurrently on three energy facilities – two electric generating stations and the Great Plains plant – within eyesight of each other in the Mercer County area.

For Great Plains, the work force peaked at about 5,800 in 1983, which was more than the combined population of the towns in Mercer County before the energy boom. In those boom years, the county's population more than doubled – rising from about 6,100 in 1970 to just over 14,000 in 1983. The number of jobs quadrupled. The number of local businesses tripled.

The communities faced a multitude of problems, trying to accommodate the influx of transient construction workers as well as a growing number of permanent employees.

A special truck carries one of the 170-ton gasifiers from a train to the plant site for installing in 1982. Seven of the 14 gasifiers were built in Japan and were shipped to Duluth, MN, where they were railed to the construction site. The other seven, built in Memphis, TN, were loaded on heavy-duty flatcars and transported by train on a sixday ride to the project. The impact could have been devastating had it not been for much planning and coordination by local communities, Mercer County, the state of North Dakota, ANG, Basin Electric and others. The state provided loans and grants amounting to \$37 million worth in 1975-84 for reducing the impact from such large-scale development.

A task force called the Interindustry Technical Assistance Team, or ITAT, produced reports on statistics, projections and other information regarding



housing, work force characteristics, grants, loans and other data.

Because of the housing shortage, Basin Electric joined with those building another electric generating plant to develop a large housing complex known as the Bachelors Quarters. The 35-acre complex featured hotel-like rooms, a dining hall, recreation facilities and a recreational vehicle park. In the peak construction period, about 1,200 workers stayed at the complex, which was purchased by ANG for its work force.

Family life for construction workers like those at the coal gasification site was tough, if it existed at all. Workers traveling to North Dakota alone often left families in Minnesota, Wisconsin or other areas. After their work shift, they suffered from separation, isolation and loneliness. Some were able to find something close to family life by renting a room in a local household. The daily routine often was work, relaxing with other solitary workers in the bars and dining hall and then sleeping in hotel rooms or the Bachelors Quarters.

Many of the construction workers were fathers and husbands who sent money back to support their families located in other parts of the country. However, the distances often left them cut off from their families.

With so much time and extra money from overtime, construction workers often spent much of their time in local bars. Like other large construction jobs, gambling also was a pastime. At one point, the local sheriff announced a crackdown on payday lotteries in which the winners picked up \$30,000 or more. This is the work force housing complex, also known as the Bachelors Quarters or "man camp," where thousands of construction workers lived. This housing in north Beulah featured single bed rooms and three meals a day. Other workers lived in campers, tents and pickup trucks.



North Dakota Gov. Allen Olson (left) and Sen. Mark Andrews (right) hosted DOE Secretary James Edwards on a tour of the gasification project during construction in 1982.

(Photo courtesy of Beulah Beacon)

Getting on line

By the end of 1983, the plant had been substantially completed, still on schedule and under budget. Construction started giving way to operation, and the permanent work force now had grown to 700.

In April 1984, a string of "firsts" began. The Great Plains plant started running the first of 14 gasifier vessels using steam, oxygen and coal to make raw gas. This medium-Btu gas, with more processing, would be made into pipeline-quality, high-Btu natural gas.

By May, the plant shipped the first byproduct. Twenty tons of anhydrous ammonia fertilizer went by truck to a grain farm near Berthold, ND. Anhydrous was the first of three byproducts to be marketed. Even then, carbon dioxide (CO2) was considered a priority byproduct, and two preliminary plans surfaced for piping CO2 from the Great Plains plant to oil fields in North Dakota.

Finally, on July 28, 1984, Great Plains drew nationwide media attention. Plant technician Linda Rader turned a valve that sent the first high-Btu natural gas made from lignite flowing from the nation's first commercial-scale gasification plant into the interstate pipeline network. Detroit's energy dream had become a North Dakota reality. 🛃

st Gas Flowing To Markets Plains Operating Technician an rians operating rechnican hader opened a 20-inch ball July 28 which allowed SNG to out of the plant and into the interstate pipeline network for the first time. Since the line was ed, about 336 million standard et of gas have been sent to Utilities Distribution Dan rea Superintendent The achievement drew ational media attention and became across all regions of the country ell as North Dakota. The gas about 34 miles southwest hrough a 24-inch pipelin n with the Northern Border line is then transported into central lo and on to utilities in the Great Lake region, the central eastern and portions of the south. End users e fuel, which is corningled with include homes.

VOLUME 2, NUMBER 8

FOR EMPLOYEES OF GREAT

AUGUST, 1984

47



Former worker says building gasification project was unique



Gerald Zittleman on site during construction.

ith the Vietnam War heating up in 1964, Seattle native Gerald Zittleman had just gotten his draft notice from Uncle Sam.

Rather than taking his chances in the Army, Zittleman instead enlisted for four years in the U.S. Air Force. He had taken electronics in high school and had even worked on a project involving a space re-entry vehicle for Boeing in Seattle. So, when it came time to pick a military specialty, Zittleman opted for a year-long course in advanced electronics.

That choice eventually led him to working at the Great Plains coal gasification project in North Dakota, something he considers a once-in-a-lifetime experience. Zittleman was one of the many thousands of construction workers and supervisors who helped turn plans for the nation's first coal gasification project into reality.

Back in the 1960s, Zittleman's Air Force tour took him to Vietnam and Korea, and after his discharge in 1968 he returned to work in Seattle. But he was laid off and, facing massive unemployment in the area, he decided to move to North Dakota, the home state of his wife, Sharelle.





Settling in Mandan, he landed a job with a nationwide company as an electronics technician, a job he held until deciding to go back to college in 1979. After graduation, he worked for another local company in appliance repair and then started his own heating and air conditioning repair business.

But, with a poor economy, that lasted only about a year. The business closed and Zittleman faced months of unemployment and looking for jobs.

In late 1981, he heard that Kaiser Engineering was looking to hire electrical inspectors at the gasification project, some 75 miles north of Mandan. It didn't exactly fit his training, but, after hearing about his background, Kaiser decided to give him a try.

It worked out, and Zittleman spent the next three years wearing the green hardhat of a supervisor and inspecting the electrical innards of the gasification project. The job meant working up to 12 hours a day and sometimes seven days a week, often walking through mud and crawling over pipes.

For some in construction, gambling pools, drinking and using drugs provided a pastime. Not unusual because with overtime, workers were making \$60,000 to \$80,000 or more a year and living "high off the hog," says Zittleman.

Getting to the project site from Mandan meant car-pooling with four others in a 1970s-something Chevelle. "I think we put 200,000 miles on it or something," he says, chuckling, and drove it until it "gave up the ghost."

Actually, the driving often was as much a challenge as the work. Going to and leaving work was not unlike driving in a road race.





The line of traffic often was side-by-side on the two-lane highway. "If there was anybody coming the other way, they wouldn't survive," he says.

Zittleman admits he knew little about the gasification process and technology. But he says he is still amazed how the huge project could be engineered and then have it all fit together with little or no change. "All in all, it was a neat project to work on. It was really interesting."

Now in his mid-50s, Zittleman and his wife have three grown children. He works as an operating engineer and refrigeration specialist at a Bismarck hospital, but he has some perspective about those construction days. He knows he was part of something unique, working on a one-of-a-kind plant, a gigantic construction project that today is still producing energy for this country and byproducts used around the world.

He says he hasn't been back to the Synfuels Plant since he left when construction ended in 1984. "Someday," he says, "I'd like to go back up there for a tour, just to see how much things have changed."



Gerald Zittleman and his wife, Sharelle, at their home in Mandan, ND.



Construction in 1983

Chapter 5 Great pains for Great Plains

A n energy goal stretching back nearly 12 years was achieved in 1984. Great Plains Gasification Associates (GPGA) built a plant in North Dakota that began gasifying lignite commercially on July 28, 1984.

GPGA declared the gasification plant an "operational reality," pointing out to North Dakotans that construction had been completed and the plant had begun operating.

"We have succeeded in building and putting into operation this \$2 billion facility on time and slightly under budget," reported GPGA, in large multi-colored inserts in 10 North Dakota newspapers. "The syngas produced at Great Plains – which is indistinguishable from natural gas – begins its journey to major markets through a 24-inch diameter pipeline running 32 miles south-southwest from the plant site to a junction with the Northern Border pipeline near Glen Ullin," the company reported. "There the SNG mixes with large volumes of natural gas carried in the Northern Border line and pumped southeast into north-central Iowa.

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(Photo opposite page) The glow of lights at night made the newly opened Great Plains gasification project look tranquil in the mid-1980s. After years of uncertainty, the project finally was built and began processing lignite into synthetic natural gas through miles of winding pipes and dozens of giant vessels (top photo). But the pioneering project soon was to face turbulence once again.



With foreign oil again flowing readily into the United States, energy prices began falling, deflating American concern about recent energy shortages. But it also deflated the hopes of those supporting the gasification project. "There the gas is delivered to additional pipeline networks which in turn deliver and sell it to utility companies for use in homes, businesses and industry. Already, in states as far north as Michigan, as far east as Pennsylvania and New York and as far south as Texas, Great Plains SNG has been used to heat homes and dry clothes, fry eggs and brew coffee in restaurants and manufacture glass, steel, chemicals and pharmaceuticals in industrial operations. In return, North Dakotans get tractors, windows, prescription drugs and much more."

M.B. "Mike" Carmichael, who just had been elected GPGA president, wrote that another milestone was opening the corporate offices in Bismarck, "a clear reaffirmation of the commitment of the partners to the project and to North Dakota."

Carmichael pointed out that the newly operating gasification project had already become a "technical showpiece" for visitors and scientists from around the world. That has put North Dakota and Great Plains "at the forefront in the development of alternative forms of energy," Carmichael enthusiastically reported.

GPGA credited North Dakotans for being patient and North Dakota leaders and the state's Congressional delegation for being supportive.

But the news in GPGA's extensive and expensive announcement wasn't all good. It noted that with depressed energy prices, the project wasn't expected to be profitable until after 12 years of operation.

GPGA's financial outlook for the project reflected rather disheartening energy news worldwide. SNG hadn't even been flowing into the pipeline before energy prices began to fall. Lower oil and natural gas prices began casting a shadow on this ambitious, innovative energy project on the upper Great Plains.

For some time, foreign oil again had been flowing freely into the United States. Oil and natural gas prices were down. OPEC was no longer the international oil cartel it used to be. Americans had forgotten about energy shortages, about conserving, about high prices. Thoughts about earlier energy crises somehow had been erased from America's collective psyche.

At first, ANR and GPGA tried to make the best of the news on falling energy prices. ANR issued assurances that the falling prices wouldn't affect the coal gasification plant. But that wasn't reality. The deflated oil and natural gas



Yoal gasification involves dismantling the molecular structure of coal and reassembling the resulting hydrogen and carbon as methane.

The heart of the gasification plant is a building containing 14 gasifiers. The gasifiers are cylindrical pressure vessels standing 40 feet high with an inside diameter of 13 feet.

Each day more than 16,000 tons of lignite are fed into the top of the gasifiers. At the bottom of the coal beds, steam and oxygen are injected, causing an intense combustion at about 2,200 degrees Fahrenheit. Hot gases from that process break down the molecular bonds of coal and steam,

releasing compounds of carbon, hydrogen, sulfur, nitrogen and other substances to form a raw gas. This raw gas leaves the gasifiers, and ash is discharged from the bottom of the gasifiers.

The raw gas goes to the gas cooling area where the tar, oils, phenols, ammonia and water are condensed from the gas stream. These byproducts are sent on for purifying and transporting. Other byproducts are stored for later use, including as boiler fuel for steam generation.

The gas moves to a cleaning area where further impurities are taken out. Methanation, the next step, occurs by passing the cleaned gas over a nickel catalyst, causing carbon monoxide and most remaining carbon dioxide to react with free


John Herrington, DOE Secretary in the Reagan Administration, was instrumental in the decisions shaping the future of the gasification project in North Dakota.

(Photo courtesy of Bismarck Tribune)

markets drove down the SNG price below the formula contained in the gas purchase agreements between Great Plains and the four pipeline companies.

Under the agreement, the initial price for SNG was set at \$6.75 per dekatherm. (A dekatherm is equivalent to 1 million British thermal units or BTUs.) However, the contract set a cap so that the price of SNG could not go above the price of a competitive fuel, No. 2 fuel oil.

Expecting oil prices to increase, GPGA originally projected it would be able to charge between \$9 and \$10 per dekatherm, pricing that would lead to profits for the consortium. Instead, the price of No. 2 fuel oil had dropped since the agreements were put in place.

So, instead of a projected billion-dollar net income, GPGA now was forecasting an operating loss of \$1.3 billion for the first 10 or more years of the plant's operation.

Facing this \$2-billion-turnaround, GPGA asked for 10 years of price guarantees for SNG through the Synthetic Fuels Corporation (SFC). Without those guarantees, GPGA said, the risk of operating the project would be too great. Abandoning the project would become a real possibility.

Though at first deferring action, the SFC approved a preliminary price guarantee package of about \$790 million for the first 10 years of plant operation. But this good news was overshadowed by politics. Two SFC board members resigned, leaving less than a quorum to conduct business (see feature pp. 63-64).

GPGA decided to move ahead with the project anyway, despite not having a final contract approved by the SFC board for price guarantees.

Negotiations continued on the financial aid package, which finally became \$820 million in price supports over the first 10 years. In May 1985, the Reagan Administration scrapped that aid package. The SFC board refused to vote on the proposal after Department of Energy (DOE) Secretary John Herrington wrote that he wanted to make sure the project sponsors remain committed for more than two or three years of operation. However, the SFC board requested DOE to stretch out the repayment of the \$1.5 billion in construction loans.

DOE extended the in-service date for the Great Plains plant from the end of 1984 until July 1985 to accommodate the formation of a new financial aid package for GPGA. By mid-July, the SFC approved a tentative agreement in principle for \$720 million in price supports as well as a restructuring of the debt repayment through DOE.

Gasifiers named: Girls on south side, boys on north

The 14 gasifiers used to make synthetic natural gas from lignite represent the heart of the Great Plains plant. These huge Mark IV Lurgi gasifiers hang in the six-story gasifier building on the north side of the gasification complex.

Although the gasifiers appear identical as "40-foot midget submarines stood on end," each has its own name and personality, according to stories in company publications. During the planning and startup of the plant, the 14 gasifiers were simply identified

by letters and as part of either A or B gasification "train" or operational unit. Both the "A-train" and "B-train" had gasifiers with letters A through G. But plant personnel said it could be confusing for a field operator radioing a message to the control room about, for instance, the "B-train A gasifier." It would be easy to misidentify a gasifier.

So, over one weekend, a crew was asked to rename the gasifiers. They came up with a system of both male and female names, using people who were at the plant during startup or someone's spouse.

So, the "girls," located on the south side of the gasifier building, are the gasifiers built by Hitachi in Japan. Their names are Arnel, Bernice, Candy, Donna, Ethel, Freida and Gail.

The "boys" on the building's north side were made by Chicago Bridge and Iron Company in Memphis, TN. Their names: Albert, Bruce, Charlie, Dave, Ernie, Frank and George.

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Partners bail out, DOE steps in

N.D. officials pessimistic

By MATTHEW T. GOLDETEIN For The Tribune

ASHINGTON - North Dako top officials left a hostily of meeting Wednesday with elicials iera a hasting verting Wednesday with retary John Herringion and oot hopeful about the Great Plains Coal i Plant. ded with them to give time to react hid, with

time to react ... but, we aren't sure that they is any more time," Gav

Sinner said. ppears that (Herrington) in inted to shul down the "the governor said. r. along state Attorney I Nicholas Spacth, Sen. Nicholas Spaeth, Sen nicrews, R.N.D. Rep. rgan, D.N.D., and an add partile Burdlick, D.N.D., rringion to keep the plan to 60 days to give the tin Dud a sen is field a way to keep the

ng t was expected to in-today of his decision More on DOE, Page 14A)



Tocility. Mothball the plant, meaning it would be closed but maintained for future use. Sell the plant. Energy afficials say it could take up to 18 meants to conclude a sale.

private companies that buil trained the Great Plains Cua d away from the project today, lefaulted on a \$1.536 fullion federal oan and dumped the nation's first commercial-scale coal gasification

the Great Plains manage

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"We're not locking the Tom Haan, a Great Plain fication Associates spok said this afternoon. "We're o ing to put gas in the pipelin after hour certil account

five companies that built perated the Great Plains and operated the Great Platts plant notified the Energy Depart-ment of their decision to abander default on the DOE-in late this morning

(Syntuels Corp. Allied, Page 2A) The companies are Tenneco, American Natural Resources Co. ranses Energy Co., MidCon Corp. of Pacific Lighting Co.

UNDER THE terms of DOE's maranise agreement rs, the Energy Department ses ownership of the plant and many. American ng company. American is Co. Great Plains Gasi-sociates is part of ANG here announced their ler

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Mac---- WETTINE, Page HAI

(Top photo) The banner headline on Aug. 1, 1985, showed the result after the federal government didn't come through on an expected financial subsidy for the gasification project. With the news, North Dakota Gov. George Sinner (bottom photo) took immediate steps to help ensure the project would continue.

(News story courtesy of Bismarck Tribune) (Photo courtesy of State Historical Society of ND)



That package would have guaranteed GPGA a price of \$6.75 per dekatherm for SNG produced at the gasification project, compared to the market price at the time of about \$2 to \$3 per dekatherm.

But the budget-cutting Reagan Administration wouldn't accept the tentative deal. On July 30, 1985, DOE Secretary Herrington delivered the message that the package wouldn't provide assurance of long-term operation by the consortium partners. No more public monies would be used to subsidize the project, Herrington said, because Great Plains "is uneconomic for the taxpayers and its product will never be commercially viable."

The following day, a front-page headline in the Bismarck (ND) Tribune read: "Partners bail out, DOE steps in." Saying GPGA was disappointed with rejection of the financial aid package, consortium chairman Cliff Rackley said the partners had no choice but to turn the plant over to the Department of Energy, which had guaranteed the loan from the Federal Financing Bank.

It appeared that the nation's flagship coal gasification plant would be shut down just a year after it began commercial operation. As might be expected, the reaction from the state of North Dakota was swift. Gov. George Sinner immediately appointed a task force to work for the plant on the state's behalf as well as study alternative uses for the facility. The governor and the state's congressional delegation worked relentlessly to keep the pressure on the Reagan Administration to keep DOE from mothballing the plant.

Taking the save-the-plant effort to the Republican administration in Washington, D.C., was North Dakota's Sen. Mark Andrews, also a Republican. "We are going to win this battle and we are going to win on facts," Andrews vowed, addressing a rally of more than 1,000 state and community leaders, plant employees and others in Beulah on Aug. 7, 1985.

Within a few days, Andrews arranged a key meeting on the future of the gasification plant involving DOE Secretary Herrington, Gov. Sinner and other state leaders.

The political pressure worked.

Just after that meeting, Herrington issued an announcement saying the plant could remain open, at least temporarily. Expressing concern for plant employees as well as the surrounding communities, Herrington explained that the plant could remain open for several months, allowing for time to work out the future for the energy facility. DOE, however, specified certain conditions. They included that there be no additional cost to U.S. taxpayers, that a unified position is presented to ensure the pipeline contracts are enforced and that waivers of state environmental restrictions are continued. In the interim, DOE contracted with ANG to operate Great Plains.

It was good news. But the roller coaster was going down again for Great Plains.

Pipeline affiliates of three former GPGA partners filed suit against DOE, asking that the gas purchase contracts be declared invalid. They contended that they didn't have to pay DOE the previously set price for SNG from the plant because the government wouldn't guarantee the full 25-year operation as set out in the agreements.

Meanwhile, North Dakota kept rallying to keep the plant alive.

At one point, the state considered soliciting bids to work on alternative uses for the gasification plant. ANG officials felt the plant could be retooled to make other products besides natural gas, preferably jet fuel but also gasoline, anhydrous ammonia, olefins and methanol. A Department of Defense (DOD) study prompted by Sen. Andrews showed that Great Plains could be converted to making liquid jet fuel. The cost: about \$160 million.

(continued on page 65)



Sen. Mark Andrews of North Dakota, a Republican, served a key role in staving off the closure of the Great Plains project by the Reagan Administration in the mid-1980s. Experts predicted that imported oil could reach \$100 per barrel by the end of the 1980s, but prices peaked well below that shortly after the SFC was created.

Synthetic Fuels Corporation *Big ideas, but a short life*

The Synthetic Fuels Corporation (SFC) is a product of the administration of President Jimmy Carter. It was born in 1980 under the Energy Security Act as an answer to the energy crises America faced periodically when the Organization of Petroleum Exporting Countries (OPEC) decided to put a chokehold on oil going to the United States.

Those supporting the synfuels program felt a big effort was needed. They pushed for an \$88-billion program, mounting an offensive similar to the one that produced synthetic rubber when supplies of the natural product were cut off because of World War II.

Instead, SFC was created with a budget of \$19 billion as a quasigovernmental agency with 225 employees. Its goal was to provide financial incentives, such as loan guarantees and a guaranteed purchase price, to the private sector for creating and producing synthetic fuels. Reducing dependence on high-priced foreign oil would come by developing practical new ways to extract energy from the nation's abundant supplies of coal, tar sands and oil-rich shale.

It looked like a good way to answer OPEC's aberrant moves in the 1970s that drove oil prices heavenward. At the time, experts predicted that imported oil would reach anywhere from \$60 to \$100 per barrel by the end of the 1980s.

Initially the goal of the newly formed SFC was to produce the equivalent of 2 million 42-gallon barrels of crude per day by 1992, replacing about 50 percent of America's imports. In hindsight, this was a pretty grandiose plan. At its original design capacity, the Great Plains coal gasification project in North Dakota, the largest of four projects funded through SFC, produced the equivalent of 20,000 barrels of oil per day. Eventually *Great Plains was transferred from the SFC to the control of the Department of Energy.*

However, OPEC fell into disarray. Conservation measures worked. Oil peaked at about \$35 per barrel within two years of the SFC's creation. The U.S. synthetic fuels program lost its steam.

President Ronald Reagan came into office looking to cut back government, and the SFC looked like it was on the chopping block. Though at first wanting to abolish SFC, Reagan instead sacked its board members set up by Carter and put in people with more conservative views.

To make things worse, SFC had political and management problems. Its first president resigned under fire for allegedly charging \$25,000 in personal mortgage payments to the SFC. Another stepped down after it became known that a bank he'd headed had been investigated for securities violations, though no criminal violations resulted. Unrealistically high salaries were paid to corporation officials.

Efficiency and waste became synonymous with the SFC. Noted one Congressman: "These are the only guys in the world who make the Pentagon look streamlined."

