DOE/MC/30098 -- 5806
(DE98002015)

Task 27 - Alaskan Low-Rank Coal-Water Fuel Demonstration Project

Topical Report
October 1995

Work Performed Under Contract No.: DE-FC21-93MC30098

For
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Disclaimer

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Introduction

Burning coal-water-fuel (CWF) is burning coal, thus it follows that its expanded use will increase the market for coal. It is important therefore to recognize that the production of coal-water-fuel is now a mature technology which since it became established in several countries (Canada, USA, Sweden, Japan, Italy, China, and Russia) has resulted in the commercialization of CWF as a boiler fuel, generally, but not confined to use as a direct replacement for oil, notably in Japan. However, development of CWF technology has to-date been predicated on the use of high-rank bituminous coal only, and until now the high inherent moisture content of low-rank coal has precluded its use for CWF production. The unique feature of the Alaskan project is the integration of hot-water-drying (HWD) into CWF technology as a beneficiation process. Hot-water-drying is an EERC developed technology unavailable to the competition that allows the range of CWF feedstock to be extended to low-rank coals. The primary objective of the Alaskan Project, is to promote interest in the CWF marketplace by demonstrating the commercial viability of low-rank coal-water-fuel (LRCWF).

While commercialization plans cannot be finalized until the implementation and results of the Alaskan LRCWF Project are known and evaluated, this report has been prepared to specifically address issues raised by ASTF concerning business objectives for the project, and outline a market development plan for meeting those objectives. In the case of the Alaskan project, any commercialization plan must be set against the background from which CWF technology was developed, and recognize that adoption of CWF by the industrialized world as an energy option, is part of a global strategy devised by the International Energy Agency (IEA) to reduce the world's dependency upon oil. LRCWF commercialization plans should not therefore be viewed as a short-term or ad-hoc measure of expediency to combat temporary oil supply and price problems. Further, it should be appreciated that the role of coal is changing in energy markets, and the merits of the Alaskan LRCWF project should be judged within the context of today's changing world.

The Changing Role of Coal In Energy Markets

Energy markets are global, encompassing a hierarchy of interconnected interests starting at the local level and extending to national and international institutions. The sometimes precarious equilibrium between supply and demand, particularly for oil, is periodically punctuated by destabilizing political and market events arising from the irregularity in growth of demand, the non-uniform distribution of supply (e.g. OPEC control 66% of the world's oil reserves), and the changing requirements of environmental protection. Set against this background, it is a cause for concern to note that some of the destabilizing forces in world energy markets during the 1970^{s}, are again developing as we approach the twenty first century.

To counter this situation, nations will have to develop strategies to balance competing interests and conflicting aspects of regional, national, and international goals. In other words, aim to strike a balance between secure energy supplies and environmental protection; versus cost. Responses to the special needs of geographical regions, and sectors of the market, have to be made within the perspectives of sustainable goals based on sound projections of needs, resources, and technologies. On all of these counts, the evidence indicates that if energy supplies are to be assured and the world's economy and security strengthened, there is no responsible alternative to (a) expanding the use of coal, and (b) utilizing a broader range of coal types.

Despite coal's environmental problems, it is unrealistic to suggest as some do, that use of this fossil fuel as a primary energy source should be drastically curtailed. On the contrary, coal which already generates about one third of the world's electricity is continuing to increase its share of this expanding market, and to argue against its use is flying in the face of reality. This confidence in coal as a primary source of energy can be attributed to the comfort factor that coal reserves exist on every continent of the world, and the secure knowledge that it will neither run out in the foreseeable future, nor will supply be dominated by one region or political grouping.

However, to continue taking full advantage of these circumstances will in large measure depend upon coal's ability to be responsive to the existing and future environmental needs, while

maintaining its economic competitiveness. This will require some changes in the way coal is used, which is the focus of clean coal technologies. The technical question is how best to use the new technologies that have been developed which now allow coal to be burned with minimum damage to the environment. The commercial issue is how to make the necessary structural changes in energy economics to absorb the cost of environmental compliance.

Environmental politics over the past two decades have been polarized between those who seek an absolutely pristine environment at any cost: and those who claim that the cost of every new initiative is too high and that action is neither needed nor feasible. A more proactive political consensus has begun to develop, including a major part of the energy industry that supports the goals of strict protection of air and water quality, and control of solid wastes and toxic substances.

While technology has an important role to play in the politics of energy, it should not be oversold as a substitute for the hard choices affecting energy and the environment. There is no technology on the horizon to achieve the idealistic objective of a cheap, inexhaustible supply of energy that does absolutely no harm to the environment. The experience of the U.S. nuclear power industry where political expediency and inept regulation forced the suspension and roll-back of projects based on unreasoning fear and demand for unattainable zero risk; should not be repeated. If coal is to avoid the fate of the U.S. nuclear industry which was destroyed by public perceptions, the present campaign by environmental activists to de-fossilize energy production and use, must be resisted vigorously.

Based on the current state of knowledge, advanced technologies are now available to allow coal to be burned with minimal damage to the environment, at a reasonable cost. In this regard, the recent emergence of coal-water-fuel as an environmentally friendly, value-added product which is more convenient to store, handle, and use, than coal in its traditional dry bulk form, is an important development. As an alternative coal-based fuel in the world's future energy mix, coal-water-fuel offers a unique ability to transport and use coal sight unseen in enclosed vessels and pipes, a feature of significant benefit to public acceptance of coal as a clean energy source.

Until the recently renewed environmental pressures on coal utilization, development of coal-water-fuels had been driven by specious economic arguments for its use as a replacement for oil as a boiler fuel, and to-date coal-water-fuel production has been predicated on the use of high-rank bituminous coal as feedstock. The reason such feedstock coals were selected by CWF developers is not difficult to find. Firstly, for economic reasons, the only coal traditionally traded internationally, has until now been high-rank bituminous coal. Secondly, and perhaps more importantly, such coals are hydrophobic in nature, and thus can be readily slurried, a priority objective of early CWF developers who largely relied upon surfactant chemistry to obtain the highest possible concentrations of coal in their fuel formulation, irrespective of other considerations.

Historically, coal use has often run into problems that stem from inadequate attention to its properties and their effect on coal utilization. It is now recognized that a scientific understanding of coal and process mechanism, is required, together with real-world problem-solving ability across a broad spectrum, from resource evaluation, to mining, reclamation, utilization, emissions control, and waste management. Today, changes in the way coal is used, and adoption of clean coal technologies is resulting in coal-based power plants evolving away from the historic boiler-turbine-generator configuration, towards integrated resource processing facilities whether the prime technology is CWF, pulverized coal, fluidized-bed combustion, or integrated coal gasification combined cycle. In the past ten years, the use of CWF has been demonstrated in both pulverized coal and oil designed boilers, as well as in the new generation of pressurized fluidized-bed combustion and IGCC plants. In this connection, it is of interest to note that the technical objective of the US-DOE sponsored R&D program on IGCC, is the development of "Gasification Island Systems" that are standardized, modular IGCC designs in the range of 50MW to 150MW.

The high moisture content of sub-bituminous and other hydrophillic low-rank coal has until now been a major constraint to its use as coal-water-fuel feedstock. Despite having excellent combustion characteristics, and generally low sulphur contents, these coals have been largely ignored by CWF developers, even though they represent more than half of the world's coal

reserves. However, the recent development of an upgrading process (hot-water-drying) now allows the range of coal-water-fuel feedstock to be extended to include these cheaper, and more abundant, low-rank coals. Technical feasibility of this new non-evaporative drying technique developed by the Energy & Environmental Research Center, has been established at EERC's pilot plant facility, Grand Forks, North Dakota. Results from extensive testing of a wide range of low-rank coals show that the economic viability of CWF is not dependant upon achieving solids concentrations of 70% and above. While 70% has become the norm for bituminous CWF, low-rank CWF with lower concentrations (60% - 65%), do not require the use of expensive chemical additives. Although their heating value is generally lower than that of bituminous CWF, unlike Bituminous CWF, they are non-agglomerating and thermally friable, thus their combustion characteristics promote faster ignition and result in rapid and almost total carbon burn-out (+99%). These features allow higher flow rates to be achieved, make for simpler burner design, and avoid operational problems at the boiler-front. This combination offers the promise that low-rank CWF will have both technical and economic superiority over its bituminous CWF counterpart.

The "Alaskan Low-Rank Coal-Water-Fuel Demonstration Project" is expected to be the world's first commercial demonstration of the production of low-rank coal-water-fuel, and its utilization for on-line generation of electricity. The CWF feedstock will be drawn from Alaska's vast coal resources which, at an estimated 5.5 trillion tons, are probably the world's largest remaining untapped coal reserves. These feedstock's will include sub-bituminous coal from the Beluga coalfield which lies close to tidewater. It is predicted that on completion, the project will confirm the economic superiority of sub-bituminous over bituminous coal when used as CWF feedstock. The marketing opportunities that are likely to arise when viability is established, will allow Alaska's currently under-utilized coal resources to be commercially exploited in today's emerging international coal-water-fuel markets, particularly those in Pacific-Rim countries striving to reduce their dependency upon imported oil.

Clean Coal Technologies & Coal Utilization

Over the years, innovative technologies have been needed to overcome the barrier that has threatened the continued use of coal as a source of energy. Those efforts have resulted in a body of sophisticated technology that can ultimately change the image of coal from that associated with the old steam engine, to one of high-tech. Today, the expanded use of coal as a primary source of energy calls for the adoption of a more integrated and environmentally sound approach to coal cleaning, handling, and end-use of coal. Such an approach will promote the use of a coal energy utilization cycle that is efficient and that minimizes the production of cumulative wastes, acid-rain, and CO_2. From a coal preparation viewpoint, this strategy favours the increased use of deep cleaning techniques. Because deep cleaning involves the fine comminution and treatment of coals as an aqueous slurry, the subsequent need to minimize coal preparation costs and handle the fine ground particles in a cost-effective and environmentally benign manner, is best accomplished with the production of a coal-water-fuel. In fuel handling and transfer operations, such a fuel greatly assists the efforts currently under way to change the present poor public image of coal.

Under the new coal regime that is emerging, changes are occurring in the way coal is used and marketing strategies must now be developed around the utilization merits of coal on a coal specific basis that includes due consideration being given to the use of latest state-of-the-art clean coal technologies. In this regard, it is important to recognize that "clean coal technologies" are not confined to advanced coal cleaning methods for bituminous coal, and upgrading of low-rank coals. They include technologies to control air pollution; systems for producing power more efficiently, cleanly and economically than conventional technologies; and technologies that open up new markets for coal. Prospects for the latter, include markets in the transportation sector, and markets in the industrial and residential sectors hitherto considered the exclusive domain of other fuels. In the broadest sense of the term, they are technologies that can respond to the demand of users and regulators. CWF technology meets most of these demands.

The Case For Coal-Water-Fuel

Energy is an essential element of economic development and social progress of all countries. Without adequate, secure supplies of energy, objectives of economic and social development are unlikely to be met. Recurring oil crises have illustrated the threat which energy can represent to the world's economy. The crisis of 1973 gravely affected the balance between supply and demand in the oil market, as oil prices escalated sharply and supplies were disrupted by political actions in the Middle East. The structure of oil dependant economies proved too rigid to absorb the shock. This awakened the world to the need for some structural adjustment in the energy economy.