Many still believed in the program. Compromising to keep the program alive, Congress cut the budget back to \$14 billion and reduced it again to \$8 billion in 1984.

With the picture of dropping energy prices and increasing SFC foibles, Congress grew more skeptical of the program. They questioned the wisdom of pouring millions of dollars into questionable projects. Finally, in December 1985, Congress cut off funding and effectively killed the program.

OIL PRICES AND THE SYNFUELS PROGRAM





Making coal-based jet fuel was one alternative considered when the Great Plains plant faced possible closure in the mid-1980s. Project supporters hoped options like this would make the energy plant attractive to potential investors.

(continued from page 62)

Andrews followed up by getting the Senate's Defense Appropriations Subcommittee to direct the DOD to purchase coal-based jet fuel and to allocate money for researching advanced military applications of coal-based fuels. Those proposals, Andrews reported, may help in attracting investors to take over and continue the operation of the Great Plains plant.

Meanwhile, Gov. Sinner had considered the idea for a state study on alternate plant uses but rejected it, saying that doing such a study would send a wrong signal to DOE at the wrong time about the plant's future. The state didn't want to make any allowances that the project would close.

North Dakota's economic interest in continued operation of the gasification plant was obvious, especially to the pipeline companies. So, it wasn't surprising that they tried to move their gas purchase contract case out of the federal court located in Bismarck. That didn't work, and a newly appointed federal district judge gave a quick decision on the case by mid-January 1986. Judge Patrick Conmy ruled, in effect, that the contracts were valid and that DOE had the right to foreclose on the mortgage of GPGA. The decision was appealed, but the 8th Circuit Court subsequently upheld Conmy's ruling.

By early 1987, DOE formally announced plans to eventually sell the plant. That quickly elicited interest by a number of organizations, including ANR, Amoco and the Three Affiliated Tribes of North Dakota. Just before the plant was auctioned, two former GPGA partners, ANR and Transco Energy, made a late offer to buy the plant. DOE rejected the bid, saying their bid offered little toward repaying the federally guaranteed construction loan of \$1.5 billion and didn't make a good commitment for long-term operation of the plant.

Meanwhile, the government formally acquired the plant and its assets at a sheriff's auction June 30, 1986, on the steps of the Mercer County Courthouse. DOE offered the lone bid of \$1 billion.

The stage was now set for a new ride in the roller-coaster life of this unique energy plant.

Trustee For The Department of Energy Under The Mortgage Dated January 15, 1982, With Great Plains Gasification Association

v. GREAT PLAINS

GASIFICATION ASSOCIATES, et al., Defendants.

NATURAL GAS PIPELINE COMPANY OF AMERICA,

Third Party Plaintiff,

FEDERAL FINANCING BANK, Third Party Defendant.

Plaintiffs,

AMENDED NOTICE OF SALE

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PROJECT ACQUISITION AGREE. MENT dated as of June 1, 1061 bet, as of March 28, 1965 between DOMI-ween ANG COAL GASEFICATION NIDN BRIGUETTES and COMPANY, ANR GASEFICATION CHEMICALS LTD. and GREAT COMPANY, ANR GASEFICATION COMPANY, INTEL AND CAMPANY, ARCS COAL GASEFICATION COMPANY, PGC PLAINS GASIFICATION ASSOCI-TENNECO SNG; INC., TRANSCO PRODUCT SALES AGREEMENT COAL GAS COMPANY and GREAT COAL GAS COMPANY and GREAT AGREEMENT dated as of January

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sold in historic moment

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J. Michael Farrell, general counsel for the federal Department of Energy, offers a statement to the media following the foreclosure sale of the Great Plains project in June 1986. The legal notice (left) and story about the historic sale (below) were big news in Mercer County and North Dakota.

(Photo courtesy of Hazen Star) (News story courtesy of Hazen Star and Beulah Beacon)

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Chapter 6 Dakota Gasification is born

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he Great Plains coal gasification plant had proven to be a technological marvel. By January 1987, the plant reached a milestone by producing the 100 billionth cubic foot of natural gas. It also had reduced its production costs.

But this flagship alternative energy plant had been abandoned by its owners. And the Department of Energy (DOE) had determined it wasn't appropriate for the federal government to compete with the private sector in the natural gas marketplace. So the federal government was looking to sell the nation's only commercial coal gasification project.

With the help of Shearson Lehman Brothers, a New York investment banking firm, the DOE was able by year's end to solicit interest in purchasing the plant from 15 companies: Amoco Corp., Chicago; Basin Electric Power Cooperative, Bismarck, ND; Beta Pipeline & Equipment, Midland, TX; Burlington Northern, Seattle; Carbontec Corp., Crosby, MN; CMS Energy, Jackson, MI; Coastal Corp., Houston; Complete Energy Petroleum, Baldwin, NY; FHN Energy, Xenia, OH; Industrial Engineering Services, Belmont, NY; International Investment Bankers, Washington, D.C.; Irving A. Backman, Boston; MAPCO, Tulsa; NACCO Industries, Cleveland; and Seagull Energy Corp., Houston.



The startup of the Great Plains coal gasification plant proved successful, and the complex energy plant began achieving milestones by 1987. Plant employees figured highly in that success including those monitoring the operation of the complex facility in the gasifier control room (main photo) as well as a chemical laboratory technician performing extraction work (top photo).



One of the potential purchasers had been doing considerable homework on the plant's potential ever since DOE appeared to be ready to close it in late 1985. Basin Electric, which operated the Antelope Valley Station adjacent to Great Plains, had more than a passing interest in keeping the project afloat. Basin calculated that closing the gasification plant could mean an increase of about \$37 million in costs annually to the cooperative. That, of course, would impact its member cooperatives that

Leaders of Basin Electric Power Cooperative were concerned about the impact on the cooperative's Antelope Valley Station (top photo) should Great Plains be operated by another owner or if the project closed. Robert McPhail (bottom photo), who had recently become Basin Electric's new general manager, promoted investigating the possibility of the cooperative purchasing the gasification facility.



supplied electricity to rural residents in an eight-state region. Included in those cost calculations were Great Plains' obligation for \$12 million in debt payments on water treatment, rail and other facilities used jointly by the gasification plant and Basin's electric generation station. In addition, the figure included \$17 million in annual fixed costs paid by ANG (the plant's operator) for power supplied to the project as well as an estimated \$8 million in increased mining costs each year should ANG no longer purchase coal.

In 1985, Basin Electric had just brought a new general manager on board. Robert McPhail, who had 21 years in the water and power field, had been the first administrator for the Western Area Power Administration. He came to Basin at a time when the cooperative was about to make a transition from a construction phase to that of operation and marketing. He was going to help guide Basin on a path to reduce its increasingly high power costs to member cooperatives.

Like other utilities in the late 1970s and early 1980s, Basin had overbuilt its generation. In Basin's case, that excess generation rested on the perceived needs of its member cooperatives. For instance, a Midwestern investor-owned utility noted that its electric demands had been growing 7.5 percent in 1950-75. A headline in that company's publication in 1975 exclaimed: "Electric Use Demand to Continue Spiraling."

Growth in electricity demands by Basin's rural electric co-ops also had been

growing about 7 percent each year and was projected to continue for some time. As a result, the cooperative invested about \$1.5 billion in the Antelope Valley Station and mine facilities, borrowing construction money during a period when interest rates had gone sky high. Adding that plant meant Basin eventually had about 1,000 megawatts more than needed by its members, enough power to serve a city of about 1 million people.

With a huge construction debt, the wholesale rate the cooperative charged its members stood at an all-time high of about 5.6 cents per kilowatt-hour. And the prospects were good that further rate increases would be needed.

When DOE took over the gasification plant in 1985, it appeared that closing the facility was near reality. That would have resulted in a big loss of electrical load about 90 megawatts for Basin and its members. "We had very high rates," recalled McPhail later. "An increase would have been unbearable for our members at that time."

Other generation and transmission cooperatives facing high debt from overbuilding had declared bankruptcy or asked for a bailout. Basin, however, embarked on a path to improve its economic health. With McPhail now general manager, Basin launched several initiatives to lower costs and increase revenues. Included in that plan was an extensive marketing and advertising campaign to sell its surplus power to other utilities in the Midwest, West and Canada. Basin also refinanced its long-term debt, lowered fuel expenses and streamlined its work force. (Over the next 15 years, Basin's initiatives proved successful, allowing the cooperative to lower its rates to its members by more than 37 percent.)

However, in late 1985 the cooperative was debt-ridden and looking at the prospect of increased costs. That could materialize either by having the gasification plant shut down or by having a new owner demand contract concessions from Basin on power and other areas. As a result, Basin and its members joined with the state of North Dakota and its Congressional delegation in the effort to keep the synfuels plant running.

While Basin was concerned about the gasification plant closing, the cooperative had not taken any action to actually purchase the facility.

But that idea soon came up at a Basin board meeting, thanks to a vision by director George Hargens, a farmer from South Dakota. The cooperative had been studying the impact from the plant's closure. Hargens told management



Basin Electric's wholesale electric rates for its member cooperatives stood at an all-time high in the mid-1980s. Basin had built generation units during a period of high interest rates, boosting its construction debt and, as a result, its member rates.



George Hargens, a South Dakota farmer and Basin Electric director, helped to lead Basin Electric in the direction of eventually owning the Great Plains plant.

and fellow directors he dreamed that the cooperative should buy the unique plant. In August 1987, the cooperative's board of directors moved ahead, calling for a study to determine what benefits there would be in purchasing the gasification plant.

At the cooperative's annual meeting in November 1987, both McPhail and Kent Janssen, Basin's deputy general manager, reported on the latest developments regarding the gasification plant and the sales effort by the government. Saying that the future of the plant was uncertain yet, Janssen noted, "Basin Electric has no way of predicting what commitment a new buyer might make to the continued operation of the gas plant and what might eventually happen to our contracts (for power, coal, etc.)."

Members were informed of the annual \$37 million impact they would face should the gasification plant close. In his explanation, Janssen pointed out that Basin's prospects of marketing the 90 megawatts reserved for the gasification plant seemed "remote" at the time.

Based on the gas purchase contracts, the gasification plant shouldn't go into the red, assuming the facility maintains its production, has no debt-service payment and the price of crude oil stays above \$15 per barrel, Janssen projected. Based on the formula to determine the price of the plant's synthetic natural gas, the pipelines were then paying about \$3.75 per dekatherm, about 50 percent more than the market price. With that price, Janssen said, the plant was generating a positive cash flow of about \$3 million per month.

The key considerations for the plant's future, he said, are the future price for natural gas and additional revenues from selling byproducts as well as reducing costs and increasing production.

From DOE's perspective, he said, the agency had three objectives: realize fair value for the plant; return the plant to the private sector; and encourage long-term operation to avoid impacts to the local economy and to capture benefits for the U.S. taxpayer.

After hearing reports at the 1987 annual meeting, Basin's members voted unanimously to authorize the cooperative to continue investigating the possible purchase of Great Plains. It also allowed the board and management to negotiate the purchase, if appropriate. Because Basin bylaws didn't allow for such a business, the cooperative's members also approved a bylaw amendment that would allow Basin to engage in businesses other than those directly linked to rural electrification. Basin President Quentin Louden said, in a news release, that the cooperative's primary interest was in long-term operation of the gasification plant "as a means of shielding the membership from rate increases."

Speculation about potential bidders began growing. Near the end of the year, DOE released a bidders' list. Included in the group of 15 were some powerful companies, such as Amoco Corporation of Chicago; and the Coastal Corporation, Houston, which by now owned ANR, the former project partner whose subsidiary was continuing to operate Great Plains for DOE.



Others had already been known including Burlington Northern Inc., Seattle; North American Coal Corporation, Cleveland; and Basin Electric.

Not all of the companies were so well known. A bid of \$1.3 billion reportedly came from a Texas company, Beta Pipeline & Equipment, a company that business leaders in that area said they didn't know. The Texas owner told a newspaper that his interest in the gasification plant was in developing "aquafuel" as an alternative to crude oil for powering jets and cars.

Meanwhile, DOE saw the large number of prospective buyers as a good sign. The interest "means that there will be sufficient competition among prospective buyers to ensure that the best interests of the taxpayers, plant employees and local citizens will be served," announced J. Allen Wampler, DOE's assistant secretary for fossil energy.

Basin continued its study of the merits of purchasing Great Plains. In-house task forces developed computer models for projecting operating costs, project revenues and risks. Outside experts were consulted on environmental concerns, reducing plant costs, assessing natural gas future pricing and developing byproducts.

Some of the members of Basin Electric members expressed nervousness about buying the gasification project. They questioned whether Basin should go into Representatives of Basin Electric's member cooperatives voted at the cooperative's 1987 annual meeting to continue looking at the possibility of purchasing the gasification project. Leaders pitched the idea that long-term operation of the plant would help protect member cooperatives from more increases in their wholesale electric rates.



the business of making natural gas, the potential liability in owning the gasification plant and the ability to resolve the plant's environmental deficiencies.

McPhail responded to those concerns, explaining that several measures were being taken to help insulate members from those liabilities. Members had approved setting up separate subsidiaries in this proposed diversification of the cooperative's business.

However, McPhail reiterated that the main concern was to protect members from the "extensive costs" that might be incurred if the plant shut down. "Secondly, the extreme economic damage such a shutdown would have on the already fragile economy in western North Dakota would also impact on Basin Electric's loads," McPhail said, in letters-to-the-editor in several newspapers. Basin was aware of the "environmental shortcomings" of the gasification plant and that was part of the analysis being done, he said. In the end, he pointed out, the members would have the final say before the plant is purchased.

Eight companies made the deadline for submitting offers. And three made DOE's short list of bidders -- Basin, Coastal Corporation and Mission Energy, a subsidiary of Southern California Edison.

In the bidding process, Basin and some members of Congress brought up a major concern. They were apprehensive that the government's broker, Shearson Lehman Brothers, was marketing the plant as a tax shelter, thereby not focusing on the plant's long-term operation. They felt a new owner might take advantage of the production tax credits and not make a good-faith effort to keep the plant operating.

Production tax credits had been granted by Congress in 1980 under the Crude Oil Windfall Profit Tax Act in an effort to stimulate investment in synthetic fuels projects like Great Plains. Credits were allowed for producing non-conventional fuels. The idea was to stimulate investment in projects that made fuel supplanting crude oil and making the United States less dependent on foreign fuel sources.

Bids from the short-list group reflected the difference betweenBasin and its competitors for the plant's future. Mission planned to take advantage of all of the production tax credits available.Coastal's bid indicated it would take the credits for three years, guaranteeing that it would operate the plant for that period. Basin's bid included a waiver of the tax credits.

production from the gasification plant could result in about \$697 million in production tax credits through 2000, which was then the last year for gaining credits under the 1980 Tax Act. So, a bid of \$300 million by a company planning to use the available production tax credits would actually represent a net loss to the federal government.

That point was made at a hearing on the proposed sale held by the House Energy and Commerce Committee in the spring of 1988. Rep. Phillip Sharp of Indiana, the committee chairman, said he wanted to ensure that the project remains in operation as a test facility and as a cornerstone of the North Dakota economy. But Sharp also said his objective is to "prevent the taxpayers from being shortchanged." Specifically, Sharp criticized DOE for erring by including hundreds of millions of dollars worth of production tax credits as a major part of the sale. "This not only imposes a hidden future liability on the government, it obscures the value of the plant as a revenue producing asset," Sharp said.

DOE agreed that someone with no interest in tax breaks may buy the plant but suggested that the tax credits may be necessary to attract a buyer who then would agree to keep the plant running. DOE's Wampler emphasized to the committee that the credits were tied to synthetic natural gas production and couldn't be claimed if the plant were closed.

The case for long-term operation of the plant was underscored strongly in testimony by those representing North Dakota, including Rep. Byron Dorgan and Gov. George Sinner.

Dorgan, later to be elected a U.S. senator, made the case that closing the plant would be devastating to both Mercer County and the state of North Dakota. But he also noted that the nation could be crippled by a drastic reduction in foreign oil supplies. "While the American people have answered the call for conservation, we are certainly a long way from energy independence," Dorgan testified. "The Great Plains project will not solve all of our energy needs, but it is a significant source of fuel, and therefore it is imperative to ensure that the project is owned by someone committed to its long-term operation."

Gov. Sinner told the hearing that the state wanted to see that any future owner give "an unequivocal commitment" to maintain and operate the plant, to expand its production and to develop byproducts. The governor also said a reserve fund must be established to deal with the plant's sulfur dioxide (SO2) emissions problems.



Congressman Byron Dorgan (right) discusses issues with Robert McPhail, Basin Electric's general manager. Dorgan joined with Gov. George Sinner in vigorously supporting the long-term operation of Great Plains during a House committee hearing in 1988.



(Top photo) House Speaker Jim Wright signs an autograph for Ron Kuhn, coal handling supervisor, during a tour of the Great Plains project in April 1988. Wright made it clear he wanted to keep the project operating. The U.S. Department of Energy (bottom photo) had narrowed the list of bidders for Great Plains, finally selecting Basin Electric.

(Top photo courtesy of **Bismarck Tribune**)



Sinner was referring to an environmental issue that existed since the plant began operating. The air quality surrounding the facility had met all federal and state standards for human health and welfare. However, Great Plains was never able to meet the guidelines for SO2 emissions set out in the construction permit as agreed upon by the original developers and the North Dakota Health Department. This problem persisted because the original sulfur removal technology failed to function satisfactorily. In addition, unpleasant odors from the gasification plant had drawn complaints from area residents almost from the day the project began producing gas in 1984.

Following the hearing, Sharp requested the General Accounting Office (GAO) to produce comparative analyses of retaining and selling Great Plains. Its cash-flow projections for 1988-2009 showed the gasification plant generating \$6.9 billion in total

revenues, including more than \$6.6 billion from gas and \$122 million in byproducts. It placed the theoretical value for the plant at \$569 million, based on future net revenues. With production tax credits factored in for a new owner, the government would need to be paid \$1 billion to realize a net gain of \$569 million, the plant's theoretical value, according to GAO.

While Sharp complained that the gasification plant was being marketed as a tax shelter, the project received the endorsement of one of the most powerful members of Congress. House Speaker Jim Wright, a Texas Democrat, accepted the invitation of North Dakota's Democratic leadership to tour the facility that spring.

Wright had been a leader in developing the country's synthetic fuels program that led to building the gasification project. On the tour, he called the facility a "national asset" that could solve the country's future energy needs. Noting that the plant was a viable operation, Wright told a newspaper reporter that he would insist the plant stay open. "I think the United States must achieve energy independence if we are going to continue to be a great country and not a second-rate power," said Wright.

Gov. Sinner, who worked hard to keep the gasification plant from closing, had co-hosted the House Speaker on his tour. Meeting later with Basin's directors,

the governor was optimistic about the plant's future. "Everyone I talk to at the U.S. Department of Energy wants to see it go on, flourish and expand to be the promise it could be," Gov. Sinner said.

The governor's optimism proved on track.

On Aug. 5, 1988, DOE announced it had selected Basin as the successful bidder for the nation's only commercial coal gasification plant. Basin's McPhail said DOE selected the cooperative because of the importance of the plant's long-term operation to Basin's members, as well as the potential for returning the federal government its original investment via an innovative profit-sharing proposal.

Under this profit-sharing proposal, DOE would get 100 percent of the gas plant's profits for the first 14 months (profits were defined as the difference between the gross revenues from synthetic gas sales minus a contractually specified gas production cost and taxes). For the next five years, DGC would get all profits and then DOE again would get the profits for 10 years. For the final five years of the deal, the two would share equally in those profits.

Besides profit-sharing, Basin's bid included a waiver of production tax credits estimated at a value of \$590 million; a cash payment of \$70 million for the gasification plant's mining rights and equipment at the adjacent Freedom Mine; a cash payment of \$15 million for the pipeline that connects the gasification plant to the interstate pipeline system; and a \$30 million line of credit available to Basin's subsidiary that would own and operate the plant.

In the bid analysis, DOE valued Basin's bid at \$594 million, about \$13 million more than Coastal's and more than \$120 million above Mission's.

The successful bid can be attributed to work done by in-house teams at Basin Electric as well as its two principal negotiators, Janssen and Basin counsel Mark Foss, who would later become general counsel for the new synfuels subsidiary.

"The principal reason for Basin Electric's involvement in the purchase process is to retain control over its own destiny and the destiny of the member systems by helping ensure long-term operation of the gas plant through direct involvement in decision-making, protecting revenues and other economies important to achieving wholesale electric rate

Basin's bid included:

- Profit sharing.
- A waiver of production tax credits.
- \$70 million for associated mining rights and equipment.
- \$15 million for the pipeline connecting the gasification plant to the interstate pipeline system.
- A \$30 million line of credit.



(Top photo) Kent Janssen, Basin Electric's deputy general manager, answers questions during an Aug. 24, 1988, special meeting of the cooperative's members about the purchase of Great Plains. (Bottom photo) Later, Basin Electric President George Hargens (at podium) presided during the vote when Basin's members voted to acquire the gasification plant through a subsidiary. This was the first special membership meeting in Basin Electric's history. stability," McPhail said, in a report to members just after the DOE announcement. The purchase was still up to the member electric systems from the eight-state region served by Basin Electric. So, a special membership meeting was set up for Aug. 24, 1988, in Bismarck.

One of the key issues for Basin's members was the potential liability from a subsidiary, should it go bankrupt or face a catastrophe. Legal opinions indicated that the subsidiary structure proposed would provide a reasonable corporate veil for Basin and its members.

The toughest part of informing members, McPhail later said, was squeezing in enough time to fully explain the complicated purchase proposal and answer questions. "We explained the consequences if we didn't buy the plant. We showed them that

there were a lot of benefits. We showed the synergies (between the gasification plant and Antelope Valley Station)," he said.

"We were all in favor if we could get the financing," recalled Louden, a former Basin president from South Dakota who would become the first president of the subsidiary formed to own and operate the gasification plant. "We could see the benefits to Basin."

The resulting votes by Basin's members were historic for the cooperative. At the special meeting, Basin's members unanimously authorized the purchase of the Great Plains coal gasification plant. And they also granted authority to establish two subsidiaries – Dakota Gasification Company and Dakota Coal



Company – to accomplish that purchase.

Within a few days of the purchase, an international symposium on synthetic fuels arranged by Sen. Kent Conrad focused on this courageous move by Basin Electric. Sen. Bennett Johnston of Louisiana, chairman of the Senate Energy and Natural Resources Committee, told the experts assembled in Bismarck that synfuels would become more important as energy prices rise. Predicted Johnston: "We're going to need that plant and a lot more."





he rural electric cooperative members of **Basin Electric Power**

Cooperative had given their approval n August 1988 to purchase an energy facility that made natural gas from lignite. To some, it was a risky gamble for a regional generation and transmission cooperative whose business was electricity, not



gasification

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But taking bold initiatives had been the basis for founding Basin Electric. Decades before, Basin and its members had broken new ground in the development of large-scale central electric generation to serve more than a million

consumers in the region.

With gasification, they were about to become pioneers again.

Basin's resourceful management had undergone a lot of analyses and evaluations since the Great Plains Gasification Associates walked away from the coal gasification plant. That analyses included consulting with recognized experts on the myriad of legal issues and technical matters related to coal gasification, gas purchase agreements, future oil and gas prices and subsidiary ownership.

The members of Basin Electric Power Cooperative took a chance by moving the electric cooperative into a new business—making natural gas. Many knew it would be a gamble, but they had confidence in the skilled management at Basin's headquarters (shown above) and in the experienced work force at the gasification project.



Robert McPhail (right), Basin Electric general manager, said he felt more assured about delving into the natural gas business because of the knowledgeable employees at Great Plains and the abilities of Kent Janssen, Basin's deputy general manager who became chief operating officer for the new subsidiary. As a result, Basin President George Hargens told the news media in 1988 that he considered the purchase decision a sound one. "Basin's members realize there are certain risks involved in this purchase, but believe the potential long-term benefits to Basin, federal taxpayers, regional, state and local economies far outweigh those risks," he said, in announcing the members' approval to purchase the plant.

However, questions were raised publicly about whether the cooperative could successfully safeguard the plant against financial and legal challenges. And there was concern about whether a cooperative in the electric business could manage a unique plant involved in making natural gas from coal.

Years later, McPhail acknowledged he initially had a concern whether Basin had the knowledge and expertise to operate Great Plains. But after trips to the facility and discussions with staff there, he said he was confident in the abilities of those operating the plant. "I also had a lot

of confidence in Kent Janssen and his abilities," said McPhail, of the man who then was his deputy general manager.

Janssen had established a successful track record in modifying electric generating units to better use lignite, overseeing large-scale power plant construction and operations as well as negotiating with ANG on developing the joint project involving Great Plains and Basin's Antelope Valley Station. Said McPhail: "He was a quick study. And I was confident that he could get on top of that operation and make it a success."

The vote to purchase the plant by the Basin membership Aug. 24, 1988, filled in one side of the purchase equation. It was now up to Congress to review the rest of the math.

The reason for a Congressional review was due to the work of North Dakota's Democratic senators, Quentin Burdick and Kent Conrad. Conrad had proposed amendments to an energy and water development appropriations bill that was eventually passed by Congress. In the amendments, the Department of Energy (DOE) was required to tell Congress 30 days in advance who the buyer was and justify the sale terms. It also contained provisions establishing a national security interest in the plant, which would make it difficult for a foreign buyer to acquire the facility.

Conrad presided at the Sept. 12 hearing on the pending sale before the Senate Energy and Natural Resources Committee. Testimony from a variety of witnesses turned out to be mostly supportive.

In his testimony, McPhail assured senators that Basin had a strong incentive to run the gasification plant for the long term. "Closure of the plant could negatively impact Basin Electric by as much as \$37 million per year," he testified. "In addition, the effect of such a closure upon the economy of western North Dakota would indirectly impact Basin Electric, its members and many consumer-members."

One question raised at the hearing concerned the potential for a future federal bailout: Would poor performance by the gasification plant due to low natural gas prices or other factors force Basin into asking for a bailout? McPhail responded that acquiring the coal gasification project would help to "protect and possibly enhance" the federal government's position as a lender to the cooperative for electric operations.

Sen. Conrad said he felt Basin would do an excellent job of operating the facility. "I also believe that return of the project to private ownership will enable the plant to maximize its technological and economic potential."

In the end, the sale to Basin Electric drew a favorable reception from Congress. "It seems to offer the best promise possible to keep the plant operating," said Sen. Johnston, the committee chairman.

Largest real estate transaction in North Dakota

The last hurdles were cleared and the final documents in a list of about 70 were ready for signing. At a ceremony involving the largest real estate transaction in North Dakota history, Dakota Gasification Company (DGC) took control of the gasification plant at 12:01 a.m. on Nov. 1, 1988.

The signing ceremony took place at DOE headquarters in Washington, D.C., attended by officers and directors of the newly formed Dakota Gasification and Dakota Coal companies as well as DOE officials. Among the documents signed by McPhail was a 6-foot by 2-foot check for \$85 million made out to DOE from the two companies.



Sen. Kent Conrad of North Dakota testifies before a Senate committee hearing in September 1988 about the proposed sale of the project to Basin Electric. Conrad told the panel that he felt Basin had the ability to operate the gasification plant. Basin President Hargens said he was confident in Dakota Gasification's ability to make the plant a success. "We're glad to be part of shaping America's energy future. All of us have a stake in keeping that plant operating and encouraging development of its full potential."

Deputy DOE Secretary Joseph Salgado said that the ideal owner had been found for the plant because Basin recognized the plant's importance to the local economy and had given the best assurances for long-term operation. "Basin Electric also proposed a very fair revenue-sharing provision and by waiving the production tax credit told us that it was buying the Great Plains plant as an energy production facility, not as a tax shelter," said Salgado.



DOE commitments

As part of the deal, DOE made several commitments including:

- Left \$15 million in working capital at the gasification plant;
- Set up a \$30 million trust fund for environmental improvements; and
- Established a \$75 million trust fund to cushion any economic shortfalls for the plant.

However, Basin's purchase certainly involved more than the gasification plant. It also meant buying the gas transportation pipeline connecting the plant to a major interstate pipeline and acquiring mining rights and equipment at the Freedom Mine, owned by The Coteau Properties Company. "I think it is important to note that even if the gasification plant got into trouble, the membership has an excellent investment in the coal mine....," said Janssen. "Adding

McPhail (left) and Deputy Energy Secretary Joseph Salgado sign the first agreements on Oct. 31, 1988, transferring ownership of the gasification project from the federal government to Dakota Gasification Company. Looking on is DOE attorney Lawrence Oliver.

these mining rights and assets to the adjacent reserves already owned by Basin Electric also makes a long-term source of fuel available for other cooperative facilities. This reserve contains a good-quality lignite that can be produced at an attractive cost."

The effort by Basin Electric to acquire the gasification plant was praised by Sen. Conrad at the cooperative's 1988 annual meeting held just days after the deal was finalized. Quoting a member of the Senate Energy Committee, Conrad described the energy plant: "Great Plains has been a prudent insurance policy against wild escalations in the price of oil and the accompanying disruptions to the economy of our country. This plant is a technological marvel, but it stands as more than an example of what America can technologically achieve. It stands also as a deterrent to energy blackmail by interests that would otherwise reap unjust rewards at the expense of the American consumer."



With the sale done and the ceremonies over, DGC faced tough tests as a new owner, such as:

- Provide reassurance to highly skilled employees at the gasification plant who were worried about their jobs and concerned about future career opportunities;
- Put together a management team that could oversee a smooth transition in ownership from DOE to DGC; and
- Prove that it had the expertise to oversee the gasification plant operations and protect it from legal and business challenges.

Janssen, who was elected vice president and chief operating officer for Dakota Gasification, molded the employee team. Employees had been working for ANG in keeping the plant operating under DOE's ownership. Now they had to apply for their positions under DGC.

Named plant manager was Al Lukes, a North Dakota native who had 20 years experience in process engineering and plant operations management. He had been at the gasification plant since 1981.

Of the 822 ANG employees, DGC made job offers to 778. Janssen complimented the new employees and also tried to reassure them. "We at

(Top photo) Included in the deal to purchase the gasification plant were some mining rights and equipment at the Freedom Mine. (Bottom photo) Janssen (left) and plant manager Al Lukes helped to mold the new employee team in the transition to ownership by Dakota Gasification Company.





DGC will do our best to provide employees with a rewarding work environment as well as career challenges and opportunities," he told the new employees, in meetings at the plant site. Several teams of employees worked on issues, helped set priorities and worked on action plans. Areas addressed included environmental needs, operations, byproducts, accounting, gas pipeline transportation and employee concerns.

"We had a concern of what to do to gain the confidence and respect of the employees at the plant," Janssen later said. DGC management took a direct approach by meeting face-to-face with employees who were leery and sometimes hostile toward the new owner. The results were positive. Employee attitudes toward the new company gradually improved.

A successful first year

The successful integration of the new company resulted from both Basin Electric and Dakota Gasification Company investing time and talent to meld the operations for more efficiencies and synergy.

The objective in DGC's first year was to

bring long-term financial stability to Great Plains that would help protect Basin's contracts with the synfuels plant.

Achieving that involved:

- Lowering the costs to produce natural gas;
- Operating at high production levels but still maintaining a safe plant; and
- Pursuing byproduct development aggressively.

The results in 1989 for that first year proved very encouraging. With employees motivated to produce, the gasification plant – renamed the Great Plains Synfuels Plant – began setting records almost immediately. One mark

A sign went up at the gasification plant showing Dakota Gasification Company as the new owners and the Great Plains Synfuels Plant as the facility's new name. was for a month-long average, 159.9 million standard cubic feet (mmscf) of natural gas per day in April 1989. By the end of the year, production had averaged 7 percent above the level of the plant's design capacity of 137.5 mmscf per day. Production costs, meanwhile, had been reduced 12 percent below projections.

"Employees have done a good job of finding ways to increase production and keep the plant operating as much as possible," DGC management reported to the media and others in mid-1989. Since the plant was purchased, "Dakota Gasification Company and Basin Electric have looked to the work force for ways to increase productivity and efficiency, and yet focus on safety as a main priority in the operation of the plant."

Besides employee efforts, the high production under the new owners was attributed to operating regularly with 13 of 14 gasifiers. Design had called for operating 12 gasifiers at a time, allowing for one gasifier being offline for maintenance and another on standby.

Management also pointed out that production of synthetic gas was a function of coal quality. "High production periods have coincided with low-sodium



coal, which creates fewer problems in the process of making synthetic natural gas from lignite. We're working closely with Coteau Properties Company (Freedom Mine owners) to provide a coal that is consistently suitable for efficient operations."

Higher production also had come in the cooler months, when the synfuels plant normally runs better. Limited production in the summer related to higher cooling-water temperatures, but the company noted that changes were being made. Employees had reworked used aerial coolers that were installed in the rectisol area, aimed at reducing the usual production drop-off in the summer. "This is another example of employees working to improve the plant's performance," DGC management reported.

Higher production of natural gas was just part of the upbeat picture in that first year. Development of new byproducts got under way quickly based on commitments by the DGC board of directors. Employee efforts to achieve higher productivity and maintain the highest quality in keeping the plant running more efficiently helped contribute to on-line records for the gasifiers and other essential systems.



Dakota Gasification Company soon began establishing its own financial identity. Terry Towers (left), technical services manager at the synfuels plant, and Clifton Hudgins (right), Basin's financial services manager, hosted Roger Opp (second from left) and Stuart Peterson, both of the St. Paul Bank for Cooperatives, on this tour in 1988. Motivation for producing new byproducts was twofold. First, under the purchase agreement with DOE, Dakota Gasification kept all revenue from byproduct sales. With byproduct revenue projected at about \$50 million a year, that looked to be a significant addition to the plant's income. Secondly, management and directors recognized early on that the volatility of natural gas prices meant they couldn't rely totally on natural gas production for long-term success. Diversification would be necessary.

The plant was already marketing three byproducts: anhydrous ammonia, liquid nitrogen and sulfur. In 1989, the DGC board approved \$25 million in capital projects for making and selling rare gases (krypton-xenon) and phenol and also agreed to look into the possibility of producing methanol.

With the synfuels plant having a good year, the new company was on the move. In that first year, DGC was assigned a financial rating. Dun & Bradstreet, a business services company, gave DGC a financial strength rating of 5A2, which was the same as its parent, Basin Electric. The highest rating possible was 5A1. ANG, the former operator of the plant and a subsidiary of the original partners who owned the plant, had not been assigned a rating by Dun & Bradstreet.



"The assignment of this good financial strength rating ... will increase the confidence of suppliers and vendors in the project and assist in the process of obtaining credit for DGC," reported Clifton Hudgins, Basin's financial services manager.

Overall, the synfuels plant's performance was excellent. "Thanks to the outstanding work force, high production levels were achieved and efficiencies were improved by combining the best operating and administrative practices of both Basin Electric and the synfuels plant," said Basin President Hargens and General Manager McPhail, in a joint statement in Basin's 1989 Annual Report.

In the first 14 months, DGC earned nearly \$31 million in after-tax profits due to higher production and lower costs. As part of the profit-sharing plan, DOE received more than \$11 million in revenue from DGC.

It was an auspicious start for the synfuels plant and its new owners. However, they would discover the challenges in owning and operating the Great Plains Synfuels Plant in the decade to come. \blacksquare



Hargens (left), Basin's president, and McPhail, Basin's general manager and CEO for the new Dakota Gasification, reported on the success of the synfuels plant in its first year of operation under the fledgling subsidiary. (Photo below) A panoramic view in 1989 of the Great Plains Synfuels Plant (left) and Basin's Antelope Valley Station with the Freedom Mine in the background.

Chapter 8

Preserving a synfuels treasure

Prought and poor farm prices had been plaguing rural America and the electric cooperatives of Basin Electric in the late 1980s. But the new synfuels subsidiary owned by the cooperatives was doing well in its first year of operation.

However, the story of Dakota Gasification Company (DGC) in the 1990s centers on a multitude of challenges. DGC's directors, management and employees exhibited impressive skills and resourcefulness in guiding the company through a terrain marked by a seemingly endless number of complicated environmental, legal and operational issues.

In a defensive move, Basin Electric had organized DGC to purchase Great Plains. The plan was to keep a potentially hostile owner from seeking concessions to keep the synfuels plant operating. Basin management anticipated that a new owner would shut down the plant in a few years. Thus, the cooperative wanted to protect the \$37 million in revenues and economies flowing to Basin and its members each year.



(Left photo) Employees at the Great Plains Synfuels Plant worked hard to make the plant a success under the management of Dakota Gasification Company (DGC). Helping to direct those efforts were DGC's first board of directors (top photo). Directors are (front, from left) Gerard Jacobs, Tom Fennell and Merrill Sterler, and (back, from left) Quentin Louden, William Guy, David Hamil and Wayne Child. Louden was elected the first chairman of the board for the new Basin Electric subsidiary. GAS PURCHASE AGREEMENT

This Agreement, made and entered into as of Janiary, 1982 by and between GREAT PLAINS GAT IATES, a general partnership organized under t ith Dakota, (herein called "Seller") and MICH: LINE COMPANY (herein called "Buyer").

WITNESSETH:

WHEREAS, Seller desires to demonstrate manufacturing synthetic gas from coal;

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That benefit would be severely tested in a drawn-out struggle with the four interstate pipeline companies over a critical element in the plant's future -- the gas purchase agreements.

Agreements a volatile issue

When DGC purchased the gasification plant, the new company inherited nearly identical gas purchase agreements with ANR Pipeline Company, Natural Gas Pipeline Company of America, Tennessee Gas Pipeline Company and Transcontinental Gas Pipe Line Corporation. All are pipeline affiliates of the original owners of Great Plains.

Without valid and binding gas purchase agreements, DGC would have no market for the higher-than-market price natural gas from the synfuels plant. With no buyers for the gas, the synfuels plant would have no economic reason to exist.

Dating from 1984, the 25-year gas purchase agreements provided that the four pipeline companies must together take all of the output of the synfuels plant based on a percentage split between them.

Under the purchase agreements, pricing for the synthetic gas from the synfuels plant was set at \$6.75 per dekatherm with inflationary adjustments and certain price caps. Before July 1989, that price cap had been the energy equivalent price of No. 2 fuel oil. But the cap changed after that, pricing the plant's gas on the average cost of the highest 10 percent of the domestic gas that each of the pipeline companies bought on the market.

For DGC, that change meant that the new price would be closer to the cost of production at Great Plains. It brought the price received from the pipeline companies down to about \$3.14 per dekatherm, which was about DGC's cost of producing the synthetic natural gas at the time.

However, as DGC general counsel Mark Foss noted, the

price caps that went into effect in July 1989 depended on gas price information known only by the pipeline companies. Based on the mechanism in the gas purchase agreements, the pricing for synthetic gas after July 1989 was based on the pipeline's gas purchases, again information that only they could accurately provide.

When the pipeline companies owned the synfuels plant, it was to their benefit

to increase the price of the synthetic gas, Foss noted. But now the situation had changed. The pipeline companies were no longer owners with an economic interest in the plant's future. They were now just purchasers of the higher-than-market synthetic gas.

And, with the last of the nation's natural gas being deregulated, the disparity between price of natural gas on the market compared to DGC's synthetic gas became more pronounced. The pipeline companies were feeling more pressure in an increasingly competitive industry.

DGC management and directors saw that scenario as an incentive for the pipeline companies to keep the price of the product from the synfuels plant low by under-reporting their market purchases.

Deregulation also was leading some companies to restructure, setting up marketing affiliates to gain an advantage. In testimony before a Senate committee, DGC's President and CEO Robert McPhail said that could lead to an attempt to void or nullify the contracts the company had with its pipeline purchasers. Though they pay more for synthetic gas, McPhail told senators, the pipeline companies are guaranteed a source of natural gas for a 25-year period.

Soon, the pipeline companies launched a legal assault on the contracts with DGC. Part of their ammunition was an attempt to put a cap on the amount of synthetic gas they were required to take under the contract, claiming it should be based on the original design capacity of the plant. That design amount was 137.5 million standard cubic feet (mmscf) per day. With improvements made under DGC, the plant now had been making up to 165 mmscf.

A third approach taken by the pipelines was to simply not accept the assignment of the gas purchase contracts by the Department of Energy (DOE) to Dakota Gasification.

In promoting their cause, the pipeline companies tried to get DGC to formally arbitrate the dispute. DGC resisted, maintaining that doing so would result in four different interpretations because arbitration cases can't be combined.



Mark Foss, DGC's general counsel, helped to lead the company in defending the gas purchase agreements, the first in a series of legal challenges faced by the subsidiary.



The U.S. District Court room in Bismarck (top photo) was the site for a series of decisions and legal challenges pitting DGC against the interstate pipeline companies. Federal District Judge Patrick Conmy (bottom photo) upheld the gas purchase agreements but later dismissed a case brought by DGC.

(Bottom photo courtesy of The Bismarck Tribune)



After months of legal wrangling, DGC finally went to court to protect the integrity of the vital gas purchase contracts. In October 1990, the company filed a lawsuit again before U.S. District Court Judge Patrick Conmy, charging that the four pipeline companies had "grossly understated" the selling price of the gas they purchased on the market. DGC sought \$76 million in damages. DOE later joined DGC as a co-plaintiff in the case.

Besides pricing, the suit dealt with the amount of gas the pipelines were required to take as well as DGC's charge for transporting the gas.

In its filing, DGC pointed out that Judge Conmy had upheld the validity of the contracts in a decision four years earlier. In that case involving the original plant owners and the Department of Justice, Conmy also ruled that the obligation of the pipeline companies under the contracts was to take all of the gas produced "without limitation as to quantity."

DGC's Kent Janssen told the media that the company had a strong case in its fight over the agreements. "The contracts are

valid, the Department of Energy legally assigned these contracts to Dakota Gasification and the pipeline companies are obligated to buy all of the synthetic gas we produce," he said.

Though it was a strong case, the issue wasn't resolved in favor of DGC.

The pipeline companies had requested that the case be dismissed on the grounds that the issue should be arbitrated as provided in the contracts. Judge Conmy agreed and dismissed the case brought by Dakota Gasification. However, an appeal again went to the Eighth Circuit Court of Appeals, which reversed Conmy's decision in 1992 and sent it back to the lower court. The case was set for trial in early 1994.

To prepare for trial, DGC needed reams of documents. So, the company set up a computer-scanning project to process a seemingly endless amount of material. Temporary employees worked around the clock for several months, scanning, coding and classifying millions of documents. The project cost nearly \$3 million, but the economic stakes were high for DGC. The plant and the company couldn't exist without the contracts, which were the focus for the lawsuit. "If you don't go through this effort, you might as well stop litigating," according to a DGC media statement.

according to a DGC media statement.

Meanwhile, changes occurred on the national scene regarding natural gas. In April 1992, the Federal Energy Regulatory Commission (FERC) issued an order that restructured the way interstate pipelines do business. FERC Order 636 required that these pipelines separate their sales and transportation functions as well as mandated that their sales be market-based. It also allowed pipelines to pass on to their customers full recovery of all "prudently incurred" gas contract realignment costs.

Synthetic gas from Great Plains was capped by what the pipelines paid for their highest priced domestic gas. With the FERC-ordered changes, DGC anticipated that the pipelines would rid themselves of their high-priced purchases, driving down the price of synthetic gas. Eventually the pipelines would simply discontinue buying natural gas.

For more than a year, deliberations abounded on a possible out-of-court settlement in this dispute over the gas purchase agreements. Pressures were mounting and legal bills ballooning for both sides as the trial deadline loomed.

For Dakota Gasification, the case was costing a half million dollars a month. The company was facing the prospect of a major investment to correct the emissions problem at the synfuels plant. Under FERC changes, the price for synthetic gas would lower and eventually drop to market level, representing about half of the price it was receiving from the pipelines. Under those prices, DGC would face a deficit of \$68 million annually. And even if the company won the lawsuit, management noted, the drawn-out process could mean the monetary award could come too late to keep the synfuels plant from closing.

Presumably, the pipelines faced similar uncertainties about the outcome should a trial be held.

With the outcome so in doubt, an out-of-court agreement was reached between the pipelines, DGC and DOE. There would be no trial on the gas purchase agreement dispute.

'A ray of sunlight'

In April 1994, a tentative settlement reached between the parties required the pipelines to:

- Reimburse DGC about \$37 million for past underpayments for synthetic gas and transportation;
- Pay DGC the market price for its synthetic gas from Great Plains; and
- Make monthly demand payments to DGC over a seven-year period. Though they had a present value of about \$360 million, the demand



Decisions by FERC, headquartered in Washington, D.C., affected the course of development for the gasification project.


DOE Secretary Hazel O'Leary helped to ensure DOE's full support in DGC's legal fight with the interstate pipeline companies. (Bottom graphic) The June 1994 settlement between DGC and the pipeline companies prompted a jubilant headline in the Bismarck Tribune and other newspapers in

payments amounted to more than \$500 million when adjusted for inflation over the period of 84 payments. However, once the demand payments end, the settlement meant DGC would receive only market prices for its gas for the remaining term of the gas purchase agreements, which come to an end in July 2009.