To meet the challenge, it is necessary to remove energy as a major constraint to sustained, non-inflationary economic growth. The ultimate goal must be to reduce dependency upon oil in order to achieve an energy mix that is less exposed to supply security risk. Structural change in the energy economies of industrialized countries is now under way and already yielding results that should last.

One of the more structural changes occurring on the world scene, is the re-emergence of coal as an important fuel with the potential for an increasingly significant role in meeting future energy needs. Unlike those of oil, coal reserves are both abundant and diverse. Since its price is relatively stable and its security of supply can be assured, coal is being favoured to play a more dominant role in the world energy markets. This universal trend back to coal is reflected in its expanded use as a primary fuel for electrical power generation. A further example of this trend is also apparent from the development of alternative coal-based fuels. Although economic downturns have periodically interrupted the development of these new fuels, the production and utilization of CWF has now been established as a mature technology. The attraction of such fuels is their potential use as a direct replacement for oil.

Of all the alternative coal-based fuels proposed to meet future energy needs, coal-water-fuel (CWF) is the most viable. Possessing the handling and storage characteristics of oil, with the

flame and burning characteristics of coal, it can be considered a liquid fuel. While not projected to sweep oil aside as a boiler fuel, it is expected to play an important role in the world's future energy mix, as a cheap substitute for oil.

Commercialization Issues

Significantly, development of CWF technology was government initiated and funded by nations anxious to reduce their heavy dependency upon imported oil. Under the sponsorship of the International Energy Agency (IEA) the nations concerned became signatories to the IEA Coal-Liquid Mixture Agreement formed to encourage exchange of technical information on alternative coal based fuels developed to replace oil. Government-funded development efforts in those signatory countries to the IEA Coal-Liquid Mixture Agreement, were essential factors in the eventual commercialization of CWF. Indeed only after its successful demonstration had been achieved, did industry become actively involved in pursuing its commercialization.

However, while commercialization plans cannot be finalized until the implementation and results of the Alaskan LRCWF project are known and evaluated, a preliminary market development plan can be drawn-up to match with the project schedule. Such a plan could be made ready to initiate once a decision to proceed is made. Realistically end-users of the fuel cannot be expected to enter into firm supply commitments until it has been shown by a successful commercial demonstration that the technology is viable.

Whether CWF is produced from high-rank bituminous coal, or low-rank sub-bituminous coal, different marketing techniques are required to those presently practised in traditional dry-bulk coal markets. In the case of the Alaskan LRCWF Project, market development should be based on both domestic U.S. markets for CWF, and export markets primarily in the Pacific-Rim countries. Commercialization plans should also include licensing the technology for use outside the USA, particularly to under-developed countries whose only indigenous energy resource is low-rank coal.

Suggested Market Development Plan

This section of the report deals with a market development plan devised to be initiated when implementation of the project is actioned. It essentially centers around soliciting interest among potential end-users of the fuel, to undertake combustion tests in their facility with trial quantities of LRCWF. Initiation of the plan would not require any commitment from the end-user to enter into firm supply contracts. The objective would simply be that of encouraging them to give serious consideration to extending their fuel selection to LRCWF should trial testing prove successful. To that end, it is suggested that the organizations listed in this section be targeted for inclusion in the market development plan, as potential LRCWF customers. The list is by no means complete, and can readily be expanded. It is intended only to illustrate the plan's wide scope.

The plan logically builds on the export coal market currently being served by Usibelli, and accordingly, the Korea Electric Power Co. (KEPCO) is included as a priority marketing objective. It is assumed that Usibelli's on-going business relationship with KEPCO could be used to develop the latter's interest in LRCWF. For the purpose of this report, it is assumed that Seward will be the location of the actual demonstration site. However, irrespective of which site is eventually selected, this market development plan would not change, since the movement of trial batch quantities of LRCWF to the market, would be via. the Seward coal terminal; the latter being the terminal through which Usibelli coal is shipped to Korea.

At the present time, Usibelli Coal Mine Inc., the only coal mine operator in Alaska, exports to Korea some 0.75 million tonnes of sub-bituminous coal, annually. The movement of this export coal between the mine and KEPCO's Honam Power Station in Korea, is via., the Seward coal terminal in Alaska. It is suggested that this existing trade could be used as the means of transporting batch quantities of LRCWF to Korea with cargoes of dry-bulk coal routinely being shipped out of Seward. The LRCWF would be containerized to keep it separate from the normal cargo of coal. It is further suggested that in principle, the movement of trial quantities of LRCWF for combustion testing in power stations in California, and Hawaii could also be shipped

out of Seward. This approach prevents the existing constraints associated with Alaska's lack of infrastructure from being a barrier to market development.

Since the markets of initial interest are all accessible to ocean vessels, the transportation of containerized batch quantities of the fuel is not expected to present any serious logistic problems. The ability to deliver trial batch quantities of LRCWF to potential end-users for combustion testing, enables a market development plan to be initiated. Potential end-users targeted in this market development plan are listed and discussed below, and then summarized in table form.

Alaska Energy

Market development for serving in-state Alaska with LRCWF, can begin in the city of Seward where the Seward Forest Products Co. (SFPC), operate a saw-mill currently being supplied with electrical power via. two 1.25 MW diesel generators. This form of power generation is typically employed for supplying electricity in remote regions of Alaska, where small communities rely upon such systems for their energy requirements. Both SFPC who operate the saw-mill, and the city of Seward who own it, have expressed interest in the Alaskan LRCWF project, and a willingness to convert from diesel to LRCWF. This situation should be fully explored since it presents an opportunity for launching a market development plan covering rural Alaska. In light of having to consider alternative demonstration sites to the one originally planned (the KAPP facility), Seward is an ideal site and meets all of the projects demonstration needs. It is a convenient centre for serving rural Alaska with LRCWF as a replacement fuel for diesel, and its deep-sea coal terminal provides direct access to potential offshore and coastal U.S. markets.

Pacific Gas and Electric

It is suggested that the market development plan for potential domestic U.S. end-users, should initially be based on serving coastal power stations in the Western U.S. California with a large number of power stations, many of which are oil-fired but whose boiler design is coal tolerant, is considered a major target area for early market development efforts. Pacific Gas & Electric are the biggest utility in California and cultivating their interest in conducting combustion tests with LRCWF should be made a prime marketing objective.

Hawaii Electric

Following a visit by consortium members, discussions have already been held with Hawaii Electric who have confirmed their interest in LRCWF. In discussions with Hawaii Electric, the possibility of conducting combustion tests in one of their power stations was favourably received and it is expected that the consortium can build upon these efforts as part of the market development plan.

Korea Electric Power Co.

It is suggested that any market development plan for the Pacific-Rim region should logically begin by building upon the existing coal trade connection between Alaska and Korea. Since KEPCO the end-user, already utilizes sub-bituminous coal (ex-Usibelli) for power generation, they are likely to be receptive to solicitations from the consortium to undertake combustion tests with trial quantities of LRCWF. Although Korea lags behind their Pacific-Rim neighbours Japan, in CWF technology, like Japan, they have a known interest in the future inclusion of CWF in their country's energy mix. Since there is intense industrial rivalry between Japan and Korea, the opportunity to gain immediate access to LRCWF technology which is unavailable to the competition, may prove an incentive to Korea, and enable them to exploit a commercial advantage over Japan by becoming the regions leader in power generation from LRCWF. For all of these reasons, it is recommended that KEPCO be targeted as a priority marketing objective in the Pacific-Rim region. Because of their on-going business with KEPCO, it is suggested that Usibelli Coal Mine Inc., are best equipped to undertake the market development role in Korea.

Pohang Steel

In the operation of a blast-furnace for steel-making, coal is increasingly being used to replace oil as an injection fuel. The development of coal-water-fuels now makes injection of coal simpler and more efficient. Korea's steel industry is among the world's most advanced, with a reputation for its willingness to adopt new technologies. In addition to their potential interest in LRCWF as a boiler fuel for power generation, Pohang Steel as Korea's largest steel producer, can also be expected to have an interest in LRCWF as a blast-furnace injection fuel. It is suggested that Pohang Steel be included in the market development plan for both markets.

Tokyo Electric Power Co.

Tokyo Electric Power Company (TEPCO) are Japan's largest electric utility and have played a prominent role in the development of CWF technology and its eventual commercialization in Japan. Significantly, TEPCO are Japan's leading advocates for the use of low-rank coal in power generation. The position they have adopted, is a departure from the conventional wisdom and practise that has to-date prevailed among the country's utilities. While Japan has wide experience in dealing with high-rank bituminous coal for power generation, it has no experience with low-rank coal. High-rank bituminous coal which currently accounts for most of the coal being traded internationally, has until now been favoured solely because of its high heating value. However, TEPCO have concluded that environmental issues have changed coal's economics in favour of low-rank coal, and acknowledged that high heating value alone is no longer a valid criteria in fuel selection. In reaching this conclusion, they have recognized that the mining, handling, processing, combustion, and pollution control aspects of low-rank coal, are quite different from those of high-rank bituminous coal. It is TEPCO's influence as a major utility, that is largely responsible for Japan's current national interest in extending their CWF technology to low-rank coal. Although Japan has embarked on its own R&D program to produce CWF from low-rank coal, the USA at present probably has a three year lead in LRCWF technology. However, despite now having its own R&D program, Japan has usually collaborated with other country's CWF developers, and been willing to undertake combustion tests with trial cargoes of fuel produced outside of Japan. AB Carbogel, an early collaborator with the Japanese Gasoline Corporation (JGC) in the development of CWF technology, is an example of such arrangements. Against this background, it is suggested that TEPCO be included in the market development plan.

Ube Industries

Ube Industries have pioneered coal-water mixtures (slurries) for use as feedstock for gasifiers in Japan. They have expressed interest in the beneficiation of low-rank coal via., the use of HWD as a means of increasing the coal concentration of low-rank coal slurries. Coal gasification is an expanding market, and Ube industries are known to be receptive to collaborating with other interested parties in testing LRCWF for its suitability as feedstock. It

is therefore suggested that Ube Industries be included in the market development plan as a potential alternative market to conventional power generation from coal in its traditional dry-bulk form.

Technology Transfer

In many non-coal-producing countries, particularly those in less developed regions of the world, low-rank coal is their only indigenous energy resource, and their current energy needs are generally met by imported oil. For such countries, use of LRCWF technology would allow them to maximize the use of their indigenous low-rank coal reserves, thus enabling them to reduce their dependency upon imported oil. The market development plan should therefore include technology transfer to such nations. However, the opportunities for technology transfer is not confined to nations in this category. Since low-rank coal represents more than half of the world's coal resources, the need to expand the current use of these coals clearly needs to be extended to the traditional coal exporting countries.

The Alaskan LRCWF Demonstration Project is expected to establish the technical and economic superiority of LRCWF over its bituminous CWF counterpart, and result in a demand for technology transfer. In addition to the USA, nations likely to adopt this new technology will include other traditional exporting coal producing countries, notably, China, Russia, and Poland, each of who have enormous reserves of low-rank coal.