In a separate settlement, DGC agreed to pay DOE \$25 million plus interest over seven years, continue the revenue-sharing plan throughout the contracts and allow DOE to eliminate the \$75 million trust fund set up at the time DGC purchased the synfuels plant in 1988.

The settlement was contingent on final approval by FERC.

The settlement was hailed as a momentous achievement. Under a front-page headline that read "Millions give gas plant life," a newspaper noted, "Perhaps for the first time ever, no imminent cloud of gloom hangs over the Great Plains Synfuels plant."

DGC's McPhail called it a fair settlement, saying it should provide the company a "reasonable opportunity" to operate the synfuels plant for the long term. "The project has been under a dark cloud ever since it was built ...," McPhail said at a news conference in Bismarck. "The settlement is like a ray

of sunlight."

He credited the efforts of Sens. Kent Conrad and Byron Dorgan, Congressman Earl Pomeroy and former Gov. George Sinner and others. "DGC has had a lot of support over the past five years," McPhail said.

A key part of the effort by the Congressional delegation was getting DOE Secretary Hazel O'Leary to step forward and bolster the federal agency's position in the negotiations.

In a joint news release, the pipeline companies said the settlement makes "good sense" for all concerned, including the pipelines and their customers. However, their statement made reference to an anticipated FERC approval, a statement that may have reflected more public relations than sincerity by the pipelines. "We look forward to favorable FERC action on the settlement so that we can put this matter behind us," the joint statement read.

Millions give gas plant life Settlement By RENE'E BEASLEY JONES Tribune Staff Writer

BEULAH - Perhaps for Bthe first time ever, no imminent cloud of doom hangs over the Great Plains

Syntuels plant. Company officials announced Thursday the favorable terms of a multimillion dollar out-of-court set-tlement with four pipeline com-panies. The pending lawsuit, which loomed with an October trial date, threatened to close the nation's first lignite-to-synthetic natural gas plant.

plant. "The settlement is like a ray of sunlight to remove the dark cloud that fell over the plant since cloud that fell over the plant since

has Mercer area upbeat

Mercer County towns buzzed with news that Great Plains Synfuels may be in the

Company officials told clear. Company officials told employees at the plant about the settlement Thursday afternoon, Workers were upbeat, said Richard Northrup, a Great Plains' employee and Beulah City Council member.

"I'm glad to see the "I'm glad to see the appearance of long-term appearance of long-term the said. "The was not resolved quickly for DGC. And while the matter was delayed, DGC saw its future slipping away.

The reason? The settlement required that the pipelines pay DGC \$3.70 per dekatherm for its synthetic gas until a final FERC order approved the agreement. That payment figure was well above the market price, and the market had been steadily dropping since the agreement was announced in early 1994.

Normally that would be good, but not here. The settlement spelled out that each pipeline would be credited for its above-market payments against its future demand payments. In other words, the demand payments – which have a greater value when paid over time – were being paid off much more quickly than expected. That lowered the inflation-adjusted payments that DGC would receive in the next seven years and reduced the overall sum the company would get.

Within six months after the settlement was reached, one pipeline, Natural Gas, did get a final FERC order for its agreement, but not the other three. As a result, DGC received about a third of its demand payments in less than a year. At this rate, DGC projected that it could get more than 80 percent of its demand payments from the settlement by early 1997.

That led to a sobering conclusion. Without a strong natural gas market or revenue from other sources, the company would begin operating at a loss for the first time, predicted DGC's Janssen.

It was a stark reversal of the expressions of relief made after the settlement announced just months before. This new reality intensified DGC's efforts toward diversifying its operations, including putting its early settlement payments in further development of byproducts (covered in the next chapter).

Rallying against a bad decision

But as bad as that economic projection looked, DGC faced its most serious legal challenge beginning just after Christmas of 1995.

The challenge was related to both the settlements and a complaint filed in 1993 by a group of natural gas companies from Wisconsin. The consumer group claimed that the prices charged by DGC for synthetic gas were higher than allowed under FERC Opinion 119 issued in 1981. That FERC opinion approved the gas purchase agreements and allowed the pass-through of higher-than-market costs of synthetic gas from Great Plains.

After DGC and the pipelines reached agreement in early 1994, FERC

Without a strong natural gas market or revenue from other sources, the company would begin operating at a loss for the first time, predicted DGC's Janssen.



consolidated both this consumer complaint and the consideration of the settlements.

Following a trial on those matters, an administrative law judge for FERC issued a decision in December 1995 recommending that the agreements with three pipelines – ANR, Tennessee and Transcontinental – should be nullified. It didn't affect the settlement with the fourth pipeline, Natural, because it already had its final FERC order.

Thus, with the arrival of New Year 1996, a familiar possibility chilled synfuels plant supporters. The synfuels plant again could close.

In his anti-DGC decision, the FERC administrative law judge held that the three pipeline companies failed to act prudently in reaching their settlements with the Basin subsidiary. The decision granted the relief requested by the utility group, which had been joined by some 40 intervenors in 15 states.

The judge ruled that FERC-ordered deregulation and restructuring of the natural gas industry warranted

abandoning the pricing formula for synthetic gas as outlined in the gas purchase agreements. The judge relied on a phrase in a previous FERC order, saying that the commission could revise its previous orders based on "greatly changed (truly exceptional) circumstances."

The administrative law judge recommended replacing the pricing formula in the settlements as well as reducing the amount of synthetic gas the pipelines are required to buy. He said DGC should sell its gas at a price equal to the price index on the Gulf Coast plus 5 percent, which then amounted to \$1.68 per dekatherm or about \$1 per dekatherm below the company's cost to produce the synthetic gas. Further, the judge maintained DGC's cost-ofproduction figures were unsupported and that the synfuels plant had

Basin Electric joined with its subsidiary, DGC, in rallying political and public support to encourage FERC to reject the December 1995 recommendation by a FERC administrative law judge. (Top photo) The issue took up the entire January 1996 Basin Report magazine. And on the amount of gas the pipelines must take from Great Plains, the law judge said it should be limited to the design capacity (137.5 mmscf per day), not the total output of the plant (about 157 million mmscf per day).

His recommendation also held that the pipeline companies must refund their customers more than \$275 million in "overcharges" from the past 2½ years. That money obviously would come from the pocket of Dakota Gasification.

It was a recommendation that, if put into a final FERC order, would certainly end the short history of the nation's only commercial synfuels plant, DGC supporters pointed out.

The fact that the preliminary decision rested on the arguments brought by the ratepayers or consumers seemed more was ironic to many project supporters. DGC board member William Guy, a former North Dakota governor, wrote, "How

ironic it is that the same natural gas consumers who were pressing their pipeline companies to develop a source of synthetic natural gas from coal in the 1970s are now the ones who want to relieve themselves of any obligation to pay the costs of the highly successful coal gasification project.

"It is astounding to me that the FERC administrative law judge appeared to be so anxious to relieve gas consumers, who originally clamored for synthetic coal gasification, of any responsibility or obligation now that the deregulation of natural gas allows them to obtain less costly natural gas elsewhere." It is time, Guy asserted, that the buyers of synthetic gas "to make good on Art Seder's promise of a high level of corporate responsibility and a gas industry that was ready to pay its own way."

For DGC, it obviously was a recommendation that simply could not be left standing. It had to be fought and overcome. If FERC adopted it as a final order, the synfuels plant would soon close, and Basin's members would be facing a large increase in their electric rates.

Once again, DGC turned to rally its friends and supporters. "We intend to fight this in every corridor and at every opportunity," said Sen. Conrad. "This is a totally unacceptable decision. The order could close the plant."

"Rallying support against decision" read the cover of Basin's Report magazine

(continued on page 101)



Sen. Conrad (right) told the news media that the law judge's decision was unacceptable and could result in closing the synfuels plant. With Conrad is DGC's Janssen.

William Guy: Key supporter of development and energy

Ver more than three decades, William Guy has provided key leadership – both as a North Dakota governor and later in public life – in bringing economic development and valuable energy to the state and to the nation.

Born in Devils Lake, Guy grew up in the tiny community of Amenia. He attended North Dakota Agricultural College in Fargo, served in the U.S. Navy and then returned to earn a master's degree from the University of Minnesota. With his wife, Jean, he returned to his home area to become an assistant county agent and also farm.

He was elected to the state Legislature in 1958, and in 1960 became the first member of the Democratic-NPL Party to be elected North Dakota governor. He was reelected to two two-year terms and two four year-terms, serving from 1961 to 1973.

Gov. Guy modernized state government and was instrumental in bringing sugar beet refineries, largescale electrical generation and other developments to North Dakota. His support was vital in the formation and development of Basin Electric Power Cooperative.

Gov. Guy became a major national figure, advising Presidents Kennedy and Johnson and chairing the National Governors' Conference. In 1976, he lost a U.S. Senate race to the incumbent and left politics.



Gov. Guy (right) appears with Basin Electric president C.R. Thiessen at the cooperative's 1964 annual meeting. Many believed Guy risked re-election to support the formation of Basin Electric in 1961.

However, he continued to be active in public life, including in electric power, water usage and economic development.

Gov. Guy recalled that when he left office in 1973, the nation's energy picture was rapidly changing. "Costly nuclear plants were being built, ethanol from corn was being subsidized, electrical power requirements were rising about 5 percent per year, a slurry pipeline from Wyoming coal fields to southern states – using piped water from South Dakota Missouri River reservoirs – was battling railroads for the right to cross their right of ways, solar energy, ground installed heat pumps, and wind energy were making their way into the energy mix," he wrote. "Coal-fired electric generating stations were being built, easily beating out bio-fired and natural gas fired electric generation when it came to cost per kilowatt."

Guy said that it was in the midst of this failing effort for the nation to become energy self sufficient that he was asked by the governors of 10 Western states to organize and serve as staff director of the Western Governors Regional Energy Policy Office.

In the mid-1970s, there was urgency regarding national energy. Guy said there was activity in Colorado to establish underground gasification by burning oil shale and extracting energy fluids. Coal gasification in the upper Missouri Basin appeared so positive, he noted, that the federal Fish and Wildlife Service had its top biologist head up an independent study to determine the effect on water supplies and the ecosystem of a potential 36 coal gasification plants in Montana and North Dakota.

"With petroleum and natural gas prices rising, and with the OPEC countries appearing to be able to control their exportable production to squeeze even higher prices, the extraction of gas or energy fluids from coal and oil shale seemed to be an energy source for the future," Guy wrote.

Guy returned to North Dakota to work as a consultant for Basin Electric, focusing on a new generation plant, coal reserves, water rights and generating plant location. "In a way, it was an intense period of time in which the ten year lead time needed to bring a coalfired electric generator on line could hardly keep up with the upward spiral of 5 percent annual increases in the electric power demand requirement studies," he said. "One of these intense requirements for Basin Electric was to build generating capacity in its system to serve a 90 megawatt demand of the flagship coal gasification plant well into construction in North Dakota."

The gasification plant was built and began operating in 1984. When the original consortium that built the plant abandoned the plant, the federal government put it up for sale to the private sector. Basin Electric purchased it through a new subsidiary, Dakota Gasification Company (DGC), in 1988. Guy, who was elected to DGC's first board of directors, retired from that position in November 2000.

Through the years, he remained a staunch supporter of the synfuels plant. "The value ... recognizes that coal is our greatest fossil fuel energy resource, and (the synfuels plant) is the only commercial sized research facility focused on coal to syn-gas conversion in the United States, as this country struggles to meet its ever growing energy demands," he said.

DGC's greatest success has been "its ability to accurately define the problems to be solved in converting high-moisture, high-sulfur, low-Btu lignite coal to synthetic natural gas" along with associated products "and then engage in successful continuing research to solve these problems." And his outlook for the company and its unique energy plant remained optimistic: "I hope DGC will be operated for at least another 25 years so it can thoroughly research cost cutting, new byproducts and coproducts, environmental

protection and technological advances in conversion of lignite coal to not only mankind's traditional uses but those uses yet to be discovered."





Gov. Ed Schafer (top photo) helped determine the serious impact closing the plant would have on North Dakota. A letter (bottom photo) signed by 24 members of Congress from the West and Upper Midwest disagreed with the law

(continued from page 98)

in January 1996. It detailed the swift and effective counterattack coordinated by Basin and DGC.

North Dakota Gov. Ed Schafer immediately called a meeting of state leaders and assembled a task force to determine the impact on the state from closing the plant, one of the state's largest employers. Working quickly, the task force subsequently reported that Great Plains represents \$500 million a year to the state's economy, similar to one of the state's two large Air Force bases.

North Dakota Attorney General Heidi Heitkamp also announced that the state would intervene in the action.

Twenty-four members of Congress from eight states registered their support for Great Plains, urging FERC chair Elizabeth Moler to continue backing the long-term operation of the facility. They also requested that FERC "carefully

Congress of the United States Washington, DC 20515

February 16, 1996

The Honorable Elizabeth Anne Moler Chair Federal Energy Regulatory Commission 888 First Street NE Washington, DC 20426

Dear Chair Moler: We are writing to you to express our concerns with regard to a matter currently before the Commission (docket #RM93-100-000). We request that this correspondence be placed in the

We are writing to yet #RM93-100-000). We require Commission (docket #RM93-100-000). We require Commission (docket #RM93-100-000). We require Commission (docket #RM93-100-000). We require Comparison (docket #RM93-100-000). We require the companies of the concerned that docket.
We are concerned that the judge's initial decision would force DGC to close the Great Plains (Coal Gasification Plant located near Beulah, N.D. Closing the plant would undermine Coal Gasification Plant located near Beulah, N.D. Closing the plant would undermine (Morrica's energy policy objectives and seriously impact electric rates of rural consumers in and Colorado).

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consider the effects that closing the plant would have on America's national energy objectives and on rural electric consumers in the States we serve."

"We believe this nation's energy independence remains a top public policy goal, and that the development of synthetic fuel technology and production remain vital components of reaching that goal," the Congressmen wrote. "The long-term operation of this one-of-a-kind projects remains an essential part of improving our nation's energy independence."

DGC quickly attacked the initial decision by the FERC administrative law judge. The company said FERC should reaffirm its commitment to Opinion 119, pointing out that it was the pipeline customers themselves who helped draft the gas purchase agreements and hadn't contested the settlements between DGC and the pipelines. Now, 15 years later, the customers want to get out of that agreement, according to DGC.

DGC also maintained that the administrative law judge had no authority to recommend retroactive refunds. FERC could only order future rate changes dating from the final order.

DOE also weighed in heavily in favor of the synfuels plant. The settlements are prudent, the federal agency said, because they resolved long-term court disputes, reformed high-price gas contracts, and protected the financial and energy-policy issues of DOE and taxpayers. "By keeping the plant operational, the technological, environmental and energy security and diversity concerns that prompted the Government's support for the Great Plains Project will continue to be addressed," DOE asserted. It was DOE's intent in 1988 to convey all its rights and privileges under the original gas purchase agreements to DGC, the agency argued, and DGC relied on the finding in FERC Opinion 119 that those agreements were prudent.

The three pipeline companies also backed the settlements. They contended that their consumers were better off with the settlements than under the original gas purchase agreements. They also argued that the cost for the settlements was cheaper than the anticipated outcome if they had gone to trial with DGC and lost.

Before a full hearing of FERC, the case for the synfuels plant continued. Sen. Dorgan urged the commission to reject the law judge's decision that would shut down the "technological marvel" operating in North Dakota. "This plant has exceeded everyone's expectations, both in the development and demonstration of synthetic fuels technology and in research which has led to new commercially viable byproducts such as fertilizers," he testified at the

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Congressman Pomeroy (right) discusses the gas purchase agreement issue with Janssen of DGC. Pomeroy joined with others who expressed their opposition to the FERC law judge's recommendation, which finally was reversed by FERC commissioners in December 1996. Washington, D.C., hearing. "It is important to North Dakota, and to our country, that this plant continue its valuable work."

Interestingly, when the administrative law judge's decision came out in December 1995, the attorney for the utility group offered this prediction to a reporter: "While anything can happen, I think it would be difficult to refuse the judge."

He underestimated the political support and leverage that DGC and its parent, Basin Electric, could muster in a year. As a result, in December 1996, FERC reversed the law judge's recommendation and approved the settlements involving DGC, the three interstate pipeline companies and DOE. And though the decision was unanimous, commissioners indicated that that they weren't happy with their options, choosing one that is "least objectionable."

With no parties filing for a rehearing, the settlements became final, avoiding an economic disaster for the synfuels plant, Basin Electric and the state of North Dakota.

The final action was good news. "The plant will have challenges in the marketplace, but the (FERC) ruling means that it will be free to compete," said Congressman Pomeroy.

In fact, one of those challenges resulted from the time it took to finally approve the settlements. During this drawn-out period, the pipeline companies had been paying DGC at a rate of \$3.70 per dekatherm for synthetic gas, which was significantly higher than the market price of natural gas. Because the pipeline companies were credited for their higher-than-market payments against their future demand payments, DGC saw its expected benefits dissipating as the settlement issue dragged on. By February 1997, the company had gotten about 75 percent of its demand payments. Instead of \$72 million annually over the next seven years, DGC now would receive about \$30 million a year through 2002 and then \$18 million a year for the final two years of the settlement period.

For DGC, that reaffirmed its long-time strategy of diversifying beyond the production of synthetic gas to ensure long-term operation of the synfuels plant. Even with that head start, the question remained: Would DGC have enough time to make the changes to ensure its survival through the 1990s?

Settlements become final but uncertainties remain

ast month, Dakota Gasification Company (DGC) dodged a regulatory bullet that would have shut down the synthetic fuels plant the company owns and operates near Beulah, ND.

That came with the Dec. 18, 1996, announcement that the Federal Energy Regulatory Commission (FERC) approved the settlements with three pipeline companies with no refunds. No party filed for a rehearing by the January 17 deadline so the three settlements are now final.

DGC General Counsel Mark Foss said this means that the three pipelines in the FERC order will make their 84 monthly demand

payments, rather than paying DGC the interim price of \$3.70 per dekatherm. DGC already has gotten 75 percent of those settlement payments. So, the company now will be paid the market value for its natural gas, plus \$30 million annually for the next five years. In the final two years, the annual demand payments will drop to \$18 million each year.

DGC's future was under a heavy cloud for the past year. FERC was considering what to do about the 1994 settlements between DGC and the three pipeline companies since an administrative law judge's initial decision in December 1995. On Dec. 18, FERC announced approval of those settlements, rejecting the administrative law judge's decision that the settlements were imprudent and ordering a refund to the pipeline's consumers.

FERC's decision was good news because the company avoided a disaster posed by a possible refund of more than \$270 million, Janssen said. "We're grateful for everyone's support, especially from the state's leaders and the North Dakota Congressional delegation."

But he cautioned that major obstacles remain for the company to ensure the long-term operation of the synfuels plant.

The challenges

Janssen said the order, if upheld, removes the immediate threat of closing the synfuels plant. "Now we have to move on to other challenges," he said.

The main challenge: DGC's production costs of natural gas are more than the market and about 75 percent of the settlement monies (to be paid over seven

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Chapter 9 Innovations and fertilizers

DGCX

nder Dakota Gasification Company (DGC), the Great Plains Synfuels Plant boosted its production of synthetic natural gas (SNG) from lignite coal to a much higher level. By 1992, the synfuels plant was routinely gasifying coal at the rate of nearly 160 million standard cubic feet (mmscf) per day, well above the design rate of 137.5 mmscf.

DGC had reduced its plant work force by nearly 30 percent, and yet the ingenuity shown by its dedicated employees kept the synfuels plant running with higher outputs of synthetic gas. In a report to Basin members in 1993, Kent Janssen, DGC vice president and chief operating officer, identified the efficiency changes made by employees in the past five years, including:

- Improved gasification and oxygen plant capacity;
 Installed larger, more efficient turbine drives for gas compression, allowing more product to be delivered into the pipeline;
 - Improved equipment maintenance and operating procedures resulting in better availability of gasifiers;
 - Installed new computer maintenance management system resulting in better planning, scheduling and completing maintenance work;
 - Increased the life of methanation catalyst materials by better removal of sulfur in the feed gas; and
 - Improved the gasifier coal feed by better coal blending, screening and crushing.



Fertilizers quickly grew to be more than just a financial byword at the Great Plains Synfuels Plant. With the installation of an innovative flue gas desulfurization facility or scrubber, the synfuels plant added another fertilizer, ammonium sulfate with the trademarked name of Dak Sul 45. This fertilizer is primarily marketed to the agricultural sector but also to homeowners (photo above). Shown at left are the ammonium sulfate storage dome at the synfuels plant and the rail loadout facility. By 1993, DGC's success in lowering costs while increasing revenues drove the company's net income to more than \$48 million.

But management and the board of directors had known from the start that the future of the synfuels plant couldn't rest entirely on making synthetic gas. The natural gas market was too volatile.

'Hallmark of high quality'

The primary key to further increasing revenues was in developing byproducts beyond the initial four – anhydrous ammonia, sulfur, tar oil and liquid nitrogen. Starting in 1989, DGC management and directors aggressively pursued that approach, spurred by the fact that the company kept all revenues from marketing byproducts. In that first year, DGC:

- Reached a 15-year agreement with Union Carbide Industrial Gases Inc. (now Praxair Ltd.) for the sale of krypton and xenon. Produced by the plant's air separation units, the rare gases are used in halogen headlights, fluorescent lighting tubes, lasers and high-intensity lighting. That required an investment of about \$4 million.
- Moved to invest more than \$20 million for a facility to produce phenol, which is used to make a resin in the plywood and chipboard industries. About 35 million pounds of this byproduct could be separated from the liquid streams of hydrocarbons used as boiler fuel to produce steam. It also would produce the same amount of a second stream of materials called cresylic acid. Cresylic acid, a mixture of chemicals related to phenol, is used to manufacture resins, pesticides and other products.
- Joined with Air Products and Chemicals Inc., Allentown, PA, to



demonstrate a commercial-scale, liquid-phase methanol production facility. The project was selected for funding under the Department of Energy's Clean Coal Technology Program. However, not all of the four interstate pipeline companies purchasing synthetic gas from Great Plains would agree to diverting gas to produce methanol. DGC eventually had to withdraw from the demonstration project.

In April 1990, those assembled for the groundbreaking of the phenol project heard about the spirit that had carried the pioneering plant and the company's dreams for the future.

Groundbreaking for a phenol plant at Great Plains took place April 2, 1990. Joining in the ceremony were (from left) Bob McPhail, DGC president and CEO; Al Lukes, synfuels plant manager; Clayton Hoffman, manager of Oliver-Mercer Electric Cooperative; Mike Pontbriand, phenol project manager; Ray Kruckenberg, DGC board member; Don Koch, Industrial Contractors Inc.; Kent Janssen, DGC vice president; Adolph Miller, Mercer County Commission chairman; and Gov. George Sinner. DGC President Bob McPhail told the group that the start of construction signaled a bright future for the plant and an economic boost for North Dakota. "The last five years the employees proved they could make SNG from coal," he told the gathering of local and state leaders. "The next phase is to prove that they can develop byproducts from coal."

Gov. George Sinner congratulated employees on their achievements in making the synfuels plant a technological success. "This plant and its technology are important to the state, the nation and to the nation's fragile energy supply," he said. "The people here at Dakota Gasification Company and their products are the hallmark of high quality."

By 1991, phenol and the other new byproducts had begun bringing in revenue, leading DGC to increase its byproduct revenue fourfold by the end of 1993 (\$16.9 million) compared to 1990 (\$4.2 million).

As noted earlier, DGC's out-of-court settlement with interstate pipeline companies in early 1994 served as a good prospect for stabilizing the future of the synfuels plant.



Demand payments from the pipelines were to come in over the next seven years to help give DGC a better financial outlook.

However, as the issue became drawn out before the Federal Energy Regulatory Commission (FERC), the market price for natural gas fell dramatically. And it appeared that those prices would remain depressed for the foreseeable future. As Janssen said, in Basin's 1995 *Annual Report*, "The prospect for staying in business based on natural gas production alone has become remote."

As a result, management and the board of directors decided to make strategic use of those early demand payments. Part of those monies went to help resolve a long-standing environmental issue while another portion was allocated to diversify further into the agricultural fertilizer market.

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Silhouetted against the evening sky, the columns of the new phenol plant represented a brighter future for the synfuels plant beginning in 1991.

Innovations reduce costs, help environment

Innovative projects at the Great Plains Synfuels Plant have been part of opportunistic efforts by management and employees toward lowering Dakota Gasification Company (DGC) expenses and helping the overall environment.

Some were pilot projects and have since ended; others are continuing. Following is an overview of those efforts:

Tree plantings

Employees initiated one of the first of these innovative projects in 1989. More than 14,000 trees were planted on a 40-acre site at the synfuels plant called "Centennial Woods," helping to commemorate the 100th anniversary of North Dakota's statehood. It was part of the state Centennial Commission's goal of planting 100 million trees in the state by 2000. At the tree planting dedication, DGC President Robert McPhail praised employees: "Their foresight and determination to get this project under way will provide a beautiful grove of trees for future generations to enjoy."

DGC leases another 30 acres of land owned by Basin Electric near the Leland Olds



Station, Stanton, ND, that contains 9,000 trees planted later.

Recycling refinery's tank residue

The synfuels plant began a cooperative effort with the oil refinery at Mandan, ND, to burn the residue from the refinery's oil storage tanks.

The sludge from the refinery normally is shipped out of state for disposal in a landfill. However, through an agreement in 1993 approved by the North Dakota Health Department, about 50 tons of these "tank bottoms" were mixed with coal and fed into the synfuels plant's 14 gasifiers to produce synthetic natural gas, byproducts and other valuable chemicals. Tank bottoms have about the same heating value as coal. DGC also gained some revenue since the refinery paid to have the sludge removed. Refinery officials said this process was cheaper than transporting the material out of state for disposal.

Later, DGC and the refinery submitted another pollution-prevention proposal to the Health Department to recycle other wastes in the synfuels plant gasifiers.

Gasifying used tires

In another test of disposing waste products through gasification, the synfuels plant has gasified used, discarded tires.

The state Health Department requested that DGC run the test to assist the state in recycling used tires rather than having them end up in landfills. The U.S. Department of Energy recently estimated that up to 3 billion scrapped tires are scattered across the nation's landscape.

In the test, the synfuels plant gasified about 70 tons of tires, representing 7,000 tires that had

been shredded.

Offering services

To enhance revenue, DGC began marketing certain services and equipment at the synfuels plant in the early 1990s.

The company developed extensive pilot-size solvent extraction and fractionation equipment and the analytical facilities to support byproduct development. Since these pilot facilities were no longer used full time, DGC decided to make those services and facilities available outside the company.

Another effort involved using the maintenance shop beyond its duties of maintaining operations through quick turnaround and minimum downtime for plant repairs as well as making spare parts. DGC acquired the necessary stamps from the American Society of Mechanical Engineers and the National Board of Boiler and Pressure Vessel Inspectors to design, fabricate and repair pressure vessels. By doing that, the maintenance shop was able to reduce costs and reduce downtime in upgrades to byproduct facilities.

With the certification for pressure vessels, DGC was able to offer the service to outside customers and generate additional revenue.

How the scrubber system works

Hot flue gas [1] is cooled by a solution of ammonia sulfate in a tower vessel called a prescrubber [2].

The flue gas then flows to a similar vessel called an absorber [3], where ammonia and water are introduced. Sulfur dioxide is removed [4] in the absorber when the ammonia reacts with it to form ammonium sulfate.

Scrubbed flue gas flows [5] to the atmosphere through the 400-foot-tall chimney while a bleedstream of the ammonium sulfate solution [6] is sent to the prescrubber. In the prescrubber, the ammonium sulfate is crystallized by evaporation and drawn off [7] in a slurry, which flows to a dewatering system.

A hydroclone starts the process of separating the crystals from the liquid and centrifuges complete the process, producing a dry cake of ammonium sulfate. The process water from these steps is recycled [8] to the prescrubber.

The dry cake is moved [9] to a compaction system where it is formed into a high-value granular ammonium sulfate fertilizer. A 50,000-ton dome [10] stores the fertilizer on the plant site until it is shipped by rail or truck.

(continued from page 108) A pioneering solution to an environmental issue

Putting emission controls on a plant as unique as the gasification facility at Beulah proved to be a challenge right from the start.

Before the gasification plant was even constructed, an agreement was reached on a process to control sulfur emissions from the facility. In 1977, the U.S. Environmental Protection Agency and North Dakota Health Department approved the Stretford process as the best available control technology to remove those emissions at the gasification project. Information from that technology was used to set the emission limits that became part of the original construction permit issued to the Great Plains Gasification Associates, the consortium that built the plant.

In the Stretford process, the sulfur-laden raw gas is scrubbed with a complex solution that produces physical and chemical changes in the gas, resulting in removal of the sulfur. However, there were immediate problems with the process. The unit plugged up and wasn't as efficient at sulfur removal as predicted. As a result, the synfuels plant emissions were at about 5,000 pounds of sulfur per hour – nearly four times the rate allowed in the permit.

After some study, ANG Coal Gasification Company, the plant's operator, decided to change to the Sulfolin process, which is basically the same as Stretford except that a different chemical solution is used for removing the sulfur. That process worked better but still hadn't brought the synfuels plant into compliance with the limits set in the construction permit.



It is important to note, however, that the synfuels plant has always met federal and state standards for air quality surrounding the plant. An extensive network of air quality monitors has been verifying that on a regular basis over the years. Ambient air standards ensure that human health and welfare is protected in the region where the energy plants are concentrated.

However, when Basin considered purchasing the synfuels plant, the cooperative's leaders were aware that the facility had unresolved environmental problems and that it would take both ideas and money to address them. At the time of the sale, the Department of Energy (DOE) – which owned the plant and was trying to sell it – indicated that \$22 million in modifications would bring the plant into compliance with the Clean Air Act and thus able to receive an operating permit. DOE set up an environmental trust fund of \$30 million for that purpose, which Basin assumed would cover the changes needed.

At first, DGC considered installing a parallel Sulfolin system to lower sulfur emissions, but that didn't appear to be efficient. Finally, in late 1990, the company proposed controlling sulfur dioxide (SO2) after combustion in the boilers using a flue gas desulfurization system, commonly known as a scrubber. DGC planned to install a wet limestone scrubber, similar to those used in electric generating plants. The process involves injecting a mixture of water and lime or limestone into the flue gases, causing a chemical reaction that "scrubs" the SO2 from the combustion gases before they are vented into atmosphere.



Ammonia scrubbing system

Flue gas desulfurization (FGD) systems remove sulfur dioxide from combustion flue gases using a chemical reaction. Sulfur dioxide is removed when a reagent reacts with it and changes its form. FGDs are commonly called scrubbers because they scrub sulfur dioxide from flue gas.

The first commercial application of an ammonia-based scrubbing system was done at the Great Plains Synfuels Plant in 1996. The patented process developed by General Electric Environmental Systems removes sulfur dioxide from flue gas while producing a high-value ammonium sulfate fertilizer. The process uses standard FGD equipment, like the wet scrubbing systems in many power plants, substituting ammonia as the reagent rather than lime or limestone.

The process may make high-sulfur boiler fuels economical because the sale of the fertilizer offsets scrubber operating costs and can generate revenue for the company. The increasing need to replenish depleted sulfur from soils makes the production of ammonium sulfate an ideal product for sale in an agricultural market. About 150,000 tons of ammonium sulfate are being produced each year at the synfuels plant.

(Reprinted from Basin Electric Annual Report)



The granules of ammonium sulfate helped to put DGC and the synfuels plant into good financial hands, at least for the moment. From the start, the synfuels plant also had another environmental concern. Odors from the synfuels plant had been drawing complaints from neighbors, particularly in the hot summer months. As part of its proposal, DGC planned to put controls on the gasifier lock vents that would reduce both emissions of coal particles as well as odors.

With the approval of the state Health Department, DGC moved ahead with its plan to bring the plant into environmental compliance. Though it committed to spend \$65 million toward the fix, the estimated cost had climbed to between \$90 million and \$100 million, well above the DOE's estimate during negotiations to purchase the plant.

After hearings, the Health Department issued a

revised construction permit in March 1993. In approving the plan offered by DGC, the department required the company to install a scrubber to lower SO2 emissions from the plant's main stack within four years.

During this process, company management reviewed the company's overall situation and began thinking about an out-of-the-box approach to this environmental issue.

Conventional scrubbers use lime or limestone as the reagent in the scrubbers to remove SO2, a process that leaves sludge that must be disposed of in an approved landfill. However, DGC set up a pilot plant to look at a different reagent – anhydrous ammonia – in the scrubber that would produce a valuable fertilizer byproduct – ammonium sulfate – instead of waste. By doing that, DGC could offset the cost of operating the unique scrubber, rather than simply facing the cost of \$10 million a year in operating costs for a conventional scrubber.

DGC would have another byproduct to sell, a very pure, granulated ammonium sulfate fertilizer.

This innovative approach provided answers for several key questions facing DGC. First, the company had made a commitment to solving this long-time environmental deficiency. The source for that commitment came from the

decades-old environmental policy established by the parent, Basin Electric, which reads, in part: "That a clean and healthy environment, which we all need and enjoy, must be maintained and that the energy industry must do all that is feasible to minimize the negative impacts on the environment."

With low natural gas prices, the company also sought ways to diversify its operations.

DGC was joined by General Electric Environmental Systems Inc. (GEESI) of Lebanon, PA, in successfully demonstrating the technology in the pilot project at the synfuels plant. General Electric termed the project



"an important breakthrough" in scrubbing technology and offered to review the demonstration at a DOE scrubber symposium.

However, GEESI's technology hadn't been used commercially before so the synfuels plant and its employees again would find themselves in the familiar role of a pioneer. "We took some risk to go ahead with this technology, but it was a way to minimize the cost of scrubbing and potentially give us a profit by making ammonium sulfate," said Janssen, who retired as DGC vice president in 1998. "We see that as a benefit to farmers and a cost savings to DGC."

Based on its research, DGC projected it could find markets for the estimated 150,000 to 200,000 tons of ammonium sulfate produced annually from the scrubber, an amount that represented about 10 percent of the fertilizer use in the United States. With scrubber construction under way in 1994, the company hired a marketing firm, H.J. Baker & Bro. of Stamford, CT, to handle the sale of the ammonium sulfate under the trademark name of Dak Sul 45. Plans were to market the general-purpose fertilizer in the Pacific Northwest, Midwest and Great Lakes regions, and in the Canadian provinces of Manitoba, Ontario and Saskatchewan.

DGC spent nearly \$100 million on the scrubber, including \$30 million from the trust fund set up by DOE. Beginning operation in 1996, the scrubber initially proved not as reliable as DGC expected. Ironically, the scrubber produced its own environmental problems, emitting tiny fertilizer particles and creating a visible plume from its stack. An additional \$8 million was invested by the company to improve reliability, but the problem of the plume remained.

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Kent Janssen: A career in helping to develop lignite

The man who helped develop an abundant natural resource – lignite – to serve the growing energy needs of rural America closed out his busy career after more than 40 years.

Kent Janssen's achievements include overseeing major power plant construction and helping guide the Great Plains Synfuels Plant through its first 10 years. He retired in September 1998 as vice president and chief operating officer for Dakota Gasification Company (DGC).

Janssen is credited with both helping lead Basin Electric Power Cooperative into a new era as well as serving DGC through challenging times. He had been DGC's chief operating officer since Basin Electric purchased the synfuels plant in 1988 through DGC.

Starting out

In 1961, Basin Electric was formed as a regional cooperative to provide supplemental power to the farms and ranches in the upper Midwest. By 1966, the Cooperative's first generating unit the Leland Olds Station (LOS) became operational near Stanton, ND. And Stanton happened to be the birthplace of Janssen, whose grandfather worked the same lignite seam that provided the fuel used for LOS. With his engineering degree in hand from North Dakota State University, Janssen went to work for Babcock and Wilcox Co.



In a 1980 ceremony, Kent Janssen (right), Basin's production manager, and General Manager Jim Grahl (center) accept an award for air-pollution control from Gus Speth, chairman of the President's Council on Environmental Quality.

(B&W), Alliance, OH, focusing on research projects related to fuel combustion, nuclear power and coal gasification.

He became results engineer at LOS in 1966 and, eight years later, moved into Basin's headquarters in Bismarck to oversee construction of the Laramie River Station (LRS), Wheatland, WY. Two years later, he became production manager, overseeing the addition of power plants in not only Wyoming but also North Dakota and South Dakota.

Heading negotiations with ANG

While LRS was being designed, Basin's membership needs showed that the Cooperative didn't have enough

electric capacity for the east side of the system. Coincidentally, American Natural Gas Co. (ANG) had come to North Dakota to visit utilities about power supply for its proposed coal gasification facility, and Basin Electric suggested the possibility of a joint project involving its need for a new electric generating plant. Janssen headed Basin's negotiations with ANG on the resulting agreements for a joint project, which would be unique in its planning. It called for joint use of water, rail and coal delivery facilities between Basin's new generator, the Antelope Valley Station (AVS), and the nation's first coal gasification project.

With work starting in 1978 on AVS, Janssen said the biggest challenge came in getting the intake structure installed to provide water from Lake Sakakawea to the side-by-side energy plants. With ANG having financial and other problems, Janssen said a new agreement was renegotiated, leaving to Basin the construction, operation and ownership of the joint project's shared facilities, such as the intake structure.

Work leads to award

Janssen also played a key role in developing the dryscrubbing technology for removing sulfur dioxide (SO2) from power plant flue gases. At that time, the few wet scrubbers that had been installed at generating plants were having serious operating difficulties.

In fact, dry scrubbers were seen as being less costly to own and operate, but the technology had not been demonstrated at that time. Joining with several potential equipment manufacturers, Janssen worked to pilot the process on lignite initially in the second unit at LOS and later at several other units. Eventually, dryscrubbing technology was incorporated into Unit 3 at

LRS and both units at AVS.

Because of this work, Janssen was asked to present a paper on this new technology at a Department of Energy symposium. As a result, Basin Electric earned an award for air-pollution control from the Environmental Industry Council and the President's Council on Environmental Quality in 1980. Since then, dry scrubbers have become the standard for many industrial boilers across the country.

In 1985, Janssen moved up again, becoming deputy general manager at Basin. When the gasification project went up for sale in 1987, he assumed the lead role in the Cooperative's bidding for that facility.

After Basin's membership voted to purchase the gasification project in 1988, Janssen was offered the job to oversee the operations of the new subsidiary, and the veteran of the coal-fired electric business began a new career.

Admittedly his heart remains in his achievements at Basin Electric, but Janssen says the challenges in his years at DGC were noteworthy, too. And Janssen credits employees for their work to make the gasification plant beneficial to the federal and state government, area communities and Basin's members.





A contractor does some preliminary work in 1995 on the project to install a flue gas desulfurization (or scrubber) unit that uses anhydrous ammonia as the reagent.

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invested by the company to improve reliability, but the problem of the plume remained.

DGC was able to improve the scrubber's operation to meet the 1993 state permit by removing more than 93 percent of sulfur from the gases coming from the plant's main stack. Despite its efforts, the company received a violation notice regarding the scrubber's performance from the state Health Department in late 1997. However, Health Department officials did recognize the effort by DGC. One department official told a newspaper reporter that "it has been a very worthwhile effort to try to improve technology that's available out in the world. They have made some improvements ... but not enough to get it into compliance."

In a negotiated consent agreement, DGC and the state Health Department spelled out improvements that the company would make in the scrubber to reduce or avoid a penalty of \$1.3 million. Under the agreement, DGC would install a wet electrostatic precipitator costing an estimated \$35 million to reduce the plume and lower emissions of fertilizer particles. A wet electrostatic precipitator uses an electrical charge to remove fine particles from gases before being released to the atmosphere.

"This new equipment will solve environmental problems ironically created by operation of the synfuels plant's flue gas desulfurization equipment," said Al Lukes, the former plant manager who became DGC's vice president and chief operating officer in the fall of 1998.

Besides committing to bring the scrubber into compliance, DGC agreed to address the odor problem by installing equipment known as an "air stripper." With this project estimated at \$5 million, the idea is to reduce the odors coming from another source, the makeup water in the plant's cooling towers.

Lukes said the Health Department has worked with the company in addressing the issues. "Because of the cooperative way the agreement was developed, I view this as an opportunity to finally be in full compliance with North Dakota's environmental regulations," he said.

Another fertilizer boost

As this innovation was being developed, another idea for DGC's growth in the fertilizer business took root.



The synfuels plant had been recovering a small amount of anhydrous ammonia from the gasification process and marketing it as an agricultural fertilizer since the plant's startup 1984. Production was about 25,000 tons per year.

With the early settlement payments from the pipelines, the company saw greater opportunities in the fertilizer business in the mid-1990s. It would install an anhydrous ammonia facility at the synfuels plant.

There were several factors that prompted this strategy. First, the market was good. Increased use by both agriculture and industry had pushed fertilizer prices up considerably, reaching the \$300-per-ton range by early 1994. That was nearly double what the price had been for the past several years. Prices were projected to continue strong for some time.

Along with that potential business opportunity, the company was watching as natural gas prices continued to fall, dropping below \$2 per dekatherm and

Construction of the scrubber at the synfuels plant is well under way at left in this 1996 photo. At right work coutinues on the anhydrous ammonia facility that would provide more fertilizer for market as well help feed the new scrubber.



DGC's sales marketing team in Denver includes (standing, from left) Joel Gesink, JoNell Guscette, Ray Hattenbach, and Ted Koerner. (Bottom photo) Gigantic process vessels for a larger anhydrous ammonia plant are enroute by train to the synfuels plant from a disassembled plant in Iowa. DGC's cost of production of about \$3 per dekatherm. That made anhydrous ammonia more valuable than natural gas, even based on the lower fertilizer prices of the early 1990s.

Another reason was linked to the unique scrubber that the company was constructing. More anhydrous ammonia would be needed to operate that environmental equipment. With an anhydrous ammonia plant, the company would divert about 20 percent of its raw synthesis gas, converting it into about 1,000 tons of fertilizer per day.

DGC convinced the state of North Dakota to join in the project. In the past, state leaders had lobbied for byproducts from the gasification plant that would benefit agriculture and the state.

With this project to benefit agriculture, the state Industrial Commission agreed to provide a grant and loan totaling about \$12 million.

Initially the cost of the fertilizer project was about \$80 million. The company opted to purchase an existing anhydrous ammonia plant at Fort Madison, IA, hoping to get the facility on line quickly to take advantage of the favorable market as well as feed the new scrubber. And, compared to a new plant cost of about \$135 million, it was projected to be a much lower investment.



It was quite a task, dismantling the Iowa plant and shipping the parts, including three huge process vessels weighing a total of 500 tons. The parts came by barge and rail for reassembly at the synfuels plant in North Dakota.

Plans for marketing fertilizer included putting together a sales team in Denver, which served as the hub for contacts and transportation for marketing fertilizer and other byproducts. Anhydrous ammonia from the synfuels plant would be sold to wholesalers for distribution throughout the region.

But problems arose with the fertilizer project. More engineering and construction were required than originally estimated, and a were required than originally estimated, and a severe winter in 1996-97 hampered the work and startup. As a result, the cost of the anhydrous ammonia plant increased significantly and delayed the startup until January 1997.

The company had been leasing more than 100 railcars for byproduct shipments. For efficiency and ensuring timely shipments of both fertilizers, DGC decided to purchase another 300 railcars – 200 tank cars for anhydrous ammonia and 100 hopper cars for ammonium sulfate. For financial reasons, the rail cars were later sold and then leased back.

Even with these investments and good operation of the synfuels plant, management and directors knew that the survival of this unique energy plant continued to depend on the market. Favorable prices would be needed for its natural gas, fertilizers and chemicals.

It would take the ingenuity of employees and management as well as an international energy project to help put the synfuels plant on more substantial footing for the future.



Chapter 10 Marketing the hidden value of lignite

A myriad of chemicals and products potentially can be extracted in the gasification process at the Great Plains Synfuels Plant.

Just four – anhydrous ammonia, tar oil, liquid nitrogen and sulfur – are considered original byproducts that were produced when the synfuels plant began operation in 1984. Those products required little or no additional processing before marketing.

Among the potential byproducts that have been considered or studied are methanol, gasoline, diesel fuel and jet fuel. For economic and other reasons, they were not pursued.

Other byproduct potential lies in mixed catechols, chemicals with uses that include making an economic "plasticizer" that makes concrete flow well with less water and yet adds to its strength.

To date, the new byproducts and products actually developed and marketed by Dakota Gasification Company (DGC) have added considerably to the revenue from diversification in recent years.



Chemicals and byproducts from the Great Plains Synfuels Plant are marketed worldwide and can be found in products consumers use every day. Byproduct sales have added considerably to the company's financial strength.



Ray Hattenbach, general sales manager for DGC, has helped to provide the strategy for marketing the company's byproducts.

For example, in DGC's first year of operation, byproducts totaled just over \$4 million in revenue, about 2 percent of the company's overall income. In 2000, byproduct sales had gone up nearly twenty-fold, reaching more than \$78 million. Sales of byproducts now represented more than 30 percent of DGC's total gross revenue.

This growth is the result of a concerted effort by the company since 1988 to reinvest in projects that produce marketable byproducts and products. By 2000, DGC had put \$350 million into diversification, including byproduct development, environmental projects and other plant improvements.