Among those countries that are either non-exporters, or lesser coal producers, the Philippines and Indonesia are candidates for technology transfer. Both countries have expressed their interest in the technology. In the case of the Philippines, a comprehensive study for introducing CWF to the country, was followed by extensive testing of indigenous Philippine sub-bituminous coal for the National Power Corporation. Market development for technology transfer to the Philippines could therefore build upon the interest already displayed. In the case of Indonesia, the contacts already made in response to their expressed interest, should be pursued.

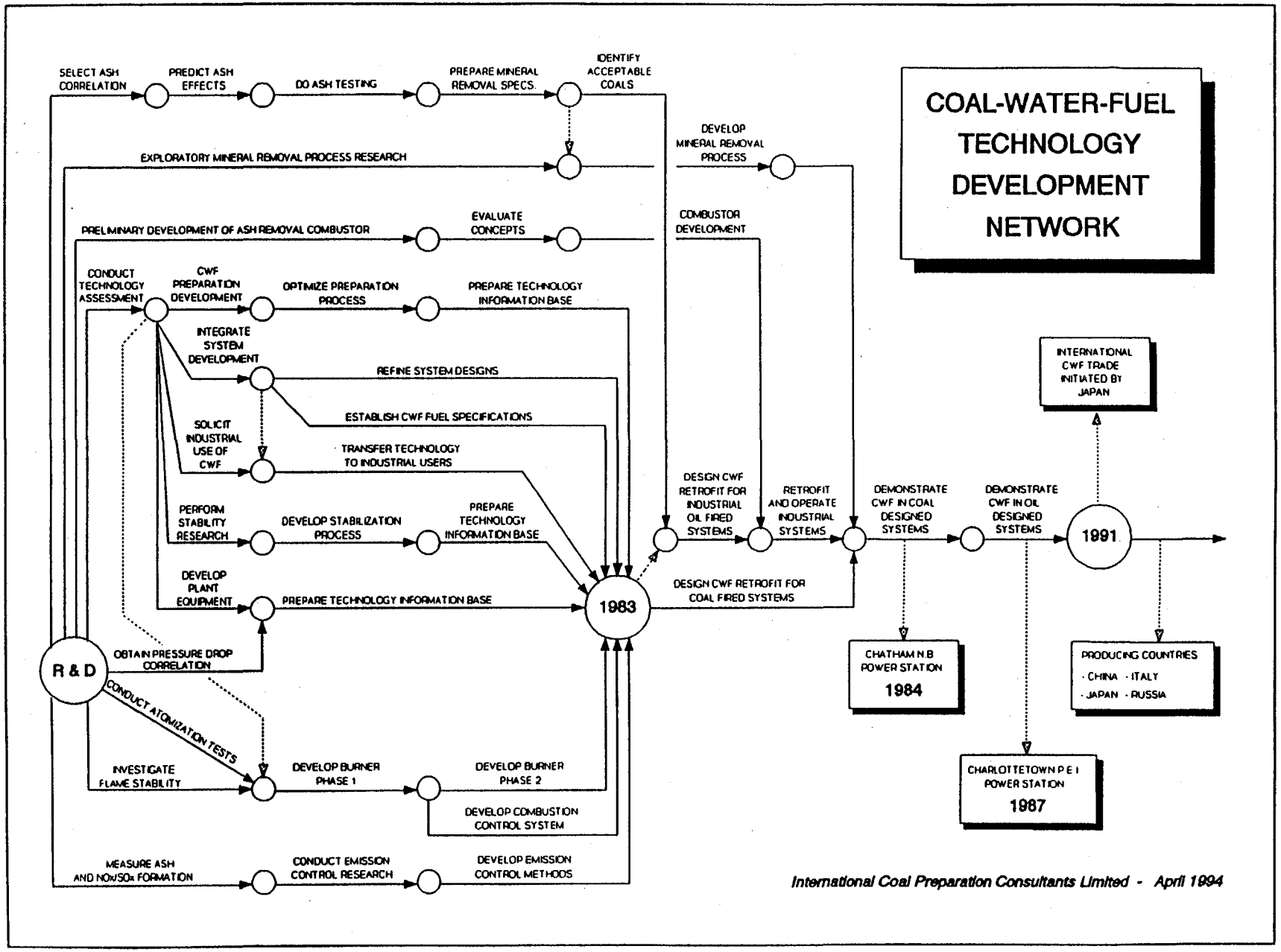
Once the Demonstration Project has been implemented, the following path towards commercialization can be adopted.

DEMONSTRATION PROGRAM SCHEDULE		
Phase	**Schedule**	**Action**
Project Approval	Day 1	Initiate the project
Engineering & Construction	Month 1 - 18	Initiate preliminary discussions with potential CWF end-users **
Actual Demonstration	Month 19 - 30	Negotiate with end-users and arrange combustion test/trials on candidate CWF feedstock coals
CWF Marketing to obtain supply contracts	Month 31 onwards	establish capital and operating costs for full-scale commercial CWF production facilities

MARKET DEVELOPMENT **		
Market	**Potential End-User**	**Potential Utilization**
Domestic U.S.	Alaska Energy Pacific Gas & Electric Hawaii Electric	Power generation in remote regions Oil replacement in California utilities Oil replacement in Hawaii utilities
Pacific Rim Export	KEPCO Pohang Steel TEPCO Ube Industries	Oil replacement for power generation Blast furnace injection fuel Oil replacement for power generation Feedstock for gasifiers
Technology Transfer	Philippines Indonesia China Russia Poland	Use of technology for in-country production and utilization of LRCWF from indigenous LRC reserves

Conclusions

Despite being a State in the most powerful and affluent nation in the world, Alaska with an estimated 5.5 trillion tons of coal reserves boasts about half of the entire U.S. coal resources and many world class mineral deposits, yet it functions almost as a third world country whose basic economy is one of exporting raw materials and relying on outside sources for most finished goods. This situation contrasts sharply with the relatively small island nation of Japan, that imports most of its raw materials and manufactures finished products for both the domestic and foreign markets. Significantly, Japan who are already commercially exploiting CWF technology which converts bituminous coal into a quasi-liquid fuel for use as a direct replacement for oil in utility and industrial boilers, are now turning their attention to low-rank coals. The production of CWF (a value-added product) from Alaskan sub-bituminous coal, offers Alaska an opportunity to open up its vast resources of low-rank coal for export, by moving the State decisively into the emerging international trade in CWF. This would promote more rapid economic and social development within Alaska, and also elevate the State to the role of being a world leader in this new, advanced coal technology. In this regard, there is a need for government to recognize that they must share in the financial risk of implementing new commercial energy technologies such as those associated with this Alaskan project.


COAL-WATER-FUEL TECHNOLOGY DEVELOPMENT NETWORK
SELECT ASH CORRELATION
PREDICT ASH EFFECTS
DO ASH TESTING
PREPARE MINERAL REMOVAL SPECS.
IDENTIFY ACCEPTABLE COALS
EXPLORATORY MINERAL REMOVAL PROCESS RESEARCH
DEVELOP MINERAL REMOVAL PROCESS
PRELIMINARY DEVELOPMENT OF ASH REMOVAL COMBUSTOR
EVALUATE CONCEPTS
COMBUSTOR DEVELOPMENT
CONDUCT TECHNOLOGY ASSESSMENT
CWF PREPARATION DEVELOPMENT
OPTIMIZE PREPARATION PROCESS
PREPARE TECHNOLOGY INFORMATION BASE
INTEGRATE SYSTEM DEVELOPMENT
REFINE SYSTEM DESIGNS
ESTABLISH CWF FUEL SPECIFICATIONS
SOLICIT INDUSTRIAL USE OF CWF
TRANSFER TECHNOLOGY TO INDUSTRIAL USERS
PERFORM STABILITY RESEARCH
DEVELOP STABILIZATION PROCESS
PREPARE TECHNOLOGY INFORMATION BASE
DEVELOP PLANT EQUIPMENT
PREPARE TECHNOLOGY INFORMATION BASE
1983
DESIGN CWF RETROFIT FOR INDUSTRIAL OIL FIRED SYSTEMS
RETROFIT AND OPERATE INDUSTRIAL SYSTEMS
DESIGN CWF RETROFIT FOR COAL FIRED SYSTEMS
DEMONSTRATE CWF IN COAL DESIGNED SYSTEMS
DEMONSTRATE CWF IN OIL DESIGNED SYSTEMS
1991
INTERNATIONAL CWF TRADE INITIATED BY JAPAN
CHATHAM N.B POWER STATION 1984
PRODUCING COUNTRIES - CHINA - ITALY - JAPAN - RUSSIA
CHARLOTTETOWN P.E.I POWER STATION 1987
R & D
OBTAIN PRESSURE DROP CORRELATION
CONDUCT ATOMIZATION TESTS
INVESTIGATE FLAME STABILITY
DEVELOP BURNER PHASE 1
DEVELOP BURNER PHASE 2
DEVELOP COMBUSTION CONTROL SYSTEM
MEASURE ASH AND NOx/SOx FORMATION
CONDUCT EMISSION CONTROL RESEARCH
DEVELOP EMISSION CONTROL METHODS
International Coal Preparation Consultants Limited - April 1994

APPENDIX 2

ARTICLES OF INCORPORATION

OF

ALASKA COAL-WATER FUEL, INC.

I, the undersigned, as incorporator of a corporation under the Alaska Corporations Code, adopt the following Articles of Incorporation:

ARTICLE 1. NAME

The name of this corporation is Alaska Coal-Water Fuel, Inc.

ARTICLE 2. PURPOSES AND POWERS

This corporation is organized for the following purposes:

(a) To arrange for the design, construction, and operation of a demonstration project for low-rank coal-water fuel development and to commercialize and market the process and its products; and

(b) To engage in any business, trade or activity which may lawfully be conducted by a corporation incorporated under the Alaska Corporations Code.

This corporation shall have the authority to engage in any and all such activities as are incidental or conducive to the attainment of the foregoing purpose or purposes of this corporation and to exercise any and all powers authorized or permitted under any laws that may be now or hereafter applicable or available to this corporation.

ARTICLE 3. SHARES

This corporation shall have authority to issue 100,000 shares of Common Stock.

ARTICLE 4. PREEMPTIVE RIGHTS

Preemptive rights as provided by applicable Alaska law are not limited or restricted by these Articles of Incorporation.

ARTICLE 5. CUMULATIVE VOTING

The right to cumulate votes in the election of Directors shall exist with respect to shares of stock of this corporation.

ARTICLE 6. REGISTERED OFFICE AND AGENT

The name of the initial registered agent of this corporation and the address of its initial registered office are as follows:

John Sims
122 First Avenue, Suite 302
Fairbanks, Alaska 99701

ARTICLE 7. DIRECTORS

The number of Directors of this corporation shall be determined in the manner provided by the Bylaws and may be increased or decreased from time to time in the manner provided therein. The initial Board of Directors shall consist of two Directors, and the names and addresses of the persons who shall serve as Directors until the first annual meeting of shareholders or until their successors are elected and qualify are:

John Sims
122 First Avenue, Suite 302
Fairbanks, Alaska 99701

Warrack Willson
12212 Old Glenn Highway, Suite 8
Eagle River, Alaska 99577

ARTICLE 8. ALIEN AFFILIATES

There are no alien affiliates of this corporation.