Six major byproducts account for virtually all of the company's income outside of synthetic gas. In 2000, those totals were as follows: anhydrous ammonia, \$40.8 million; ammonium sulfate, \$16.8 million; crude cresylic acid, \$8.9 million; phenol, \$5.5 million; naphtha, \$2.6 million; and krypton/xenon, \$1.6 million.

Ray Hattenbach, DGC's general sales manager, said production of the most important byproducts from the synfuels plant increased in 2000. With higher energy prices in that period, commodity prices worldwide also increased, pushing DGC's byproduct revenue upward since its byproducts are commodity chemicals. Great Plains produces many byproducts. Following is a synopsis of the major byproducts along with marketing outlooks (as of late 2000):



Anhydrous ammonia

Production capability: 350,000 short tons Uses: Fertilizer, refrigerant

Used as a fertilizer, this gas is shipped in liquid form by tank truck or railcar from the synfuels plant.

By the late 1990s, prices for this fertilizer had reached historic lows, causing DGC to reconsider its production and marketing options. Lower prices have been the result of several factors. More foreign fertilizer plants that have low-cost gas for feedstock contributed to an over supply of the product, Hattenbach said. At the same time, a downturn in the economies of Asian countries resulted in a tremendous drop in the demand for fertilizer, he said.

However, in the United States, dramatic changes occurred in the fertilizer

industry in the year 2000. Prices for natural gas – the primary feedstock for producing anhydrous ammonia – more than doubled, forcing marginal plants across the country to shut down, Hattenbach said.

Meanwhile, several world-scale plants in Trinidad had production problems, and, with poor market conditions, the Mexican government closed several plants for long periods. And, during the past year, construction of three new huge fertilizer plants continued in Trinidad, Argentina and Venezuela.

As a result, in the last half of 2000, the world fertilizer market has turned around. Fertilizer prices recovered from record lows to near five-year market highs, Hattenbach said.

DGC drastically altered its fertilizer production strategy due to the combined effect of higher natural gas prices and fertilizer production at the synfuels plant in the summer of 2000. At times, it was more profitable for DGC to sell all of its natural gas rather than convert a portion into anhydrous ammonia.

With high natural gas prices, DGC became one of the more efficient producers of anhydrous ammonia in the United States. Therefore, Hattenbach said, the company was able to diversify its markets and increase its overall market penetration in competition with imported fertilizer. DGC's expanded market now includes industrial customers in Nevada, Wyoming, Canada and Illinois while still maintaining its traditional agricultural markets in North Dakota, South Dakota, Montana, Nebraska, Minnesota and Washington.



Production capability: 150,000 short tons Uses: Fertilizer



Sales were lower for the 1999 season due to extremely wet conditions in Canada, North Dakota and Nebraska, which are three target agricultural



Fertilizers sold throughout **North America**

Products from DGC support agriculture



Markets for anhydrous ammonia only Markets for anhydrous ammonia and ammonium sulfate Additional markets for ammonium sulfate only ★ Warehouse locations for ammonium sulfate

markets. Hattenbach said the marketing goal is to continue to supply the market base developed by H.J. Baker & Bros. Inc., the Connecticut firm hired to market the fertilizer.

As part of its marketing plan, DGC trucks and rails its fertilizer to leased storage sites in California, Washington, Nebraska, Idaho, Indiana, Iowa and Minnesota as well as Manitoba and Saskatchewan in Canada.

> Production capability: 33 million pounds Uses: Resins for wood products, foundry molds, paper and industrial coatings, pipe insulation



Used for resins, plastics, disinfectants and pharmaceuticals, this byproduct is a white, crystalline solid that is separated from the hydrocarbon stream used as a boiler fuel to make steam in the gasification process. It is shipped as a liquid by rail tank car.

With new plants coming on line, phenol suppliers are chasing the customers. This over-supply situation particularly affects smaller producers like DGC. Its annual production represents less than 1 percent of the North American supply.

Currently the company's biggest customer is a Canadian resin manufacturer. As a small supplier, DGC has a marketing challenge in trying to make successful spot sales to bigger customers, according to Hattenbach.

Cresylic acid

Phenol

Production capability: 33 million pounds

Wire enamel solvent, phenolic and epoxy resins, antioxidants, manufacture of pesticides

Derived from the same stream as phenol, this liquid is use as a wire enamel solvent, for resins and antioxidants and in the manufacture of pesticides. Shipment is by railcar.

With an international shortage of cresylic acid continuing from mid-1999 through 2000, this byproduct has been the marketing "bright spot" at the moment, Hattenbach said. The company's entire product is sold to a new conglomerate called MeriSol, which delivers it throughout the world.



Krypton and xenon

Production capability: 3.1 million liters Uses: High intensity lighting, lasers, thermopane window insulation

These are rare gases used for high-intensity lighting, lasers and thermopane window insulation. DGC has a contract with Praxair Ltd. to take the plant's total production.



Naphtha

Production capability: 7 million gallons Uses: Casoline bland stock, solv

Gasoline blend stock, solvents benzene production

About 75 percent of the plant's naphtha – benzene, toluene and xylene – is being sold by DGC, with some reserved as a fuel for Great Plains. The buyer is a Citgo refinery in Chicago. Hattenbach said DGC could easily market the full amount of this byproduct.



Liquid nitrogen

Production capability: 24 million gallons Uses: Cryogenic storage medium, oil well additive, chemical processes

The production and sale of this byproduct varies. Used in refrigeration and enhanced oil recovery, liquid nitrogen has been marketed to food processors, oil service companies and other businesses.



Carbon dioxide

Production capability: 40.2 billion cubic feet Uses: Secondary oil recovery by injecting into old oil wells

Carbon dioxide (CO2) long has been considered a likely product to be marketed from the Great Plains Synfuels Plant. How it finally became a reality deserves special attention.



CASEM

Cenex is one of the many customers for anhydrous ammonia from Great Plains. A Cenex representative (photo left) demonstrates the application of fertilizer on a field in North Dakota. The sale of Dak Sul 45 is enhanced through advertisements (below) focusing on ownership of the company by the electric cooperatives in the Upper Midwest region.

Helping things grow, In more ways than one

DAK SUL 45^R is a quality fertilizer produced at the Great Plains Synfuels plant near Beulah, ND. The plant is owned by the region's electric cooperatives through Dakota Gasification Company. Those co-ops have been providing reliable electricity for more than 50 years. Now they're also helping to further strengthen our rural economy by developing new products to add value

to agriculture while creating new jobs,



Chapter 11 An international energy venture

The idea for selling carbon dioxide (CO2) from the gasification plant arose well before the project was being built in the early 1980s.

The focus was to use CO2 from the plant for injecting into aging oil fields and recovering oil that otherwise would be lost. In particular, enhanced oil recovery using CO2 from Great Plains would make economic sense for certain reservoirs within the huge Williston Basin field underlying parts of North Dakota, South Dakota and Montana in the United States and Manitoba and Saskatchewan in Canada.



Enhanced oil recovery is the term for the process of injecting either a gas or liquid into a reservoir to scrub out oil remaining after both pumping and water flood are no longer productive.

Originally about 4.5 billion barrels of oil were located in medium and larger reservoirs in the larger North Dakota portion of the Williston Basin. After using primary and secondary recovery (water flood) methods, it is estimated that about 335 million barrels remain recoverable by using CO2 flooding. Midale and Weyburn, two large oil fields in Saskatchewan, also had been identified as good candidates for recovering more than 350 million barrels of oil through enhanced oil recovery methods using CO2. Using carbon dioxide (CO2) for enhanced oil recovery in the Williston Basin has been studied for many years. When Dakota Gasification Company (DGC) bought the Great Plains Synfuels Plant, selling CO2 from the plant became part of the diversification strategy with the prospect that higher production in the region's oilfields would result in increased electric sales for the members of Basin Electric Power Cooperative. (Photo left) On Sept. 14, 2000, the strategy became reality as DGC field technicians Mike Carr (left) and Tim McEvers opened the valve that let CO2 flow into a pipeline from Great Plains into Canada.


The process in removing the oil is different in CO2 injection or tertiary recovery, compared to secondary recovery or water flood. Water flooding is generally used to increase the pressure in the oil reservoir to try to improve production. However, when CO2 is pumped underground, it dissolves into the oil and acts as a solvent to scrub oil trapped in rock pores.

Typically, CO2 for enhanced oil recovery in the United States has come from naturally occurring deposits, such as the large field located in southwestern Colorado. Because of the 750-mile distance to the Williston Basin, that field is not considered a viable CO2 source

The Williston Basin is a large reservoir of oil that lies beneath the region and spans the border between the United States and Canada. for the Williston Basin, according to a report by Ray Hattenbach, general sales manager for Dakota Gasification Company (DGC). There also is a large CO2 gas field in southwestern Wyoming, as well as fields discovered in British Columbia in Canada. However, these also present problems of distance and cost for delivering CO2 to the Williston Basin.

Another potential source is taking CO2 from the flue gases emitted by coalfired power plants. However, engineering studies have shown this process is not economical.

That means the only economically viable source of CO2 for enhanced oil recovery in the Williston Basin is the synfuels plant, Hattenbach concluded.

As early as 1983, one American oil company, Amerada Hess, proposed the construction of a CO2 pipeline from the gasification plant to major oil fields in western North Dakota.

Despite this interest over the years in CO2 enhanced oil recovery, no oil companies took the initiative for actually developing a project. With one eye on oil prices, oil companies would have to invest in facilities for injecting CO2 in their fields. However, for years, none had been willing to allocate the manpower or the dollars to put together a commercial project, said

What is CO₂ miscible flooding?



The most common enhanced oil recovery technique is a water flood, which involves pumping water into the oil reservoir to increase pressure and boost production. This has been applied to the Weyburn field for more than 40 years. PanCanadian has also drilled a series of more closely spaced vertical wells and horizontal wells to increase production.

The next phase of enhanced oil recovery is the injection of CO2, which mixes with the oil. The two compounds dissolve into one another. The CO2 acts as a solvent to overcome forces that trap oil in tiny rock pores. It helps sweep the immobile oil that has been left behind after the effectiveness of water injection falls off.

The CO2 miscible flood technology is a proven process that swells oil in deep reservoirs to help move the medium weight oil to the surface. When the reservoir pressure rises, the injected CO2 creates a bank of oil that is being driven to the surface. CO2 also increases the volume of the oil and lowers its viscosity, making it easier to pump.

Ideal conditions for miscible flood include a depth of at least 2,500 feet to allow for the high pressures needed to ensure miscibility of oil and CO2 and a specific quality and quantity.

The Weyburn Unit is an ideal candidate for miscible flood technology because of the crude oil quality and the reservoir average depth is 4,655 feet.

(Reprinted from <u>Basin Today</u>)



Hattenbach.

That proved frustrating for management and directors for Basin Electric and its subsidiary, DGC. They were well aware of the potential use for the plant's CO2-rich waste gas, which was being burned in the boilers for its fuel value before being vented into the atmosphere. In Basin Electric's annual reports of 1989 and 1990, management noted benefits for both the company and parent organization. While DGC's revenues would certainly rise from the sale of CO2, a project at the synfuels plant would benefit Basin Electric and its member systems because of the larger electric load required, thus generating more income for Basin. In addition, Basin and its member cooperatives in the region would see benefits from increased electricity sales resulting from the extension of oil field production.

Dakota Gasification had on-and-off discussions about the potential for a pipeline project with both American and Canadian companies for several years beginning in 1988. More interest came from two large Canadian companies, PanCanadian Petroleum Ltd. and Shell Canada.

Talks picked up when Shell Canada began a large-scale field pilot test of CO2 injection in the Midale field in 1992. As a result, DGC hired an engineering firm to prepare a pipeline design and feasibility study for a route from Great Plains to the Canadian border. Included in the pipeline design were taps that would allow delivery of CO2 in the future to oil fields in western North Dakota and eastern Montana.

In 1995 discussions finally turned into contract negotiations and a preliminary agreement between DGC and PanCanadian, Canada's second largest oil and natural gas producer with interests worldwide.

The agreement called for DGC to supply about half of its available 240 million standard cubic feet (mmscf) daily of CO2 to the Weyburn field operated by PanCanadian in late 1998 or early 1999. The Weyburn field had 37 owners, including PanCanadian. In its 1996 annual report, the Calgary-based PanCanadian reported to its shareholders on a proposed "future mega-project" involving \$1 billion (Canadian) over five years at the Weyburn unit, making it the company's single largest capital commitment in its history.



However, the cyclical project turned sour again in the fall of 1996. PanCanadian informed DGC that it had been unsuccessful in trying to gain tax incentives from the provincial government regarding the project.

The announcement meant a year delay in completing the project. For DGC, at the time, that was not necessarily bad news. The company itself was in a holding pattern, awaiting a final decision by the Federal Energy Regulatory Commission (FERC) on its 1994 settlements with interstate pipeline companies over gas contracts.

Finally, in October 1996, PanCanadian officials said they were ready to move ahead on the project but at a lower amount of 95 mmscf per day. That change caused DGC to revise its engineering designs as well as pricing.

With FERC approval of the pipeline companies' settlements in early 1997, another cloud was removed for management and directors, who'd been struggling for years with environmental, financial and legal issues of the synfuels plant. For a final reassurance on the CO2 project, Dakota Gasification hired an engineering firm to review the plans, figures and proposed contract. Its conclusion, given to directors and management in May

1997, was positive. The costs and schedule were reasonable, the contract carried minimal risk and the project appeared economically feasible.

With that study in hand, DGC went ahead on July 15, 1997, to sign a contract with PanCanadian, launching an international energy venture.

Signing the 15-year contract were the two chief executive officers – DGC's Bob McPhail and PanCanadian's David Tuer. The deal was for DGC to pipe up to 95 mmscf of CO2 more than 200 miles from the synfuels plant at Beulah to the 40-year-old Canadian oil field, which is expected to produce an additional 140 million barrels of oil from the CO2 injection. DGC In an international deal, David Tuer (left), president and CEO of PanCanadian, and Bob McPhail, president and CEO of Dakota Gasification Company, shake hands after signing a contract July 15, 1997, that would send CO2 from the Great Plains Synfuels Plant in the United States to an oil field in Saskatchewan, Canada.





The 205-mile route of the pipeline carrying CO2 from the synfuels plant to Weyburn, Saskatchewan, would mean crossing under Lake Sakakawea.

countries."

Political dignitaries joining in the ceremony were North Dakota Gov. Ed Schafer and Saskatchewan Deputy Premier Dwain Lingenfelter. North Dakota's congressional delegation – Sens. Kent Conrad and Byron Dorgan and Rep. Earl Pomeroy – participated by satellite hookup from Washington, D.C.

The contract meant that PanCanadian would be taking 40 percent of the total available CO2 from the synfuels plant. DGC would own and operate the 167 miles of pipeline within North Dakota while a Canadian subsidiary, Souris Valley Pipeline Ltd., was formed to own and operate the 35 miles in Canada.

With oil prices dropping and natural gas and other commodity prices down at the time, DGC's leadership again found themselves in stressful times. The company began looking for additional funding from various sources for the project, including Basin Electric, U.S. Department of Energy (DOE), Lignite Research Council, the state of North Dakota and others.

Part of that effort was to convince North Dakota legislators to agree to a 10year property tax exemption for the new facilities. Legislators agreed during

would spend about \$110 million to build the pipeline and compressor, receiving \$15 million to \$18 million in net revenue from PanCanadian once the CO2 begins flowing in the pipeline.

"The pipeline will become an international energy project that helps in the recovery of a valuable resource," said McPhail, at the ceremony in Basin Electric headquarters in Bismarck. "It's good news for Dakota Gasification and PanCanadian. It's also good news to the economies of Saskatchewan and North Dakota and the surrounding region because of the potential for enhanced oil recovery projects in the Williston Basin."

Tuer called the signing a "significant milestone for both companies and for two

Employees see a brighter future



(Employee reactions were noted in a company publication when the carbon dioxide agreement was signed in 1997. Following are excerpts from that story.)

eelings of relief and hope for a bright future filtered through the Great Plains Synfuels Plant as the contract to export carbon dioxide (CO2) was signed with officials of PanCanadian Petroleum Ltd.

After crunching numbers for the last four years,

Bob DeMaria, rotating equipment engineering supervisor, and Bob Fagerstrom, process engineering supervisor, said there is no doubt in their minds that this is a great opportunity for the synfuels plant. They were very pleased to see the project get approval. "We conducted many studies and optimizations, and we knew it was a winner!" said Fagerstrom.

DeMaria added, "We found it to be a very good investment when you can create revenue from a waste product that has been used as a low-value fuel."

DeVane Webster, engineer, says he, too, was relieved to hear the news. "This is something everyone has been waiting on for a long time. There is no question that this is going to be a big help to the company's bottom line."

Jim Hanson, process operations field technician, says he has never put off personal plans pending the outcome of decisions at DGC. "We can't live in fear of the future," he said. "But I'm very optimistic about the future now with the CO2 project given the fact that we have a need for CO2 in North Dakota oil fields as well as in Canada. That makes the project attractive to our state because it will help the economy and provide the opportunity to boost oil production in North Dakota."

Although diversification is providing a platform for long-term viability for the synfuels plant, DeMaria says, "Undoubtedly our employees are the real key to DGC's long-term success. Their continued creativity, hard work and dedication obviously are vital to make the project work in the long run."



(Photo above) Groundbreaking for DGC's project to construct a CO2 pipeline from Great Plains into Canada was held May12, 1999, at the synfuels plant. Participating were (from left) DGC CEO Bob McPhail, DGC board chairman Howard Carlson, PanCanadian senior vice president Gerry Protti and DGC COO Al Lukes. (Photos below and opposite page) Construction began two weeks later, and, following two months of preparation, pipe was laid under Lake Sakakawea in just one day. their session earlier in 1997.

Another bold move by management filled in the last major piece of the financial puzzle. With help from the Congressional delegation, DGC was able to get the DOE to lift the waiver of production tax credits that had been part of the deal when Basin Electric purchased the plant from DOE in 1988. Lifting the waiver would enable DGC to sell the production tax credits to help fund both the CO2 pipeline project and needed environmental improvements.

The agreement reached with DOE in the fall of 1998 drew Energy Secretary Bill Richardson to Bismarck for a formal announcement. (DGC never followed through on the sale of the tax credits. With natural gas prices rebounding in 2000, the economic benefits of completing the transaction changed, and Basin and DGC boards decided not to proceed.)

Still, the agreement with DOE opened the way for the much-anticipated pipeline project. Nearly two decades after discussions first took place on using CO2 from the synfuels plant, groundbreaking was held for the pipeline in May 1999. The start of construction followed within two weeks.







The North Dakota portion constituted 167 miles of the total 205-mile route to the Weyburn oil field. Haines Construction Co. of Woodward, OK, installed the pipe in four sections or "spreads" four feet underground.

But there was one unusual spread – a three-mile underwater crossing of Lake Sakakawea.

That section took two months of preparation, figuring the details for pulling more than 13,000 feet of pipe across North Dakota's largest body of water. That was achieved by joining five 2,600-foot sections on the lake's north shore and then pulling them across the lake.

The pipe was laid in eight-foot-deep trenches that were 1,400 feet long on either side of the lake. The trenches were then covered and riprapped to protect the pipe. Between the two trenches, most of the pipe lies on the lake bottom at a depth of up to 60 feet.

The extra planning paid off. The lake crossing took just 24 hours.

Two huge compressors - each driven by a 20,000-

horsepower electric motor – were installed to push CO2 through the pipeline. The pipeline itself is oversized and taps were included to accommodate other potential CO2 sales. Should more CO2 customers be found, more compressors and a booster station could be added later.

Overall, the project went so well that by Oct. 1, 2000, the North Dakota portion was essentially completed. The final "golden" weld joining the North Dakota and Saskatchewan pipelines occurred on Dec. 1, 1999. By February 2000, the entire pipeline was finished and testing began.

On Sept. 14, 2000, the first CO2 began flowing northward from the synfuels plant, reaching the PanCanadian valve site on the new pipeline in just over 12 hours.

The significance of this one-of-a-kind project was reflected in the dedication

(Photo above) Pipe sections averaging 60 feet long were laid four feet below the ground surface along the 205mile route to Canada. Workers also installed taps at certain points to allow for potential CO2 sales in addition to PanCanadian. (Photo below) The final "golden" weld joining the pipeline sections in North Dakota and Saskatchewan occurred on Dec. 1, 1999.



ceremonies. American and Canadian dignitaries joined DGC officials and employees in ceremonies on Oct. 19, 2000, held concurrently at the synfuels plant and in Weyburn. A television linkup allowed participants at both sites to view the other proceeding some 200 miles away and across the international border, after being transmitted skyward to a satellite 20,000 miles in space.

border, after being transmitted skyward to a satellite 20,000 miles in space.

In videotaped remarks, Energy Secretary Richardson said the dedication marks a milestone in international energy cooperation. "This project helps expand both the life of an American energy plant and Canadian oil field. When a venture is a plus for both Canada and the United States, it is something to celebrate." Richardson noted that as energy demand rises, more CO2 is released into the atmosphere. Using CO2 for enhanced oil recovery – in other words, CO2 sequestration – helps resolve that, he said.

America can't afford to ignore domestic energy resources, including its "immense coal reserves." Coal is an energy workhorse, he said, that "helps fuel our economy today, and needs to be a part of our energy future." To do that, Richardson said, the United States must keep learning how to use coal more efficiently

and cleanly in the future by investing in clean coal technologies.

In fact, he said, the Energy Department is working on concepts for future energy plants that use coal, natural gas and other fuels but would be virtually pollution free. He concluded: "These plants build on the innovations of the synfuels plant here in North Dakota. Developing them would go a long way toward tapping America's abundance of coal and other domestic sources to reduce our dependence on imported energy. That was the goal that brought the Great Plains Synfuels Plant into existence decades ago. I am confident that this plant will be part of America's energy legacy for the future."

From a linkup in Ottawa, Ralph Goodale, Canadian Natural Resources minister, said the project is part of the growing technology success story in Saskatchewan. "Through an international research initiative, this project will (continued on page 144)



Department of Energy Secretary Bill Richardson spoke via videotape to the audience assembled for the pipeline dedication Oct. 19, 2000. Richardson is shown here speaking during a visit to DGC and Basin Electric in late 1998.

Sequestration One way to manage carbon dioxide

Some see environmental benefits from the carbon dioxide (CO2) pipeline project. For Dakota Gasification Company (DGC), the project to sell CO2 to PanCanadian Petroleum Ltd. for enhanced oil recovery represents good business.

Officially, the company's position reflects the policy adopted by its parent, Basin Electric Power Cooperative, during its annual meeting in November 2000. In that resolution, Basin Electric member cooperatives noted the concept has been developed that CO2 from industrial processes could cause catastrophic global climate change and the resulting Kyoto Protocol, if ratified, would have a "calamitous" effect on the electric industry as well as the U.S. economy. The resolution also notes the "considerable disagreement" among scientists over whether there are any human-induced climatic changes.

Based on that scientific uncertainty, Basin Electric doesn't support mandated CO2 reductions called for in the Kyoto Protocol. However, Basin Electric recognizes that while it must act "in the best long-term economic interest of its members and the safeguard of their coal-based electrical generating assets," it also supports "voluntary actions that may contribute scientific knowledge or result in the identification and enhancement of techniques for the sequestration of carbon dioxide." The sequestration of CO2 through the pipeline project represents that type of action, according to the resolution.

Therefore, Basin Electric resolved that it remains "committed to the goal of protecting the economic well being of its membership and their assets in balance with responsible natural resource stewardship."

DGC simply sees the 15-year contract to sell CO2 to PanCanadian as an innovative business solution to several issues. Revenues from CO2 will help stabilize the company's financial future. In addition to turning this waste gas stream into a bottom-line benefit for DGC, the deal will help PanCanadian recover a valuable resource - oil - that otherwise would not be tapped.

PanCanadian sees the project as having the potential for being the world's largest joint implementation project to reduce CO2 emissions.

Both Canada and the United States lately have been considering ways to sequester CO2 emissions that some researchers say are affecting global climate.

Here is an explanation of CO2 sequestration and why some feel it should be done.

Predictions of global energy use in the next century suggest that carbon emissions will continue to rise, producing more CO2 in the atmosphere. The U.S. Department of Energy (DOE) says the effects of increased CO2 levels on global climate are uncertain, and scientists today have different views on the effects from having more atmospheric CO2.

DOE says there are various methods of managing CO2, including "carbon sequestration," that is, capturing and securely storing the CO2 emitted by the world's energy systems. DOE also notes there are several options for storing or sequestering carbon including oceans, geologic formations and soils and vegetation. In fact, DOE identifies CO2 injection during tertiary oil recovery as one option that could work particularly well today.

In the case of DGC, its pipeline project will be carrying up to 95 million standard cubic feet per day of CO2 to PanCanadian oilfields near Weyburn, Sask. That CO2 will be combined with water to wash out oil residue deep in the reservoirs, creating an oily froth that rises to the surface for easy recovery. The oil is then separated while the water and CO2 are pumped back into the reservoir and recycled again and again to recover more oil.

Because of its continuous reuse, this CO2 is considered "sequestered" since it is not being vented into the atmosphere. Canadian officials say the 9,000 tons of CO2 injected daily into the reservoir is the equivalent CO2 emissions from 100,000 cars each day.

DGC participating in joint CO₂ study

Dakota Gasification Company (DGC) will be participating in an international research project associated with piping carbon dioxide (CO2) from the Great Plains Synfuels Plant to an oil field near Weyburn, Sask.

Keith Ganzer, DGC environmental affairs manager, said the multiyear study is called the International Energy Administration (IEA) Weyburn CO2 Monitoring Project. The \$23-million project is



Keith Ganzer, DGC environmental affairs manager

designed to demonstrate an effective method of CO2 sequestration while also expanding the understanding of enhanced oil recovery around the world. It is being conducted by the Canadian Petroleum Technology Research Centre, Regina, Sask., for the IEA.

As a corporate sponsor, DGC agreed to put in \$50,000 annually for four years. Additional funding is was provided by the U.S. Department of Energy (DOE), the Canadian government and the provinces of Saskatchewan and Alberta.

Ganzer said collection of baseline data for the study began in May 2000. "A database of this type of knowledge would serve to enhance the understanding of CO2 sequestration in oil fields and promote the use of CO2 for enhanced oil recovery," Ganzer said. This knowledge would be valuable to DGC in analyzing future sales of CO2 to other oil field operators."

Besides the technical information about sequestering CO2 as a part of an enhanced oil recovery project, there's another potential benefit. "If sequestration of CO2 is assigned an economic value – either through emissions trading or other market-based mechanisms – additional oil fields like the one at Weyburn can be developed to take advantage of the combined revenue streams derived not only from the CO2 credits, but from the recovered oil as well."

If a monetary value is placed on CO2 credits, Ganzer said both DGC and Basin Electric could benefit by "banking" them for future use. By participating in the research, the information gathered during the study would be available to DGC.

(Basin Today story by Daryl Hill)

(continued from page 140)

help Canada and the world advance the scientific



Joining in the ceremonial valve-opening for dedicating the CO2 pipeline were (from left) Don Applegate, DGC chairman; Ron Harper, DGC CEO; Bob McPhail, retired DGC CEO; Gerry Protti, PanCanadian senior vice president; Fred Stern, Great Plains plant manager; and Al Lukes, DGC COO.



Chapter 12

Dreams of the future

Dakota Gasification Company (DGC) has become the new pioneer in synfuels energy. And it remains to be seen how the Great Plains Synfuels Plant under DGC's direction will fit into America's energy picture in the 21st century.

The synfuels plant began in the 20th century as the country's flagship energy facility in a national effort to help the United States gain energy independence. Over the years, Great Plains has survived a tumultuous history, facing many environmental, business and legal challenges.

Often, political support served as the last backstop to keep Great Plains open during those trying periods. That meant the future of the plant rested heavily on the efforts of the state's political leaders, notably former Sen. Mark Andrews, Sens. Kent Conrad and Byron Dorgan and Congressman Earl Pomeroy, and former Govs. George Sinner and Ed Schafer.



DGC and its synfuels plant face an exciting future. Just what role the company will play in America's energy future remains unclear, but the expertise and experience in using lignite coal demonstrated at Great Plains will serve the nation well as new energy strategies are developed.



DGC would like to shed those all-too-familiar stressful events, including its extensive litigious history. Over the years, there seems to have been more than enough court challenges facing the company. Mark Foss, DGC general counsel, has helped to provide the right road map for management and directors to successfully negotiate the legal mazes facing the company. Foss says DGC has experienced as much litigation as it has because it is involved in three major industries – natural gas, fertilizers and chemicals. "For a company our size, that is incredible," he said.

Those legal and other challenges now have been largely met. Certainly there will be others. But those who were instrumental in saving the synfuels plant from closure in the mid-1980s now feel justified in the actions taken by Basin Electric Power Cooperative to purchase the facility and continue its operation. "It's turned out real well," said Quentin Louden, the South Dakotan who was Dakota Gasification's first chairman of the board. "And I hope it will continue to be."

Leaders of both Basin Electric and Dakota Gasification have reason to be both hopeful and proud today. The synfuels plant and its employees have been recognized across the state as well as nationally and internationally for their technological achievements and innovations. In a recent national magazine, an article titled, "Lignite-to-gas plant reveals numerous innovations," suggested that the controversies over the years at Great Plains have "masked the real technological achievements that have been made there."

The Greater North Dakota Association recognized those achievements in late 2000. DGC earned the association's Vision 2000 Award for business investments that enhance the state's economy. Specifically, the award recognized the development of byproducts and the jobs created by them, all contributing to a more successful economy in this rural state.

Byproduct development and other achievements have attracted thousands of visitors from across the nation and throughout the world to view and learn about the Great Plains plant.

Yet, for DGC, the goal remaining at this point in its history is to establish long-term financial success for the synfuels plant. And by late 2000, with higher natural gas prices and a new byproduct being

Basin Electric *Power for America's heartland*

Basin Electric Power Cooperative, the parent of Dakota Gasification Company (DGC), has long been a supplier of electricity to the heartland of America. With its subsidiaries, it is primarily in the business of energy supply, but the Bismarck, ND-based organization provides telecommunications, Internet and

other services for rural Americans.

Founded in 1961, the consumer-owned regional cooperative operates more than 3,300 megawatts of electric generating capacity. That power is sold to 120 member rural electric cooperatives serving 1.7 consumers in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota and Wyoming.

The coal-based power plants operated by Basin Electric produce some of the lowest cost electricity in the United States. Those plants are the Antelope Valley and Leland Olds stations in North Dakota and the Laramie River Station in Wyoming. It also operates an oil-fired power plant, the Spirit Mound Station, in South Dakota.

A \$2 billion business, Basin Electric has several subsidiaries with a total employment of about 1,700.

DGC, one of two major subsidiaries of Basin Electric, owns and (continued on page 149)

This map illustrates the region served by the 120 rural electric cooperative members of Basin Electric Power Cooperative.

Power for America's heartland

(continued from page 148)

operates the Great Plains Synfuels Plant. The other major subsidiary is Dakota Coal Company, which was formed to provide financing for–and purchase coal from–the Freedom Mine in North Dakota.

Among the Cooperative's other subsidiaries or businesses are Basin Telecommunications Inc., which provides telecommunications and Internet services, and Wyoming Lime Producers, which operates a lime-processing plant in Wyoming.

"Basin Electric provides a stable, clean, reliable and low-cost source of energy to members. That's a 'powerful' connection, but Basin Electric is of more value than just a kilowatt factory," according to a recent Basin Electric Annual Report. "Basin Electric is also the cooperative network of people created to share ideas, to solve mutual problems and to build political coalitions and marketing alliances. This network also provides services, products and expertise that individual systems would be unable to afford on their own."

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Antelope Valley Station, Beulah, ND



Leland Olds Station, Stanton, ND



Laramie River Station, Wheatland, WY



Spirit Mound Station, Vermillion, SD



Wyoming Lime Producers, Frannie, WY

Basin Electric Headquarters, Bismarck, ND

sold, the prospects for achieving that goal appeared even better.

There's no doubt that DGC and its parent, Basin Electric, have the assets – resourceful management, skilled staff and political support – to accomplish the goal of long-term viability for the synfuels plant. DGC has developed several important strategies to better position that facility for the future, such as:

- Diversifying the company's business, recently evidenced by the opening of a pipeline to deliver carbon dioxide (CO2) into Canada for enhanced oil recovery. With the pipeline oversized and taps already included, there is good potential for more customers and increased sales in the near future.
- Reaching an agreement with the North Dakota Health Department on a plan to resolve environmental deficiencies at Great Plains. As a result, the company received an operating permit for the synfuels plant on Oct. 12, 2000, the first ever since the plant began operating in 1984. The permit sets exacting measures – such as installing a wet electrostatic precipitator – to reduce particulate emissions from the plant's main stack and to better control odors from cooling towers. Al Lukes, DGC vice president and chief operating officer, told Basin Electric's members at their 2000 annual meeting that although the compliance deadline is June 2003, "we want to do better for ourselves, the communities surrounding the plant, and the state."
- Gaining more efficiencies by identifying and carrying out cost-saving measures. As a result, DGC recently met its goal to shave annual operating costs by \$1 million a month or \$12 million annually.
- Developing a natural gas hedging program to reduce the company's natural gas price risk in selling on the market. This financial transaction ensures a price for a portion of its natural gas, foregoing the benefits of high prices but avoiding the revenue drop when prices fall, according to Paul Sukut, former DGC vice president for finance and administration and the hedging program's key architect. Sukut, who was promoted to deputy general manager at Basin Electric in mid-2001 adds: "We are constantly looking at the long-term market while prices are up to lock in these high prices."



Al Lukes, DGC's chief operating officer, addresses the 2000 annual meeting of Basin Electric's membership about environmental and other achievements by the company.

A new name?

Would a different corporate name help in better understanding the business of Dakota Gasification Company?

Twice in the last five years, Dakota Gasification directors considered that possibility. Their consideration was based on the idea that a new name could convey a more accurate corporate image of the research mission and technological innovations under way at DGC's Great Plains Synfuels Plant. Another name might better express the work and public value of the company for officials and the public, from regulatory agencies and legislators to news editors and educators.

Names that were considered included Great Plains Synfuels Corporation, SynEnergy Research Inc. and Synfuels Technology Inc.

However, in mid-1998, the DGC board of directors elected not to make any change after hearing a staff recommendation that the benefits of retaining the present name outweighed the potential benefits from a name change.

Synfuels Great Plains Synfuels Corporation Though the synfuels plant remains dependent on volatile commodity prices, the more diversified operation should serve as the basis for greater economic stability in the future.

In looking to diversify and enhance revenues, DGC has explored a myriad of byproducts and other options since 1988. Other byproducts – from transportation fuels to fine chemicals for food flavorings and perfumes – have been the subject of millions of dollars and many hours of research.

At the time, DGC found it was probably impossible to competitively produce and market those products. Markets had changed and oil prices remained volatile so the company had to focus on maintaining its viability. Today the greatest potential for DGC to enhance its revenue lies in gaining new customers and expanding the sale of carbon dioxide and, perhaps in the future, for marketing cresylic acid, which would come from the processing of the plant's tar oil.

So what does the future hold?

With natural gas prices sagging in the 1990s, DGC's revenues dropped also. To counteract that development, DGC had been driven to constantly improve operations, says Lukes. That meant making changes to control systems, enhancing reliability, increasing production and ensuring product quality. Computer technology will be used increasingly to achieve higher goals and ensure DGC's competitiveness.

However, natural gas prices rose dramatically by late 2000, giving the company a much better financial footing. By October 2000, DGC was selling natural gas for more than \$5.25 per dekatherm, more than twice the selling price of about \$2.10 per dekatherm just a year earlier. As a result, DGC recorded net profits for 11 of 12 months in 2000, compared to two straight years of losses. DGC's profit for the year was more than \$15 million, recording a financial turnaround of more than \$22 million from 1999 to 2000.

DGC's good fortunes rested on several factors that boosted natural gas prices in this period. Lukes said the primary reason was lack of storage by suppliers for the winter of 2000-01, amounting to about 20 percent less than the year before. In addition, the electric generating industry has turned to natural gas for the burgeoning number of gas-fired turbine generators around the country. And, Lukes said, the final major reason for climbing natural gas prices is higher oil prices.

Natural gas prices aren't expected to remain at the level recorded in late 2000. But Lukes says the prices shouldn't bottom out at \$2 per dekatherm either, as experienced in late 1999. The new market price floor may be somewhere in the range of \$3 to \$3.50 per dekatherm, he projects. And that bodes well for the plant, which is able to produce natural gas under that expected price range.

Historically for DGC, the bottom line has been in benefiting Basin Electric resulting in lower electric rates to Basin's member cooperatives. So far, the benefit to Basin Electric and its members from the operation of the synfuels plant has been substantial, possibly as much as a half billion dollars.

Directors for both Basin Electric and Dakota Gasification know of that benefit and of the obstacles that have faced the synfuels plant in getting there. Looking back, Basin Electric President Wayne Child says there have been critics of the plant who say it should have been shut down and that it was a mistake for the cooperative to purchase it. However, the Wyoming rancher says he takes the point of view that to gain a reward, one must take some risk.

Up-and-down natural gas prices are up again. With the plant's improvement and good operations, the plant hopefully can continue to run at a profit, providing even more benefit to Basin Electric, he says. "I think it's going to be a success," says Child. Like other board members, he underscores the work of management and staff in keeping the plant viable today.

Operation of the synfuels plant has not been easy, observed Don Applegate, a Basin Electric board member from Iowa and DGC chairman. However, it has been providing Basin Electric member cooperatives and their consumers with more than \$30 million a year in benefits. "That's a real success," he said.

(continued on page 155)



Don Applegate, DGC chairman (2001)



Wayne Child, Basin Electric president (2001)

Keys for management Team approach, communication



Management at Dakota Gasification Company (DGC) and its parent, Basin Electric Power Cooperative, has been focusing on communication and the team approach.

Both Ron Harper, who took over as DGC president and chief executive

Ron Harper, CEO Basin Electric and DGC

officer in May 2000 as well as general manager and CEO of Basin Electric, and Al Lukes, the company's vice president and chief operating officer, espouse a belief in that management style.

In recent years, there has been a closer relationship between the management teams of DGC and Basin Electric. That was evident in September 1999 with the appointment of Fred Stern, a former electric plant manager for Basin Electric, as the fourth plant manager at Great Plains.

Here is a closer look at DGC's top two managers and the manager at the synfuels plant.

Ron Harper

Harper has nearly 30 years experience in working with rural electric cooperatives. Born in San Diego, Harper was raised in Anadarko, OK, where his father worked for Western Farmers Electric Cooperative.

Harper earned a bachelor's degree at Southwestern State University in Weatherford, OK, and then spent seven years working for distribution cooperatives before becoming general manager at Carbon Power & Light Inc. in Saratoga, WY. In 1988, he moved on to manage Powder River Energy Corporation in Sundance, the largest cooperative in Wyoming and a Basin Electric member.

He earned the National Rural Electric Cooperative Association's Region VII award for outstanding service to rural electrics in 1997.

Harper was named to the job at Basin Electric with the retirement of Robert L. McPhail, who had been at Basin since 1985 and served as DGC's first president and CEO.

Shortly after assuming his new job at Basin and DGC, Harper described himself and his management style in an interview and editorial in <u>Basin Today</u>. Harper said he'd long admired the teamwork shown at Basin Electric. "I have found that the people that make up the Basin 'team' are competent, caring and willing to go the extra mile to make it happen."

He described his management style as a "people person who enjoys walking around and communicating to learn what people are thinking and doing. I try to lead by example; in other words, I won't ask you to do something that I wouldn't do myself. I demand honesty and integrity from people and encourage up-front and honest communications."

AI Lukes

A North Dakota native, Lukes has had industrial experience at Dow Chemical Co. in Michigan where he had various engineering and production management positions in the hydrocarbons department.

After 10 years at Dow, he became plant manager of the ammonia, carbon dioxide, hydrogen and industrial complexes of Air Products & Chemicals Inc. in New Orleans.

In 1981, he returned to North Dakota to accept the challenge as operations manager at Great Plains. He was an integral member of the team that built the facility on time and under budget. In 1988, he was named plant manager.

Lukes holds a bachelor's degree in chemical engineering from the University of North Dakota and earned his chemical engineering masters from Cornell University. A strong believer in continuing education, Lukes took a sabbatical in 1991 to attend the MIT program for senior executives. That is an advanced management program designed to provide insight and strategies for successfully operating businesses in today's highly competitive global economy.

In September 1998, he was named DGC's vice president and chief operating officer, succeeding Kent Janssen, who retired.

Just two months into his new position, Lukes addressed the owners of the subsidiary, committing to communicating openly, cutting overall costs and working cooperatively. "I believe that all of us need to stand together for our mutual benefit," he told rural electric members at a recent Basin Electric annual meeting. "DGC has produced major benefits for you in the past. With your support, it will do so in the future."

Lukes acknowledged that the synfuels plant and DGC face challenges ahead. "However, that's been part of the continuing history of the synfuels plant, and our employees have maintained their commitment to make this unique energy facility a success. I believe that with the strong support of our employees, the community, Basin Electric and its members and our other friends, we will be able to keep the synfuels plant and DGC viable."

The DGC management team in mid-2001 includes (front row, from left): Al Lukes, Laurie Voegele, Fred Stern; (second row, from left) Bern Tolosky, Dave Peightal and A. T. Funkhouser; (third row, from left) Mark Foss, Bob Fagerstrom and Duane Scheurer; and (final row, from left) Steve Gleave, Ray Hattenbach, Claudia Miller, Dave Sauer and Bruce McComish.

Fred Stern

Stern, who had been plant manager of the Leland Olds Station near Stanton, ND, since 1991, became the first manager from a Basin electric generating plant to move into the position as plant manager at Great Plains.

A native of Golden Valley, ND, Stern spent most of his life working in North Dakota lignite and energy industries. He graduated with a bachelor's degree in chemistry from Dickinson (ND) State University. In 1978 Stern earned a master's degree in chemical engineering and management from the University of North Dakota, Grand Forks. While there, Stern worked for the U.S. Department of Energy as a chemical engineer involved in ash-alkali scrubbing and dry sulfur dioxide scrubbing. He also worked as a technician in a Project Lignite coal liquefaction lab at the University of North Dakota.

Stern joined Basin Electric in 1978 as a chemical engineer at the Leland Olds Station. Since that time, he held numerous positions within Basin Electric before being named plant manager at the Leland Olds Station.



Joan Dietz of the Great Plains Synfuels Plant uses the synfuels plant model to explain plant operations to the head of a group of 15 Chinese business and government leaders that toured the plant in late 1997. Great Plains has hosted thousands of business, energy and governmental visitors from around the world.

(continued from page 152)

Applegate said the trials that DGC has undergone have produced an attitude among company staff and employees he likes, an approach similar to that in the mid-1980s when the parent, Basin Electric, went through tough times. "It's a 'fight back' mode that we're going to make this work," said the director. "Everyone has rallied around."

Lukes, who's been associated with the gasification project since 1981, takes great satisfaction in the company's success as the new century unfolded. "This is truly the first time in our history that the plant is running on market economics, and its financial future looks stable," he told Basin Electric members at their annual meeting in November 2000. "The light at the end of the tunnel no longer appears to be a freight train." Over the years, Lukes told the gathering, the mission and vision for DGC continues to be the same:

- Striving to operate a stable, financially viable plant;
- Seeking out and developing commercial byproducts from lignite to improve the plant's viability;
- Working to contribute to Basin Electric's bottom line; and
- Enhancing America's energy independence.

And while those remain the mission and vision, Lukes said at the November 2000 meeting in Bismarck, the company's point of view for its future has drastically changed in the past year. It has, he concluded, gone beyond mere survival to a point of stable operations and a positive bottom line.

Ron Harper, who became DGC's new president and CEO in May 2000, says the October 2000 valve-turning on the CO2 pipeline project with PanCanadian Petroleum has solidified the future for Dakota Gasification "and all the people who worked so hard to make this plant a success." The relationship with PanCanadian, he says, "is critical to our future and PanCanadian's future," noting that each company invested about \$100 million in the project that uses CO2 from the synfuels plant to extend the life of PanCanadian's oilfield.

With that huge achievement, Harper says, DGC's focus for the immediate future will be on ensuring the plant's reliability and efficient operation. "It's time to say 'time out'," Harper said. After establishing a track record of reliable and efficient operation, he says, DGC may then be able to look at developing more byproducts.

On a broader plane, the future of the synfuels plant may be in serving as the model for synthetic fuels technology

worldwide. A recent U.S. Energy Secretary pointed out that Great Plains already is serving as a blueprint for future energy plants now being conceived that would be fueled by coal, natural gas and other domestic sources. If so, the synfuels plant indeed would further America's effort of using its own fuels to reduce dependence on imported energy. That is a national goal today, revived from the energy crises of the 1970s that led to the rise of a unique energy plant on the prairie of North Dakota.