ARTICLE 9. LIMITATION OF DIRECTOR LIABILITY

To the full extent that the Alaska Corporations Code, as it exists on the date hereof or may hereafter be amended, permits the limitation or elimination of the liability of Directors, a Director of this corporation shall not be liable to this corporation or its shareholders for monetary damages for breach of fiduciary duty as a Director. Any amendment to

or repeal of this Article 9 shall not adversely affect any right or protection of a Director of this corporation for or with respect to any acts or omissions of such Director occurring prior to such amendment or repeal.

ARTICLE 10. AMENDMENTS TO ARTICLES OF INCORPORATION

This corporation reserves the right to amend or repeal any of the provisions contained in these Articles of Incorporation in any manner now or hereafter permitted by law, and the rights of the shareholders of this corporation are granted subject to this reservation.

Dated: April 15, 1994

Richard M. Johannsen, Incorporator

VERIFICATION

STATE OF ALASKA)
) ss.
THIRD JUDICIAL DISTRICT)

Richard M. Johannsen, being first duly sworn, on oath deposes and says that he has read the foregoing document, knows the contents thereof, and believes the same to be true.

Richard M. Johannsen

SUBSCRIBED AND SWORN to before me this 15th day of April, 1994.

NOTARY PUBLIC for Alaska
My commission expires: 7-19-96

PHYLLIS I. SORENSEN NOTARY PUBLIC STATE OF ALASKA

APPENDIX 3

ALASKA COAL-WATER FUEL, INC.

(An Alaska Corporation)

March 1995

LOW RANK COAL WATER FUEL DEMONSTRATION PROGRAM

PREFEASIBILITY BUSINESS PLAN

This Prefeasibility Business Plan has been prepared by and for Alaska Coal-Water Fuel, Inc.

PREFEASIBILITY BUSINESS PLAN
TABLE OF CONTENTS

EXECUTIVE SUMMARY

MISSION STATEMENT

The ultimate goals of •ACWFi are:

- Development and operation of a commercial Low Rank Coal Water Fuel (LRCWF) plant in Alaska shortly after the turn of the century.

- Development and operation, under license, of one or more commercial LRCWF plant(s) outside of Alaska.

- Return of Demonstration Project grant funds to ASTF and USDOE.

Implementation and successful completion of Phase II of the LRCWF Demonstration Project is the essential prerequisite to achievement of any and all of these goals.

For purposes of this prefeasibility business plan, successful completion of Phase II of the LRCWF Demonstration Project is defined as:

- Confirmation of the utilization properties and performance of LRCWF in commercial scale installation.

- Validation of the technical and economic feasibility of the LRCWF process at a commercial scale.

- Establishment of market recognition/acceptance and marketability of LRCWF in the utility sector of Heavy Fuel Oil (HFO) market.

- Determination of the economic and financial feasibility of an Alaska commercial scale LRCWF plant.

LRCWF MARKET DEVELOPMENT STRATEGY

The goal of the LRCWF Market Development Strategy is to secure sufficient commitments for LRCWF to justify development of a commercial scale plant in Alaska. The major elements of strategy to be employed during the Phase II of the LRCWF Demonstration Project are:

- Focus initial market development efforts toward the Japan Utility Sector.

- Establish market recognition/market acceptance through a combination of direct marketing to the nine Japanese utilities and indirect marketing through Japanese trading companies, one Japanese bank, Japan Ministry of International Trade & Industry (MITI) and MITI sponsored energy programs.

- Solicit ownership participation in •ACWFi by at least one Japanese trading company.

- Provide large volume samples of LRCWF to one or more Japanese entities for test firing.

- Use market development success in the Japan Utility Sector as a basis for penetration of the US West Coast and Hawaii utility market sectors.

Ultimately LRCWF produced by a commercial facility in Alaska would compete in:

- Local Alaskan fuel oil markets,

- North Pacific Basin heavy fuel oil markets, and

- Emerging markets for bituminous coal water fuel (CWF) in the northern Asian Pacific Rim.

TECHNOLOGY LICENSING MARKET DEVELOPMENT STRATEGY

While it is not practical to develop a LRCWF technology licensing strategy prior to the initiation of Phase II of the Demonstration Project and prior to some success of the LRCWF market development efforts, it is possible to identify target sectors toward which a technology licensing effort would be directed. These target sectors or niches would include western US and Indonesian low rank coal producers. Application of LRCWF technology to low rank US coals would open new markets for these low cost producers. LRCWF produced from the ultra-low ash Indonesian coal would have the potential of penetrating the transportation fuel market.

ALASKA COMMERCIAL SCALE LRCWF PLANT

A specific development plan for, and associated economic and financial evaluations of, an Alaska Commercial Scale LRCWF Plant will be developed during Phase II. Three development scenarios will be considered:

- A stand alone greenfield LRCWF plant development (this development scenario would be used as the basic model for the technology licensing program),

- A greenfield LRCWF plant and associated export infrastructure development.

- An integrated greenfield mine, plant and transportation and export infrastructure development.

All three scenarios would assume at least a 1 million ton/year (mtpy) capacity development located in the Beluga Region of Southcentral Alaska. If a 1 mtpy development is determined to be economically feasible, a 0.5 mtpy would be evaluated.

INTRODUCTION

This Alaska Coal-Water Fuel, Inc. (•ACWFi) Prefeasibility Business Plan has been developed as part of Phase I of the Low Rank Coal Water Fuel (LRCWF) Demonstration Project, a technology Demonstration Project funded in part by the Alaska Science and Technology Foundation and in part by private sector entities. The critical assumption upon which this Plan is based is that Phase II of the LRCWF Demonstration Project would be funded by a combination of Alaska Science and Technology Foundation (ASTF), US Department of Energy (USDOE) and private sector entities acting through •ACWFi.

This Prefeasibility Business plan consists of seven sections including the **EXECUTIVE SUMMARY** and this **INTRODUCTION** section.

Outlined in the **MARKET DESCRIPTIONS, STRUCTURES & STRATEGIES** section are characteristics of the markets •ACWFi intends to pursue and strategies to be employed during Phase II of the LRCWF Demonstration Project. This section also contains an overview of a potential market opportunity (Coal Technology Services Market) which would could be pursued after Phase II and with or without the involvement of •ACWFi.

Contained in the **PRODUCT & COMPETITIVE POSITION** section are an evaluation of the potential market value of LRCWF and an assessment of the most probable competitive position of LRCWF relative to Orimulsion® and bituminous coal water fuel (CWF).

The overall plan for organizational development of the •ACWFi enterprise from its formation during Phase I through Phase II and beyond is presented in the **ENTERPRISE DEVELOPMENT PLAN** section.

Determination of the economic and financial feasibility of a commercial scale Alaska LRCWF development is beyond the scope of Phase I and specified as a major deliverable of Phase II. However, presented in the **ECONOMIC FEASIBILITY** section are very preliminary assessment results which indicate that an Alaska LRCWF development should fall in at least the marginal range and could fall in the high upside potential range.

Finally, the **OPPORTUNITIES, PROBLEMS & RISKS** section contains preliminary evaluations of several external factors which could add to or detract from the potential future success of the enterprise.

PHASE II MARKETING AND COMMERCIALIZATION SCHEDULE

The following is a list of and brief scope of the specific Phase II tasks to be undertaken and their start date relative to the start of Phase II. All tasks, with the possible exception of the Commercial Project Design, would continue after the completion of Phase II of the LRCWF Demonstration Project.

BUSINESS/COMMERCIALIZATION PLAN DEVELOPMENT (Start Month 2)

Development and updating of a detailed business plan for the •ACWFi, and a general and Alaska specific LRCWF project development plan.

LRCWF MARKET DEVELOPMENT (Start Month 4)

Promotion of LRCWF as an alternative fuel to Orimulsion® and CWF in the Japan utility sector and development of an on-going HFO market tracking system.

LRCWF MARKETING (Start Month 18)

Direct and indirect marketing and sales of test burn samples to target market sectors.

COMMERCIAL PROJECT DESIGN (Start Month 14)

Development of a prototypical LRCWF design with associated engineering economics.

TECHNOLOGY MARKETING (Start Month 21)

Promotion and marketing of LRCWF production technology to target market sectors.

SPINOFF BENEFITS OF PHASE II IMPLEMENTATION

Irrespective of the future commercial success of LRCWF, implementation of Phase II of the LRCWF Demonstration Project would produce the following spinoff benefits:

- The LRCWF produced from continued operations of a demonstration facility located at the University of Alaska at Fairbanks (UAF) could become the fuel of choice for UAF's standby oil fired boilers. This would eliminate the need to purchase more expensive fuel oil and possibly defer development of new coal fired capacity.

- The demonstration facility, in combination with both UAF and private sector expertise and experience gained during Phase II of the Demonstration Program, could form the basis for the pursuit of opportunities in the hot water dried slurry fuel technology services markets.

- The financial support of the State would send a clear message to the marketplace that Alaska is not only committed to the sound development of its natural resources, but Alaska is also committed to diversification of its economy through adding value to those natural resources.

•ACWFi intends to pursue opportunities in the Heavy Fuel Oil (HFO) market, a product market, and the Technology Licensing market, a service market. Shown in the following table are primary and secondary target sectors/end users •ACWFi intends to pursue in implementing this prefeasibility business plan.

Table 1: Primary & Secondary Market Sectors & End Users

Market	Primary Target Sectors/*End Users*	Secondary Target Sectors/*End User*
Heavy Fuel Oil (Northern Pacific Basin)	• Alaska Utility Sector • *Hawaii Electric Power* • Japan Utility Sector (HFO/CWF) • West Coast US Utility Sector	• Japan Industrial Sector • *Korea Electric Power* • Korea Industrial Sector • *Taiwan Power Company* • Taiwan Industrial Sector • Mexico Utility Sector
Technology Licensing (Coal Upgrading & Processing Sector)	• Western US Subbituminous & Lignite Reserve Owners & Producers • Texas Lignite Reserve Owners & Producers • Indonesian Coal Producers	• Eastern European Brown Coal Producers • Australian Brown Coal Reserve Owners

HEAVY FUEL OIL MARKET

There are no established markets for, nor end users of, LRCWF. Except for the Italy, Japan and Russia Utility and Industrial Sectors, there are no established markets for, nor end users of, Coal Water Fuel (CWF), a mixture of bituminous coal, water and special additives). For the market sectors noted LRCWF would, and CWF does, compete in the HFO market. The estimated demand for HFO in the Primary Target Sectors/End Users is shown in the following table:

Table 2: HFO Demand for Primary Target Sectors/End Users

Primary Target Sector/*End User*	HFO Demand (mbl)	Equivalent LRCWF (mbl)	(mtons)
Alaska Utility Sector	1.0	2.6	0.5
Hawaian Electric Company	8.4	21.7	4.2
Japan Utility Sector	145	375	72

Note: 1) mBTU = 1,000,000 BTU

2) One barrel of Heavy Fuel Oil contains approximately 6.2 mBTU as compared to one barrel of LRCWF at 2.4 mBTU. One ton of LRCWF contains approximately 5.2 barrels of LRCWF.

While the potential of the Primary Target Sector/End User market is huge, the most immediate challenge facing •ACWFi is establishment of market recognition/market acceptance of LRCWF as a viable alternative fuel to HFO and as a viable competitor to CWF.

MARKET DEVELOPMENT STRATEGY

The initial focus of •ACWFi's market development efforts, during Phase II of the LRCWF Demonstration Project, would be development of market recognition/market acceptance of LRCWF by the Japan Utility Sector. Initial market development activities would not be initiated until construction of the Phase II demonstration plant is well underway. It is anticipated that establishment of market recognition/market acceptance will take at least 2 years.

The Japan Utility Sector is the primary target for the following reasons:

- The majority of the fuel moving to this market is purchased under multi-year (term) contracts as opposed to spot.
- The sector is populated with numerous large end users.
- Diversity, security and stability of supply are as important as fuel price.
- Capture of a 2% share of this market would be sufficient to justify development of a commercial plant in Alaska.

Marketing to the Japanese utilities presents it own unique set of problems in that the marketing must be both direct to the end user and indirect through Japanese trading companies, Japanese banks and the Japan Ministry of Trade and Industry (MITI).

The Japanese utilities are, with one exception, independent of the Japanese government and are not members of the traditional Japanese business groups. However, both the Japanese trading companies and MITI will have some involvement in the marketing process.

The local Alaska market, the Hawaii Electric Power opportunity and opportunities with West Coast US utility sector would receive secondary emphasis. The Alaska market is relatively small, populated with numerous small users and could best be served as a secondary market once a commercial plant were in operation.
Hawaii Electric Power and the West Coast US utility sector markets offer substantial market potential, would be predominantly term as opposed to spot and are populated with several large users. However, marine transportation costs as a result of Jones Act requirements make penetration of these markets problematic. If current efforts to exempt Alaska coal and coal derived fuels from Jones Act restrictions are successful, •ACWFi's ability to penetrate these markets would be greatly enhanced.

TECHNOLOGY LICENSING MARKET

The coal upgrading and processing technology licensing market is an emerging service market. Most US based entities are relative newcomers to this market while some European entities have been in the market for many years. In the US, the feasibility of numerous technologies have been investigated and several demonstration plants employing

various combinations of technologies have been constructed as part of various public/private sector joint ventures. With few exceptions, these demonstration programs have focused on improving the efficiency of coal utilization and/or reducing the environmental impact of coal utilization.

The focus of the LRCWF technology is adding value to coal by producing a fuel which competes in a market that places a premium on liquid BTU's relative to solid BTU's. Thus the key differentiating factor of a LRCWF technology license is the ability of a licensee to compete in a sector of the higher BTU value oil market.

A market development strategy which exploits the advantage of LRCWF technology relative to other coal upgrading and processing technologies will be developed toward the completion of Phase II of the LRCWF Demonstration Project.

COAL TECHNOLOGY SERVICES MARKET

The LRCWF Demonstration Project facilities at UAF in combination with University and private sector based engineering and operating experience gained during the Demonstration Project would form the primary support service capability to •ACWFi's technology licensing efforts. The combination of facilities and technical expertise available at UAF and the participation of private sector technical expertise would have the capability of offering its services on the open market. The capability to both produce hot water dried slurry fuels and evaluate the fuels performance in the same facility would favorably position a joint effort between the private sector and UAF in the coal technology services market place. Pursuit of opportunities and participation in this market is not presently within the scope of •ACWFi. However, it would be •ACWFi's intention to provide whatever assistance practicable to both UAF and participating private sector service providers in the promotion of this unique combination of facilities and expertise.

The specific market in which LRCWF from an Alaska commercial plant would compete can be described as the northern Pacific Basin Heavy Fuel Oil market. The unit heating values and range of market values (landed price in Japan) for HFO, LRCWF and non-HFO competitors, CWF and Orimulsion® (an emulsion of heavy Venezuelan crude and water), are presented in the following table. The range of heating values and market values for coal are also provided.

Table 3: Heating and Market Values for Various Fuels

	Heavy Fuel Oil (HFO)	LRCWF	Orimulsion®	CWF	COAL
Heating Value	6.1 - 6.3 mBTU/bl	2.4 mBTU/bl	2.7 mBTU/bl	3.0 mBTU/bl	8,000 - 12,500 BTU/lb
Market Value ($/mBTU)	$2.50 avg. (CIF Japan)	? (CIF Japan)	$2.00 est. (CIF Japan)	$2.50 - $3.25 (CIF Japan)	$1.80 - $2.00 (CIF Japan)

The market values shown come from a variety of sources and are believed to accurately reflect the best available information.

LRCWF MARKET VALUE

The market value (the price a buyer is willing to pay) for LRCWF will be established by the market during Phase II of the Demonstration Project. However, given the market values in the preceding table and considering only landed price, the range of potential market values would be $2.00/mBTU (Orimulsion®, lowest cost competitor) to $3.25/mBTU (Chinese manufactured CWF, highest cost competitor).

LRCWF v. Orimulsion®

Orimulsion® is currently not a significant factor in the Pacific Basin HFO market. Panama Canal charges in combination with long marine routes generally make South American produced coal non-competitive (cost) in the Pacific and similar transportation charges against Orimulsion® would reduce, although not eliminate, a cost advantage (against HFO) in the Pacific.

Orimulsion® has the potential of capturing market share in the Pacific Basin HFO market; however, LRCWF would have competitive environmental advantages (i.e., non-oil cargo, ultra-low sulfur, lower trace elements) and should be directly interchangeable with Orimulsion®.

LRCWF v. CWF

The current market for CWF is limited to a few installations in Japan, either specifically designed to burn CWF or with the capability to fire either HFO or CWF. The CWF being fired in these facilities is either produced in Japan from imported coal or imported from China. Market values for CWF produced in and exported from China to Japan are in the range of $3.25/mBTU to $3.50/mBTU (CIF Japan).

While market values for CWF produced in Japan are not available, it is known that the landed cost (in Japan) of imported bituminous coal is on the order of $2.00/mBTU. Processing costs for CWF are estimated to be on the order of $0.50/mBTU to $1.00/mBTU (including additives) yielding a cost on the order of $2.50 /mBTU to $3.00/mBTU.

LRCWF produced from Alaska coal has three distinct advantages over CWF:

- LRCWF combustion characteristics are superior to CWF. It is a demonstrated fact that less of the carbon (the source of the BTU's) in CWF is burned than is the case with LRCWF. The user of LRCWF gets the benefit of 90% to 95% of the available BTU's; whereas, the CWF user gets the benefit of 80% to 85% of the available BTU's. The greater combustion efficiency of LRCWF could translate to a $0.10/mBTU to $0.25/mBTU benefit to LRCWF. (references 4,5,6,7)

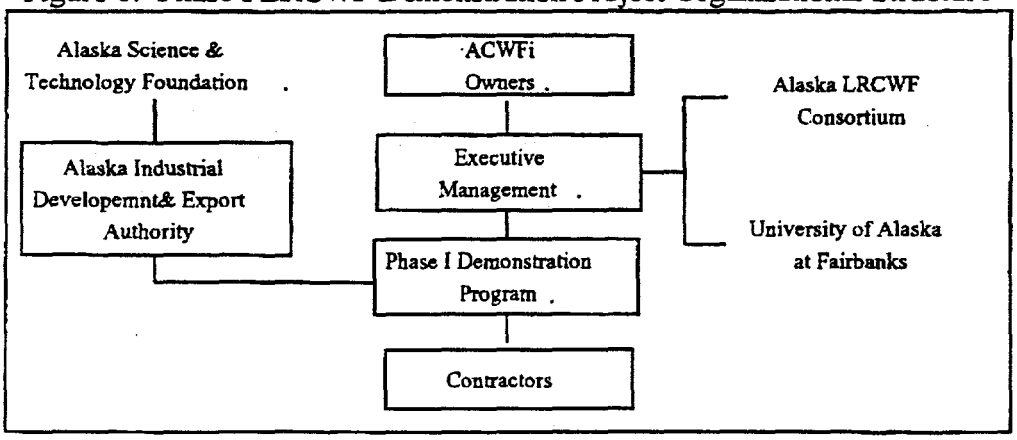
- Combustion of LRCWF produced from ultra-low sulfur Alaska coal produces less sulfur dioxide (SO2) than CWF. This results in lower emissions of SO2 and/or reduced SO2 removal costs. Lower SO2 could translate into a $0.05/mBTU to $0.10/mBTU benefit to LRCWF.(8)

- Production of stable LRCWF does not require costly additives. In order to achieve the desired and stable solids loading (i.e., the coal to water ratio) in CWF, it is necessary to include chemical additives in the slurry. The properties of hot water dried low rank coals are such that acceptable solids loading can be achieved without the use of additives. The absence of the need for costly additives eliminates an uncontrollable cost element from the production of LRCWF. (9,10,11)

With the possible exception of a higher unit heating value (i.e., BTU/bl), transportation and use of CWF has no advantages over LRCWF and LRCWF would be directly interchangeable with CWF.
Finally, the derate (i.e., reduction in output) of a plant designed to fire HFO should be less with LRCWF than that associated with CWF.

At present the Alaska LRCWF enterprise consists of the following major elements: Alaska Coal-Water Fuel, Inc. (•ACWFi); the Alaska LRCWF Consortium ("Consortium"); the University of Alaska at Fairbanks (UAF); Alaska Science & Technology Foundation (ASTF) and the Alaska Industrial Development and Export Authority (AIDEA). During Phase I of the Demonstration Project these major elements are functionally related as shown below:

Figure 1: Phase I LRCWF Demonstration Project Organizational Structure



•ACWFi was formed in 1994 as a private sector development corporation with responsibility for the promotion and management of the LRCWF Demonstration Project. Dr. John Sims, Vice President of Marketing for Usibelli Coal Mine, Inc. (•UCM), serves as president of •ACWFi and Mr. Warrack Willson of EERC serves as secretary of •ACWFi. At present, •ACWFi has no employees.

The Consortium is a collection of private sector entities which, prior to the formation of •ACWFi, functioned as the promoters of the LRCWF Demonstration Project. Subsequent to the formation of •ACWFi, various members of the Consortium have functioned as unpaid advisors or participants in and/or paid contractors to Phase I of the LRCWF Demonstration Project. It is anticipated that during Phase II some members of the Phase I Consortium will join the •ACWFi owners group, while others may function as unpaid advisers and/or paid contractors.

UAF, a recent addition to the enterprise, is the owner of the site and facilities where the Phase II demonstration plant would be constructed.

PHASE II ORGANIZATIONAL STRUCTURE

During the interim between the completion of Phase I of the LRCWF Demonstration Project and the initiation of Phase II, •ACWFi's owners, •UCM and EERC Foundation, and executive officers, Dr. John Sims, President, and Dr. Warrick Willson, Secretary, will:

- Finalize any necessary agreements between •ACWFi and UAF regarding among other things use of the UAF facilities for Phase II and ownership of the facilities at the conclusion of Phase II.

- Appoint a Board of Directors, including the Chairman of the Board/Chief Executive Officer. At least two members of the Board will be outside/non-owner directors.

- Solicit equity participation in •ACWFi by members of the Alaska LRCWF Consortium and active participants in the HFO market.

- Establish internal financial and administrative control systems.