The birth of the nation's synthetic fuels flagship wasn't easy. And those who've guided the synfuels plant in the decade since have experienced an often dizzying ride. However, the leaders of DGC and Basin Electric today are seeing signs of a brighter, more stable future. They have known well what it means to be energy pioneers ... to have faced the many daunting challenges of yesterday and, in the end, to persevere.

Like Thomas Jefferson, these new energy pioneers "like the dreams of the future better than the history of the past."





"I like the dreams of the hiture better than the history of the past." Thomas Jefferson

DGC Board of Directors

The Board of Directors of Dakota Gasification Company (as of June 2001) are: (front row) chairman Don Applegate, Oakland, IA, and Heidi Heitkamp, Mandan, ND, and (back row, from left) Wayne L. Child, Cheyenne, WY; Donald Porter, Pequot Lakes, MN; Thomas Owens, Grand Forks, ND; treasurer Cliff G. Gjellstad, Norwich, ND; and vice chairman Roy Ireland, Martin, SD.

Service by past DGC board members



Gerard Jacobs (1988 - 96)



Quentin Louden (1988 - 89)



Merrill Sterler (1988 - 99)



William Guy (1988 - 2000)



Tom Fennell (1988 - 2000)



David Hamil (1989 - 92)



Bill Wagner (1989 - 97)



Robert Partridge (1993 - 2000)



Howard Carlson (1996 - 2000)

Acknowledgements

Many people gave their time, attention and encouragement to make this book possible. Though surely too short, the following list represents those who contributed to this work:

> Former President Jimmy Carter Ron Harper, Basin Electric and DGC CEO Al Lukes, DGC COO Wayne Child, Basin Electric president Don Applegate, DGC chairman Former ND Gov. William Guy Former ND Gov. Arthur Link Robert McPhail Kent Janssen Mark Foss Paul Sukut Ray Hattenbach Keith Ganzer Dan Schmidt Steve Aadland Floyd Robb Wally Goulet **Carey Bittner** Daryl Hill Kathi Risch Terry Diekman Ken Yetter Steve Crane Joan Dietz Lyn Lanz Fletcher Poling **Dewey Heggen Deborah Sims Stelter** Gerald Zittleman Barbara Herzberg-Bender Geri Gaginis Kay Ramsbacher Susan Dingle Linda Kay Naas Lyle Halvorson

Chronology Milestones of the past

- May 1972 Michigan Wisconsin Pipe Line Co., a subsidiary of American Natural Resources (ANR), and North American Coal Corp. sign option agreement dedicating 1.5 billion tons of North Dakota lignite to ANR.
- Fall 1972 ANR chairman Arthur Seder Jr. meets with ND Gov. William L. Guy about plans for flagship coal gasification plant in North Dakota.
- Feb 1973 Michigan-Wisconsin applies for state water permit for coal gasification.
- Mar 1973 ANR forms synthetic fuels group.

Lignite agreement expands to give ANR rights to additional 1.2 billion tons in North Dakota.

- Feb 1974 Michigan-Wisconsin gets conditional state water permit for 17,000 acre-feet from Garrison Reservoir (now Lake Sakakawea) for gasification plant proposed on site north of Beulah, ND.
- Mar 1974 Michigan-Wisconsin opens office in Bismarck, ND, to handle coal gasification field needs.

Michigan-Wisconsin begins meeting with Basin Electric Power Cooperative on possible joint project for gasification and electric generation facilities. Feasibility study on joint project authorized.

- July 1974ANG Coal Gasification Co., ANR subsidiary, forms to handle ND project, ships
12,000 tons of lignite to Sasolburg, South Africa, for testing. Results are favorable.
- Sept 1974 Preliminary economic impact report indicates coal gasification plant will produce \$75 million in retail sales when in operation, in addition to 3,000 jobs at peak construction and 1,000 permanent plant and mine jobs with total annual payroll of \$12 million.
- Dec 1974 ANR and Basin Electric announce plans for possible joint gasification/power plant project at the site north of Beulah. Basin would supply electricity from proposed electric plant (Antelope Valley Station) to the gasification facility.
- Mar 1975 ANG and Michigan-Wisconsin apply to federal government to build and operate ND coal gasification plant. Plant cost estimated at \$780 million. Construction expected to begin in 1977.
- Dec 1975 US House kills bill to provide federal loan guarantees for pioneering synfuels projects, such as the proposed ND coal gasification plant.
- Mar 1976 ANG announces plans to scale down proposed ND coal gasification project and build in two phases, each with production of 125 million standard cubic feet per

day. Seder cites inflation and procurement problems as reasons for change. Costs for first phase estimated at \$600 million, instead of \$1 billion for original proposal.

ANG (formerly Michigan-Wisconsin) opens another ND office in Beulah.

- Sept 1976 US House fails (by one vote) to pass bill to provide financial guarantees for synthetic natural gas projects.
- Nov 1976 ANR's Seder says company has begun partnership talks with Peoples Energy Corp. of Chicago to share financing burden of ND gasification project.
- Dec 1976 ANR and Basin Electric sign imaginative co-generation agreement whereby Basin would build power plant at the gasification site and reserve power for the coal-to-gas plant. Plants would use joint facilities. Basin also requires assurance by the fall of 1978 that the gasification plant would be built.

ANG opens third ND office in Hazen.

- Mar 1977 ANG and Peoples Energy subsidiary sign agreement-in-principle to build first phase of gasification plant. Peoples has option to join in second phase.
- Apr 1977 Mercer County commissioners approve use permit for coal gasification project with 21 conditions attached.
- Nov 1977 President Carter vetoes bill to give Energy Research and Development Agency (ERDA) loan guarantee authority. Veto attributed to inclusion of funding for nuclear project.

ND Public Service Commission (PSC) issues site permits for ANG plant and water pipeline corridor, and ND Health Dept. grants construction permit.

- Feb 1978 President Carter signs bill giving ERDA authority to guarantee synfuels loans, but officials say approval process will go beyond ANG time commitments to Basin Electric. At urging of Department of Energy (DOE), new financing plan involving a consortium approach evolves.
- Mar 1978 ANR and Peoples meet with four natural gas companies about forming consortium to finance the ND coal gasification project.
- May 1978 Subsidiaries of five major natural gas companies say they are forming a consortium to build the nation's first coal gasification plant in North Dakota. Inflation has raised the price tax on the first phase to \$900 million.
- June 1978 The new consortium Great Plains Gasification Associates (GPGA) is formally announced, including subsidiaries of Columbia Gas Systems Inc., Tenneco Inc. and Transco Inc. Partners file for tariff with Federal Energy Regulatory Commission (FERC).

- July 1978 Construction begins on Basin Electric's Antelope Valley Station at gasification project site.
- Aug 1978 Prehearing conference held with FERC staff to resolve issues brought by intervenors.
- Late 1978 Agreements between Basin and ANG renegotiated because ANG unable to commit to project and proceed with water supply. Basin was able to proceed on its own as it had all the rights held by ANG.
- June 1979 FERC administrative law judge recommends denial of certificate to sell product gas from the gasification plant. Judge said costs and risk should be borne by all citizens through federal assistance, not by pipeline customers.
- Nov 1979 FERC approves the sale of gas from proposed ND gasification plant but cuts the initial rate of return from 15 percent to 13 percent. ANR says it is concerned but announces construction to begin in the spring of 1980.
- Mar 1980 Mercer County commissioners issue final zoning compliance certificate.

Appeals filed to overturn FERC order by Ohio Office of Consumers' Counsel, General Motors Corp., New York PSC and Michigan Attorney General.

July 1980 President Carter delivers conditional letter of commitment July 18 from DOE to award \$240 million loan guarantee, enough to ensure one year of construction. ANR simultaneously announces plans to begin construction, despite pending appeals.

ANR's Seder meets with state and local officials July 25 in Beulah to formally announce construction plans.

- Nov 1980 DOE conditionally approves \$1.5 billion federal loan guarantee for Great Plains project.
- Dec 1980 Federal Appeals Court panel rules FERC exceeded authority on financing plan for the project. The ruling says FERC has no jurisdiction over the project until synthetic gas is actually co-mingled with natural gas being transported in interstate commerce.

Later, in settlement meetings, issues are raised by General Motors, Ohio and New York on Great Plains recovery of equity investment should project be abandoned and proposed increase in return on equity. As a result, DOE says it wouldn't be able to grant loan guarantees to the project.

- Jan 1981 Loan guarantee application is increased from \$1.5 billion to \$1.8 billion.
- Feb 1981 ANR announces new financing plan.
- Mar 1981 General Motors and Ohio consumer office announce agreement with GPGA over pricing of synthetic gas from proposed gasification project.
- Apr 1981 GPGA files settlement offer April 10 with FERC tying price of synthetic natural gas (SNG) from the project to a base of \$6.75 per thousand cubic feet but with future adjustments and price caps.

	FERC approves the settlement April 30 by issuing Order 119, marking a major step for the project. The order approved the gas purchase agreements and the ability of the pipeline companies to pass the cost of SNG on to their customers.
May 1981	FERC Order 119 becomes final on May 28 based on state of Michigan saying it would not seek a rehearing.
June 1981	Newly elected North Dakota Gov. Allen Olson reaffirms support for Great Plains in a letter to DOE Secretary James Edwards and urges prompt action on loan guarantee. ANR declares the project ready for construction.
July 1981	Disagreement surfaces in the new administration of President Reagan over the loan guarantee. DOE favors it while the Synthetic Fuels Corp. (SFC) chairman opposes it. ANR threatens to abandon the project if \$2.02 billion in guarantees aren't forthcoming soon but holds off action.
Aug 1981	President Reagan authorizes DOE Aug. 5 to issue conditional loan guarantee up to \$2.02 billion.
	ANR's Seder returns to Beulah Aug. 14 to announce full-scale construction.
Sept 1981	Water intake structure at Lake Sakakawea finished by Basin Electric after three years work. Water to be delivered to gasification plant and Basin's Antelope Valley Station (AVS).
Oct 1981	Construction force climbs to about 700.
Jan 1982	Pipeline companies (affiliates of the companies building the project) sign gas purchase agreements Jan. 2, requiring them each to buy a percentage of the total Great Plains output.
	DOE and Great Plains officials sign agreement Jan. 29 for federal loan guarantee of up to \$2.02 billion. Default by Great Plains would allow DOE to take over the project and reinstate gas purchase agreements.
Feb 1982	Great Plains begins seeking bids for purchasing two byproducts, anhydrous ammonia and sulfur.
May 1982	Pacific Lighting Corp. of Los Angeles announces it will acquire 10 percent interest in the consortium. With Pacific, the other owners now are: Tenneco, 30 percent; ANR, 25 percent; Transco, 20 percent; and Natural, 15 percent.
June 1982	Construction of the Great Plains project is about 12 percent complete by month's end.
July 1982	The first two of 14 gasifiers installed without problems on July 19.
Nov 1982	The last gasifier is installed.
Dec 1982 - Mar 1983	A mild winter permitted extensive work outdoors, allowing 3,000 craft workers to remain on the job. Recruitment began for full-time operations staff.

- Mar 1983 GPGA cash-flow projections show a loss of \$840 million in the first 10 years because of falling energy prices.
- Apr 1983 Construction on the gasification plant is about half complete. Construction work force peaks at about 5,800.
- Aug 1983 A General Accounting Office report says GPGA would make money in the plant's first 10 years when tax benefits are included.
- Sept 1983 Faced with continued energy price declines, GPGA changes its projections to show a loss of \$1.3 billion in the first 10 years.
- Oct 1983 GPGA files for price guarantees with the SFC. Without the guarantees, GPGA says the risk is too great and project abandonment is possible.
- Dec 1983 SFC says it will take requests for assistance from coal gasification projects, clearing the way for discussions with Great Plains on price guarantees.

By year's end, the project is 95 percent complete, and the permanent work force stands at 700.

Apr 1984 On April 24, the gasification plant first begins producing medium-Btu gas.

On April 26, the SFC board approves a preliminary agreement to provide up to \$790 million in price guarantees for the first 10 years. Shortly, two board members resign, leaving no quorum to give approval on a final contract.

- May 1984 Great Plains ships its first anhydrous ammonia May 29 to a grain farm near Berthold, ND.
- July 1984 Unit 1 at nearby Antelope Valley Station begins commercial operation July 1.

For the first time, high-Btu gas made synthetically from lignite begins flowing July 28 from Great Plains into the nation's interstate pipeline system. Permanent work force reaches about 1,000.

With various equipment problems, the plant fails to comply with sulfur emission limits set in the original construction permit.

- Oct 1984 Great Plains' two production "trains" become operational.
- Nov 1984 Great Plains temporarily achieves peak SNG production of 125 million standard cubic feet (mmscf) per day Nov. 11.
- Mar 1985 North Dakota state legislators agree not to tax any federal price support for Great Plains, a condition sought by the SFC.
- May 1985 SFC refuses to vote on \$820 million price support package in response to letter from DOE Secretary John Herrington expressing concern that price guarantees wouldn't ensure plant's long-term operation.

Great Plains plant completes first successful turnaround or planned maintenance shutdown.

June 1985	GPGA signs marketing agreement for a light-oil byproduct to be used as a wood preservative.
	Great Plains plant sets a production record on June 18 of nearly 139 mmscf per day.
July 1985	SFC board approves an agreement in principle July 16 for \$720 million in price supports, based on DOE rescheduling debt payments.
	On July 30, the Reagan Administration rejects the latest price support deal. DOE Secretary Herrington says it wouldn't ensure long-term plant operation at a reasonable cost to taxpayers.
Aug 1985	On Aug. 1,GPGA announces Aug. 1 the partners will abandon the gasification project and default on the federal loan immediately. On the same day, North Dakota Gov. George Sinner appoints a task force to determine the impact from closing the plant.
	Sen. Mark Andrews of North Dakota meets with Secretary Herrington Aug. 15, arranging for the plant to remain open until the spring of 1986.
	Natural Gas Pipeline Co. sues the federal government Aug. 20, claiming the gas purchase agreements are null and void.
Jan 1986	US District Judge Patrick Conmy issues a summary judgement Jan. 14 in favor of DOE. That effectively upholds the gas contracts valid and grants the government's right to foreclose on GPGA.
Feb 1986	DOE announces its intent to sell the Great Plains plant to the private sector.
June 1986	Portion of Unit 2 at Antelope Valley Station begins commercial operation.
	DOE bids \$1 billion for the project at a sheriff's sale June 30 at the Mercer County Courthouse and assumes ownership. (Marshall's deed dated July 16.)
July 1986	ND Health Department issues violation notice to DOE regarding sulfur emissions at gasification plant.
Aug 1986	Pipeline companies appeal Judge Conmy's decision regarding gas contracts.
Dec 1986	ANG signs agreement to operate the project under DOE.
Jan 1987	Great Plains reaches a production milestone, 100 billion cubic feet of SNG, on Jan. 18.
Feb 1987	DOE hires Shearson Lehman Brothers of New York City to help in marketing the Great Plains plant.
May 1987	Eighth Circuit Court of Appeals affirms ruling May 19 by Judge Conmy upholding validity of gas contracts.
June 1987	Basin Electric General Manager Robert McPhail informs Basin Electric's member co-ops by letter about importance of court decision and Basin's interest in continued operation of the gasification plant.
- Aug 1987 Basin Electric directors instruct management to study the merits of the Cooperative becoming a bidder for the plant.
- Oct 1987 Eighth Circuit Court upholds foreclosure.
- Nov 1987 Sens. Quentin Burdick and Kent Conrad of North Dakota ask Senate leaders for support on amendment calling for Congressional oversight of gasification plant sale.

At annual meeting Nov. 20, Basin Electric members authorize cooperative to continue investigating and, if appropriate, negotiate for the purchase of the gasification plant. A bylaw amendment approved also allowed forming subsidiaries to engage in other business.

Basin Electric notifies DOE of interest in purchasing Great Plains.

Dec 1987 DOE releases the names of 15 companies interested in the Great Plains plant.

Basin Electric board agrees to hiring experts, if needed, to evaluate the plant and its purchase.

Apr 1988 The U.S. House Subcommittee on Energy and Power holds a hearing April 13 to examine the proposed sale of the gasification plant.

Great Plains achieves one year (1.7 million workhours) without a lost-time accident on April 14.

House Speaker Jim Wright tours Great Plains April 25 along with DOE Assistant Secretary Allen Wampler, Congressman Byron Dorgan and Gov. Sinner.

DOE submits an application to modify the construction permit regarding environmental deficiencies.

Aug 1988 DOE announces Aug. 5 that Basin Electric is the successful bidder for Great Plains.

Basin Electric members authorize purchase of gasification plant through subsidiaries at special meeting Aug. 24.

Sept 1988 U.S. Senate Energy and Natural Resources Committee holds hearing Sept. 12 on pending sale of Great Plains.

Basin Electric forms Dakota Gasification Company (DGC) and Dakota Coal Company as subsidiaries on Sept. 15. Elected to the first DGC board were Basin directors Merrill Sterler, Wayne Child, Gerard Jacobs and Quentin Louden, who also was elected DGC chairman. Outside directors elected were former ND Gov. William Guy and Tom Fennell, former South Dakota Rural Electric Association manager. A third outside director is to be elected later. Officers elected were Robert McPhail, president and CEO, and Kent Janssen, vice president and chief operating officer.

- Oct 1988 DGC assumes ownership of the gasification plant on Oct. 31.
- Jan 1989 David Hamil, former administrator of the Rural Electrification Administration, elected to DGC board along with re-election of previously named directors and officers.

May 1989	5,000 trees planted at synfuels plant site as part of North Dakota Centennial Tree project.
July 1989	Merrill Sterler elected DGC's second chairman, replacing Louden, who was not re-elected to his local cooperative board.
Oct 1990	DGC files suit against the four pipeline companies buying SNG over the price and amount of SNG they are required to take from the facility renamed the Great Plains Synfuels Plant.
	New byproduct facilities are constructed to recover phenol and produce krypton-xenon.
Nov 1990	U.S. Justice Department files to intervene in gas purchase agreement case on behalf of DOE against the pipeline companies.
Dec 1990	First phenol samples sent to potential buyers for testing.
Jan 1991	Judge Conmy dismisses DGC lawsuit, holding that the contract requires the parties involved to arbitrate their differences.
Feb 1991	DGC and DOE appeal Conmy's latest ruling to Eighth Circuit Court of Appeals.
May 1991	First krypton-xenon shipped from synfuels plant.
May 1992	Eighth Circuit Court of Appeals reverses Conmy's ruling and remands case back to federal District Court for trial.
July 1992	DOE Secretary James Watkins visits Basin for Great Plains update.
Jan 1993	Synfuels plants sets record for daily SNG production at 176.8 mmscf on Jan. 27. Monthly production record set at average of 170.2 mmscf.
Feb 1993	Robert Partridge, former National Rural Electric Cooperative Association CEO, elected to DGC board, replacing David Hamil, who resigned in January.
Mar 1993	First cresylic acid is sold to company in England.
	ND Health Department issues amended construction permit requiring DGC to install a wet scrubber to control sulfur emissions.
Apr 1993	Wisconsin Distributor Group files complaint with FERC, claiming gas price charged violates FERC Order 119.
Mar 1994	DGC reaches out-of-court settlements with four pipeline companies, subject to FERC approval. Pipelines petition FERC for approval.
	Construction begins on unique scrubber that will produce fertilizer.
Aug 1994	DOE Secretary Hazel O'Leary joins in joint 10 th anniversary of commercial operation of synfuels plant and adjacent Antelope Valley Station.
Oct 1994	FERC consolidates the pipelines' filings with the ratepayer complaint.

- Jan 1995 FERC approves Natural's settlement with DGC on grounds no issues were to be heard.
- June 1995 Construction begins on 1,000-ton-per-day anhydrous ammonia facility.
- July 1995 PanCanadian Petroleum officials visit DGC about potential carbon dioxide (CO2) pipeline project, continuing discussions of the past three years.
- Dec 1995 FERC administrative law judge issues preliminary decision, saying settlements weren't prudent and ordering pipeline to make \$270 million refund to customers.
- Dec 1996 FERC reverses law judge's recommendation and approves settlement.
- Jan 1997 FERC order approving DGC settlements with three pipeline companies becomes final.

Relocated anhydrous ammonia plant and new scrubber become operational.

- July 1997 DGC signs agreement with PanCanadian to deliver CO2 for enhanced oil recovery.
- Sept 1998 Kent Janssen, DGC vice president and Basin Electric's key negotiator in the purchase of the synfuels plant, retires. Al Lukes, plant manager, named new DGC vice president and Chester Howard named synfuels plant manager.
- Dec 1998 Consent agreement approved between ND Health Department and DGC resolving violation notice regarding emissions at synfuels plant.

Amendment to agreement with DOE signed allowing the use of production tax credits associated with SNG production at the synfuels plant.

- Jan 1999 Howard Carlson elected DGC's third chairman of board of directors.
- Mar 1999 DOE Secretary Bill Richardson visits Basin Electric headquarters to announce agreement allowing DGC to sell production tax credits to finance CO2 and environmental projects. (In 2000, DGC and Basin decide not to use the tax credits due to improved gas prices and changed economic benefits from the transaction.)
- May 1999 Groundbreaking held May 12 at synfuels plant on \$110 million pipeline project to deliver CO2 to Canadian oilfield.
- Sept 1999 Fred Stern, former manager of Basin Electric's Leland Olds Station, named manager of synfuels plant, replacing Chester Howard who retired.
- Oct 1999 Construction on North Dakota portion of CO2 pipeline completed.
- Dec 1999 Canadian and North Dakota portions of CO2 pipeline joined on Dec. 1.
- May 2000 Ron Harper, former general manager of Powder River Energy Corp., Sundance, WY, becomes new CEO and general manager of Basin Electric as well as president and CEO of DGC. He replaces Robert McPhail, who retired.

June 2000	Don Applegate elected fourth chairman of DGC board, replacing Howard Carlson, who retired.
July 2000	Technicians at synfuels plant vote to be represented by the International Brotherhood of Electrical Workers.
Sept 2000	First CO2 enters pipeline Sept. 14 from synfuels plant to Canada.
Oct 2000	DGC receives first-ever operating permit for synfuels plant from ND Health Department on Oct. 12.
	Dedication ceremonies for CO2 pipeline held concurrently at synfuels plant and in Weyburn, Sask., Canada, on Oct. 19.
Nov 2000	DGC directors William Guy, Bob Partridge and Tom Fennell retire.
Dec 2000	Don Applegate re-elected as DGC board chairman at annual reorganization meeting.
May 2001	Three new DGC directors formally seated: consultant and retired professor Donald Porter of Pequot Lakes, MN; former North Dakota Attorney General Heidi Heitkamp of Mandan ND; and Thomas Owens of Grand Forks, interim dean at the University of North Dakota School of Engineering and Mines.

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