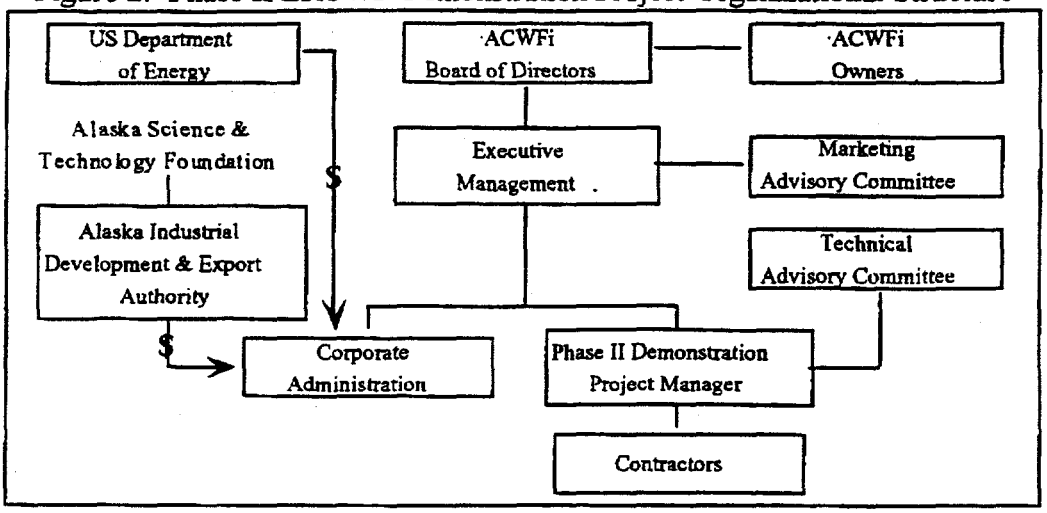
- Appoint a full time Project Manager for Phase II of the Demonstration Project.

- Establish both a marketing and a technical advisory committee with representation from ASTF, AIDEA, USDOE, •ACWFi and the Consortium.

- Finalize all agreements between •ACWFi and ASTF/AIDEA and •ACWFi and the US Department of Energy.

Implementation of these actions would result in the functional organizational structure shown below:

Figure 2: Phase II LRCWF Demonstration Project Organizational Structure



During Phase II of the LRCWF Demonstration Project:

- Those functions initially provided by the Marketing Advisory Committee will be replaced with an •ACWFi Market Development/Marketing unit. The initial focus of this unit will be the Pacific Basin HFO market. Toward the completion of Phase II, the scope of activities of the Market Development/Marketing unit will be expanded to include the Technology Licensing market.

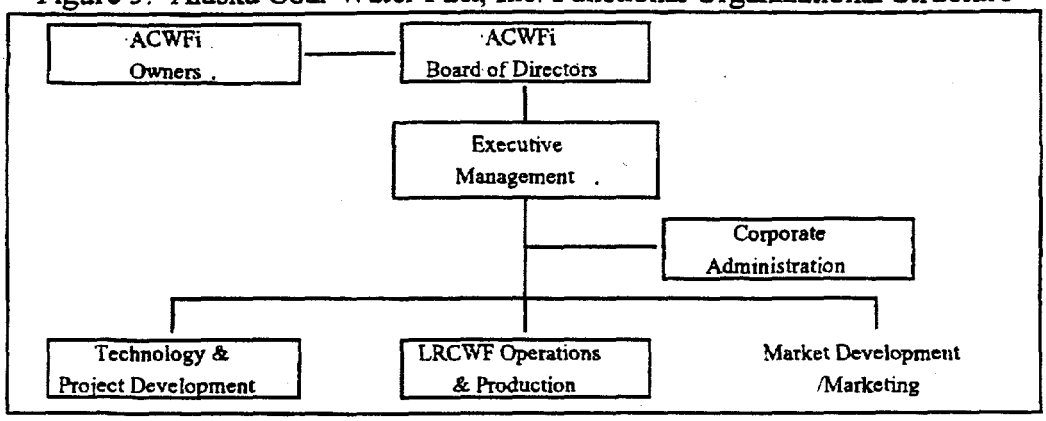
- Approximately midway through Phase II, the scope of activities of the Phase II Demonstration Project Manger will be expanded to include both Technology and Project development responsibilities.

- Executive Management will update this Prefeasibility Business Plan to assess performance relative to the plan and redirect the strategic focus of the plan as may be required by changing conditions.

As market acceptance/marketability of LRCWF is established and the full scale economics of an Alaska LRCWF plant are validated, the strategic focus of Executive Management will shift to development and financing of a full scale plant.

Ultimately the organizational breakdown structure of •ACWFi would be as shown below.

Figure 3: Alaska Coal-Water Fuel, Inc. Functional Organizational Structure



The primary focus of the Technology & Project Development unit will be support to the Market Development/Marketing unit both with regard to the Pacific Basin HFO market and the Technology Licensing market. The sole focus of the LRCWF Operations & Production unit would be the Alaska LRCWF plant.

Phase II of the LRCWF Demonstration Project is intended to, among other things, answer the following questions:

- What value (price) will the market assign to LRCWF as a alternative to HFO, Orimulsion®, &/or CWF?
  Based on available information it is believed that the Japan Utility Sector would assign a value, in 1995 dollars, of between $2.00/mBTU and $3.25/mBTU.

- What costs (including owners return on investment) are associated with production of LRCWF from Alaska low rank coals?
  Feasibility estimates of LRCWF production (processing) costs are in the range of $1.00/mBTU to $1.50/mBTU.

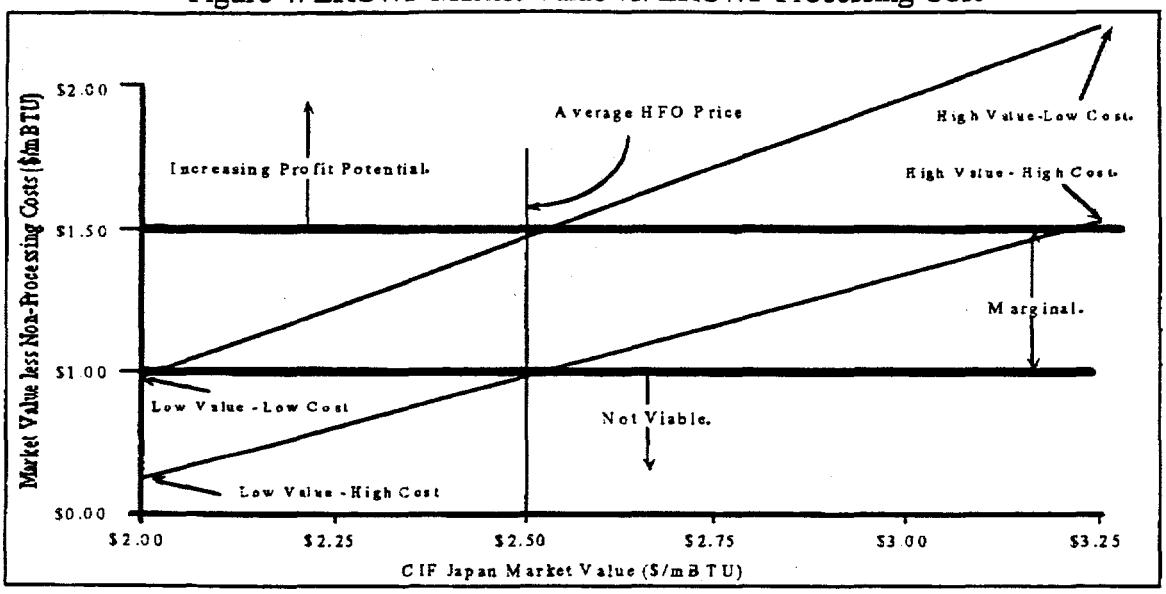
LRCWF non-processing costs such as feed coal price and port & marine charges, are, in addition to market value and process costs, major determinants of economic feasibility. Shown in the following table are the estimated ranges (1995) of non-processing costs associated for a Beluga Region, Alaska LRCWF commercial plant shipping to Japan.

Table 4: Non-Process Cost Ranges (1995 dollars)

	Low Range		High Range	
	$/ton	$/mBTU	$/ton	$/mBTU
Coal Price (FOB plant)	$9.25	$0.58	$16.25	$1.02
Port & Marine Transport Charges	$6.00	$0.48	$9.00	$0.72
Total	$15.25	$1.06	$25.25	$1.74

The difference between the market value and non-processing cost (i.e., margin available to cover processing costs) is shown in the following graphic for various prices.

Figure 4: LRCWF Market Value vs. LRCWF Processing Cost



As can be seen, except for the combination of low to median market value and high to moderately high non-processing costs, an Alaska LRCWF commercial plant should be at least marginal with significant upside potential.

Numerous factors outside the control or influence of •ACWFi have the potential of effecting, positively or negatively, the long-term success of the •ACWFi enterprise. The following is a partial listing of known factors along with a preliminary evaluation of their significance.

SEASONAL VARIATION IN HFO MARKET VALUE

The spot price of HFO is known to fluctuate as much as ± $1.00/mBTU. The utility sector is known to purchase the majority of its coal supplies under term contracts with annual price reopeners, thereby assuring a dependable supply and a relatively stable price. Given the initial focus on term contract markets, •ACWFi would not anticipate seasonal fluctuations in the market value of LRCWF. However, once in production, a LRCWF plant could participate in spot markets when spot HFO supplies are tight and prices are high.

FLUCTUATION IN GLOBAL CRUDE OIL PRICES

Fluctuation in global crude prices are likely to produce similar fluctuations in the spot price for HFO. HFO producers attempt to get 80% of the crude price ($/mBTU) for HFO. Term contract prices for HFO are likely to be less responsive to short-term fluctuations in crude prices. LRCWF would not likely be linked to the spot price of oil and, therefore, would not fluctuate due to changes in the spot price of oil. However, in times of tight oil supplies, LRCWF has the potential of exploiting oil supply shortages.

DEVELOPMENTS IN OIL REFINING

At present HFO trades (on a $/mBTU basis) at about 65% to 80% of the value of straight run crude. A developing trend in the refining industry is, through the construction of new conversion units, to convert the lower ends of the barrel to higher value distillates and thereby compete with its HFO customers for use of that portion of the barrel used for boiler fuel. This trend would, over the long-term, reduce the supply of HFO and/or drive up the value of HFO to close to the value of straight run crude. An increase in the price and/or a decrease in supply of HFO in the market would enhance the future prospects of LRCWF.

LONG-TERM UTILITY SECTOR DEMAND FOR HFO

The Japan, Taiwan and Korea utilities sectors are moving toward reducing the percentage share of electrical power produced by oil. These markets are not necessarily taking existing oil fired generation out of service, although most new generation is either coal or gas fired. However, Japan's willingness to pursue CWF and Orimulsion® as alternates to HFO would indicate a desire to maintain some level of "oil fired" capacity in their overall generating mix.

In the case of West Coast US utilities and Hawaii Electric Power, there are no indications of any significant reductions in oil fired generation.

ORIMULSION® & CWF PENETRATION OF THE PACIFIC BASIN HFO MARKET

All Asian Pacific Basin utilities multi-source fuel supplies at the plant level. This multi-sourcing strategy makes the introduction of a new or alternate fuel (Orimulsion®, CWF or LRCWF) extremely difficult unless and until the utility is convinced that a source of supply of a similar alternate is available. Thus Orimulsion® and CWF penetration of the Asian Pacific Basin utility sector, while capturing market share, would actually enhance the future prospects for LRCWF.

LRCWF AS A REPLACEMENT FOR DIESEL FUEL

Technological developments in large stationary and marine diesel engines have the potential of adding to the overall market potential of LRCWF. The major limiting factors are higher ash and the lower energy density (BTU/gal) of LRCWF as compared to diesel fuel. LRCWF made from some of the extremely low ash, low rank Indonesian coals or de-ashed Alaska coal could substantially reduce the ash factor. The low energy density of LRCWF would require substantially greater storage capacity as compared to diesel fuel. However, the non-hazardous nature of LRCWF virtually eliminates the adverse environmental impacts associated with diesel fuel spills.

JONES ACT REQUIREMENTS

The US Jones Act requires that all commerce between any two US ports be carried in US constructed vessels and manned by US crews. The cost differential associated with Jones Act vessels as compared to non Jones Act vessels would virtually eliminate the prospect of LRCWF being cost competitive in West Coast US and Hawaii markets. If current efforts to exempt Alaska coal and fuels derived from Alaska coal from the requirements of the Jones Act are successful, the overall US market potential of LRCWF would be greatly enhanced. If the efforts are unsuccessful, the market potential of LRCWF in US coastal markets is doubtful.

VERTICALLY INTEGRATED LRCWF PROJECT

Development of a vertically integrated LRCWF Project, consisting of a dedicated mine, LRCWF plant, a dedicated LRCWF fired power plant and all associated infrastructure is a possibility. However, the capital requirements and overall scope associated with a vertically integrated LRCWF development are beyond the capacity of •ACWFi. A minimum scope integrated development would involve a ± 1 million ton per year mine and LRCWF production plant linked to a ± 250 megawatt power plant. The mine, LRCWF plant and power plant would represent a capital investment on the order of $400,000,000 to $500,000,000.

One possible scenario would involve a mine and LRCWF plant located in the Beluga Region of Southcentral Alaska and a power plant located in Mexico, Hawaii or on the west coast of the "Lower 48". This scenario would require the involvement of an Independent Power Producer (IPP) to address the power plant and power sales agreement elements of the development.

Another possible scenario would involve the mine, LRCWF plant and the power plant located in the Beluga Region of Southcentral Alaska. This scenario would place LRCWF in direct competition with the currently abundant and relatively inexpensive natural gas of the Upper Cook Inlet. Depletion of the Upper Cook Inlet gas reserves and/or a significant increase in the gas price in the next century would enhance the potential for an all Alaskan vertically integrated LRCWF development; however, a power plant fired with run-of-mine coal would probably be a lower cost alternative.

APPENDIX A: REFERENCES & DOCUMENTS REVIEWED

1. W. Irwin, International Coal Preparation Consultants, Ltd., "Coal/CWF Supply and Demand Marketing Factors", Sept., 1994.

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APPENDIX 4

PETROLEUM MARKETING SOLUTIONS
705 WEST 6TH AVENUE SUITE 207 ANCHORAGE, ALASKA 99501

MARCH 23, 1995

DR. WARRACK WILLSON
ALASKA CWF, INC.
12212 OLD GLENN HWY, SUITE 8
EAGLE RIVER, AK 99577

DEAR DR. WILLSON,

THIS REPORT HAS BEEN PREPARED IN CONNECTION WITH THE WORK OUTLINED IN THE MAJOR INTERNATIONAL LETTER OF FEBRUARY 13 1995 TO MR. DAVE EBERLE OF THE ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY.

THE REPORT VIEWS THE MARKET FROM THREE DIFFERENT PERSPECTIVES:

HOW HAS RESIDUAL FUEL HISTORICALLY BEEN VIEWED

WHAT DYNAMICS ARE DRIVING THE CURRENT TRANSITION PERIOD

WHERE IS RESIDUAL FUEL LIKELY TO SETTLE OUT WHEN THE TRANSITION IS OVER.

RECENT HISTORY

IN MY BRIEF REPORT TO YOU ON MARCH 11, 1994 I NOTED THAT LOW SULFUR WAXY RESID, YOUR MOST LIKELY COMPETITIVE FUEL, WAS PARTICULARLY DEPRESSED IN PRICE. AT THE TIME IT WAS SELLING FOR 11.20 / BARREL FOB SINGAPORE WHICH GAVE IT LAID IN JAPAN VALUE OF APPROXIMATELY $ 12.74. AT THAT PRICE THE COST PER MILLION BTU'S WAS ABOUT $ 2.09.

THE REPORT FURTHER NOTED THAT I FELT THAT THE MARKET WAS UNDULY DEPRESSED AT THAT TIME AND CALLED FOR IMPROVED VALUES ON BOTH CRUDE AND PRODUCTS BY THE END OF 1994. THAT HAS HAPPENED AND WE ARE CURRENTLY SEEING PRICES FOR RESIDUAL FUEL THAT ARE IN THE RANGE OF $ 14.95 / BARREL LAID IN TO JAPAN. THAT GIVES A COST PER MILLION BTU'S OF APPROXIMATELY $2.45.

SO THE COMPETITIVE NEWS HAS ,INDEED, IMPROVED.

WHY HAS THAT HAPPENED? THE KUWAIT REFINERIES ARE BACK TO MAKING THE LIGHT PRODUCTS THAT THE JAPANESE MARKET HAS DEPENDED ON THEM FOR AND THE SAUDIS EXERCISED THEIR CONSIDERABLE PRODUCTION CLOUT TO MOVE THE CRUDE MARKET BACK TOWARD PRICE LEVELS THAT ARE TOLERABLE EVEN THOUGH STILL LOWER THAN THEY WOULD LIKE TO SEE.

RESIDUAL FUEL TRADITIONAL HISTORY

THE PACIFIC RIM MARKET FOR RESIDUAL FUEL HAS, IN THE PAST, BEEN FOR UTILITY USE, INDUSTRIAL USE AND FOR SHIPS BUNKERS. THAT PATTERN IS JUST LIKE THE ONE YOU WOULD FIND ON THE NORTHEAST COAST OF THE UNITED STATES. IN SUCH A MARKET THE TRADITIONAL FORCES DROVE THE VALUE.

THEY ARE:

ECONOMIC STRENGTH IN THE AREA

WEATHER

SEASONAL DEMAND FOR THE LIGHT ENDS WITH SUMMER GASOLINE AND WINTER HEATING OIL RAISING AND LOWERING RUNS OF THE DISTILLATION CAPACITY AND TURNING OUT MORE OR LESS RESIDUAL FUEL AS A BY- PRODUCT OF THE LIGHT END DEMAND.

A CAVEAT TO THIS IS THAT THE ECONOMIC ACTIVITY LEVEL OF THE PACIFIC RIM MARKET WOULD HAVE MUCH MORE OF A SHIPS BUNKER FUEL REQUIREMENT THAN MOST AREAS.

IN THE TRADITIONAL SCENARIO, REFINERS LIKE TO SEE A RESIDUAL FUEL NETBACK THAT IS IN THE RANGE OF 75% TO 80% OF THE COST OF THEIR CRUDE. THE MARKET IN MOST CASES HAS NOT FAVORED THEM WITH THAT KIND OF RETURN. IN THE LAST FIVE YEARS SOMETHING IN THE RANGE OF 65% HAS PROBABLY BEEN THE NORM AND REFINERS FELT LUCKY TO GET THAT. IT IS MY OPINION THAT ALL OF THAT IS ABOUT TO CHANGE. THE REASONS ARE IN THE NEXT SECTION.

THE TRANSITION AND WHAT IS DRIVING IT

SOME GROWTH IN DEMAND IN THE FAR EAST IS AS A RESULT OF ADDED USAGE FOR POWER GENERATION . THAILAND IS A GOOD EXAMPLE. SEASONAL DEMAND CAN ALSO PULL RESIDUAL PRICES INTO A MORE ATTRACTIVE RANGE. JAPAN'S VERY HOT SUMMER OF 1994 AND THE RESULTANT HIGH ELECTRICAL DEMAND SHOWED THAT RESULT. THESE ARE TRADITIONAL AND SHORT LIVED IMPACTS.

BY FAR THE MOST IMPORTANT AND LONG LIVED FACTOR DRIVING THE CHANGE IN RESIDUAL FUEL ECONOMICS WILL BE THE ADDITION OF CONVERSION CAPACITY TO DESTROY THE BOTTOM OF THE BARREL AND CREATE FEEDSTOCK FOR DOWN STREAM UNITS THAT WILL FEED REFORMERS TO PRODUCE OCTANES FOR GASOLINE AND GENERATE NAPTHA FOR PETRO CHEMICAL FEEDSTOCK.

WELL, WHERE DID ALL THAT COME FROM AND WHY WEREN'T REFINERS DOING IT ALL ALONG? IT CAME FROM YEARS OF LOOKING AT THE 65% OF CRUDE VALUES FOR RESIDUAL FUEL AND SEEING THE POTENTIAL REPRESENTED BY THE OPENING UP OF CHINA AND THE EXPLODING GROWTH OF OTHER THIRD WORLD COUNTRIES IN THE AREA. THE NEED FOR THE FUNDAMENTAL PETROCHEMICAL BUILDING BLOCKS THAT RESULT FROM NAPTHA WILL BE TREMENDOUS AND THAT IS GOOD NEWS FOR THE REFINER AND SHOULD BE GOOD NEWS FOR THE POTENTIAL SUPPLIER OF EMERGING TECHNOLOGIES THAT WILL PRODUCE FUEL THAT COMPETES WITH RESIDUAL FUEL. OIL.

WHAT WILL HAPPEN AS A RESULT OF ALL THIS REFINERY CONSTRUCTION WILL BE GOOD NEWS IN PHASES. THE FINAL RESULT WILL BE REFINERS WHO WILL NEED STRAIGHT RUN RESIDUAL FUEL TO FEED THE HIGH CONVERSION UNITS ARE GOING TO COMPETE WITH THE BOILER FUEL USERS FOR THE SAME BARREL. THERE HAS BEEN VERY LITTLE OF THAT IN THIS ARENA BEFORE. THE RESULT WILL BE HIGHER VALUES FOR RESID AND HIGHER VALUES FOR ANY PRODUCT THAT REPLACES RESID FOR BOTH THE UTILITY AND THE LARGE INDUSTRIAL USER.

I FEEL THAT THIS WILL HAPPEN IN PHASES AND NOT BE IMMEDIATELY APPARENT IN THE MARKET PLACE. THE REASONING HERE IS THAT IN THE LAST FEW YEARS, THE CONSTRUCTION OF DISTILLATION CAPACITY HAS OUTSTRIPPED THE CONSTRUCTION OF CONVERSION CAPACITY. I FEEL THAT WE HAVE SEEN MOST OF THAT COMPLETED AND IT WILL TAKE THE MARKET A FEW YEARS TO ABSORB THAT. IT WILL HAVE THE EFFECT OF MASKING THE COMING TIGHTNESS OF STRAIGHT RUN RESID AND THE CORRESPONDING UPWARD PRESSURE ON PRICES.

WHEN THE DISTILLATION BOOM HAS RUN IT'S COURSE THE HIGH CONVERSION CAPACITY WILL BE THERE WITH IT'S LARGE APPETITE FOR RESIDUAL FUEL FOR FEEDSTOCK. THE OWNERSHIP OF THOSE PLANTS AND THE LENDING INSTITUTIONS THAT ARE "ON THE LINE " FOR THESE VERY COSTLY INSTALLATIONS WILL WANT TO SEE THEM RUNNING AT OR NEAR CAPACITY AND RESIDUAL FUEL VALUES MAY WELL EXCEED THE 80% OF CRUDE LEVEL THAT HAS BEEN THE TRADITIONAL BENCHMARK.

THE TIME AVAILABLE AND SCOPE OF WORK DO NOT PERMIT A DETAILED ANALYSIS OF POTENTIAL INDUSTRIAL USE IN KOREA AND JAPAN. IT IS MY FEELING THAT SUCH A DETAILED STUDY WOULD CONFIRM GROWING POTENTIAL FOR LRCWF FOR HEAVY INDUSTRY IN THE FAR EAST.

AT THIS POINT IN TIME I FEEL THAT THE UTILITY MARKET SHOULD BE THE AREA OF PRIMARY FOCUS SINCE IT OFFERS THE GREATEST SHORT TERM MARKET AND WILL PROBABLY SERVE IN MANY CASES TO PROVIDE A NECESSARY DEMONSTRATION OF THE PRODUCT TO A CURIOUS BUT CAUTIOUS INDUSTRIAL MARKET.

I HAVE INCLUDED TWO YEARS OF HISTORY FOR LOW SULFUR WAXY RESID LAID IN TO JAPAN. THE INFORMATION COMES FROM PLATTS SINGAPORE POSTING FOR THIS MATERIAL AND INCLUDES A CALCULATION FOR THE ACTUAL FREIGHT RATE BEING CHARGED DURING THE MONTH IN QUESTION. YOU WILL NOTE SOME VERY WIDE SWINGS IN PRICE AND THE EVENTS THAT CAUSE THOSE VARIATIONS ARE FOOTNOTED BELOW THE TABLE.

*ALL PRICES ARE IN **DOLLARS PER BARREL** AND ARE **C&F, (DELIVERED), JAPAN***

MONTH	***1993***	***1994***	***1995***
JANUARY	*17.00*	*10.75*	*15.21*
FEBRUARY	*17.42*	*11.40*	*14.64*
MARCH	*18.17*	*12.84*	
APRIL	*17.20*	*11.79*	
MAY	*20.80*	*13.79*	
JUNE	*21.40*	*14.59*	
JULY note #1	*16.75*	*17.49*	
AUGUST note # 2	*14.50*	*22.61*	
SEPTEMBER	*14.30*	*16.60*	
OCTOBER	*14.25*	*13.40*	
NOVEMBER	*12.80*	*15.16*	
DECEMBER	*9.70*	*14.31*	

THE CHART ABOVE IS ALSO EXPRESSED IN COST PER MILLION BTU IN THE ATTACHED APPENDIX.

JULY AND AUGUST OF 1994 SHOWED UNUSUALLY HIGH PRICING FOR LOW SULFUR WAXY RESID. IN JAPAN. THIS WAS DRIVEN BY TWO EVENTS. THEY ARE EXPRESSED IN THE NOTES SHOWN AT THE BEGINNING OF THE NEXT PAGE.

NOTE #1

THE ABNORMALLY HIGH TEMPERATURES IN JAPAN. THIS CAUSED UTILITIES TO RUN AT VERY HIGH LEVELS AND TO BID UP THE MARKET FOR LOW SULFUR FUEL OIL.

SUPPLIERS AND VESSEL OWNERS TOOK FULL ADVANTAGE OF THAT SITUATION AS THEY PUSHED THE MARKET FOR ALL IT WOULD ALLOW.

NOTE #2

AT ROUGHLY THE SAME TIME THE NIGERIAN OIL WORKERS STRIKE OCCURRED AND PRODUCERS SUCH AS SHELL WERE REPORTING LESS THAN 50% OF THEIR NORMAL PRODUCTION. THIS EVENT ALSO TENDED TO HEAT UP THE TRADING MARKET AND CRUDE AND PRODUCTS RESPONDED IN TANDEM AS THEY ALMOST ALWAYS DO.

CONCLUSION

LOOKING AHEAD, THE NEWS IS GOOD FOR ANY FUEL COMPETING FOR THE UTILITY AND LARGE INDUSTRIAL USER IN JAPAN AND KOREA. THE CHANGES THAT ARE OCCURRING IN THE REFINING INFRASTRUCTURE IN THE PACIFIC BASIN ARE COSTLY AND PERMANENT. THE NEW EQUIPMENT WILL RUN AND WILL COMPETE FOR HIGH QUALITY RESIDUAL FUEL AS A FEEDSTOCK CREATING A STEADY UPWARD PRESSURE ON PRICE.

ALTHOUGH NOTHING IS GUARANTEED THE ATMOSPHERE FOR LOW RANK COAL WATER FUEL IS MUCH IMPROVED AS WE LOOK INTO THE NEXT DECADE AND BEYOND.

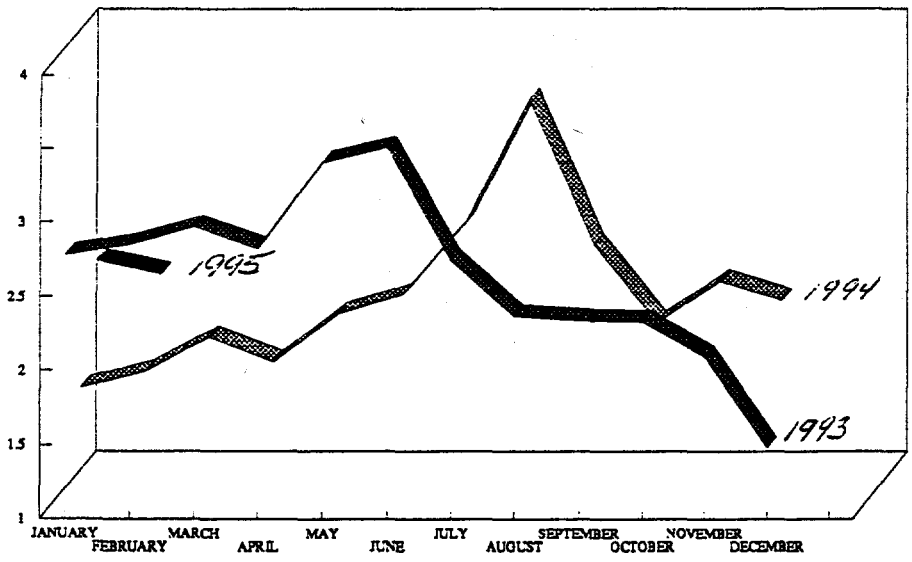
THANK YOU FOR THE OPPORTUNITY TO PARTICIPATE IN THIS PROJECT. PLEASE CALL ME IF THERE IS ANY FURTHER SERVICE OR CLARIFICATION I CAN PROVIDE.

VERY TRULY YOURS,

E.W. CROMEY
PRESIDENT
PETROLEUM MARKETING SOLUTIONS

LOW SULFUR WAXY RESIDUAL FUEL
PRICE PER MILLION BTU, DELIVERED TO JAPAN

MONTH	1993	1994	1995
JANUARY	$2.78	$1.76	$2.49
FEBRUARY	$2.85	$1.87	$2.40
MARCH	$2.97	$2.10	
APRIL	$2.82	$1.93	
MAY	$3.41	$2.26	
JUNE	$3.51	$2.39	
JULY	$2.74	$2.87	
AUGUST	$2.37	$3.71 →	
SEPTEMBER	$2.34	$2.72	
OCTOBER	$2.33	$2.20	
NOVEMBER	$2.09	$2.48	
DECEMBER	$1.48	$2.35	



APPENDIX 5

LRCWF Production Cost Estimates

Beginning in 1986 a number of A&E firms have made LRCWF cost estimates with a variety LRCs including Australian brown coal and ND lignite. During Phase 1 LRCWF production cost estimates from a commercial plant located at a Beluga mine were made by the EERC, EPC and ICPCL.. All of these estimates are based on pilot plant data from the EERC and vary considerably.

EERC, as well as, several of the A&Es believe that there are significant economies of scale to be gained from building larger plants, i.e., the larger the plant the lower the costs. As shown in Table 1, EERC cost estimates predict that LRCWF costs will be over 50% lower for a 10 MM tpy plant versus one of ! MM tpy. However, the larger the plant the higher the capital cost, the higher the risk and the more difficult it will be to raise the capital. Therefor, even if economies of scale are significant, it is likely that the first plant built in the Beluga region will be designed to consume all the coal from the smallest sized coal-mine that makes economic sense to the coal producer to open, nominally 1,000,000 tons per year.

Table 1 – EERC LRCWF Cost Estimates

Size (MM	Opn. Cost ($MM/yr)	Opn. Cost ($/MM	Debt/qty (%)	ROR (%)	Price ($/ton)	Price ($/MM Btu)
1	$36	$2.60	50%	20%	$56	$4.10
4	$93	$1.70	50%	20%	$35	$2.60
10	$196	$1.40	50%	20%	$28	$2.00
1	$40	$3.00	80%	20%	$48	$3.50
4	$103	$1.90	80%	20%	$30	$2.20
10	$213	$1.60	80%	20%	$24	$1.80
1	$36	$2.60	50%	10%	$47	$3.50
4	$93	$1.70	50%	10%	$30	$2.20
10	$196	$1.40	50%	10%	$24	$1.80
1	$40	$3.00	80%	10%	$44	$3.30
4	$103	$1.90	80%	10%	$28	$2.10
10	$213	$1.60	80%	10%	$23	$1.70

Bill Irwin, President of International Coal Prep Consultants, Ltd. of Calgary, Alberta, Canada was a leader in the development of Canadian CWF technology. He designed the 50 tph coal-water fuel plant and its use in a 20 MW oil-fired utility in Atlantic Canada. He introduced CWF technology to the Philippines, India and Columbia. In his most recent commercial coal project he served as the lead engineer in a Canadian venture to build a 4 MM tpy colliery in Iran. Mr. Irwin contends that Canada's loss of interest in CWF was due to world oil glut kept the international price of oil depressed. and an abundance of lower

cost energy in Canada.. While Japan be came the world's leader in bituminous CWF, Mr. Irwin saw the potential that LRCWF had to compete against bituminous CWF since it used a lower cost, more reactive feedstock and avoided the high costs associated with additives. Bill believes that a modular design based on 500,000 tpy units will the most economical approach and estimated that the production costs for Beluga LRCWF could be as low as $0.77 per MM Btu , excluding the cost of coal, Table 2.

Table 2 – LRCWF Production Cost Estimates by ICPCL.

Capital	Capital	Coal	Opns	Inland Trns	FOB Port
($ MM)	($ /MM Btu)	($ /MM Btu)	($ /MM Btu)	Port Fees	($ /MM Btu)
$67.47	$0.42	$0.65	$0.35	$0.50	$1.92
$101.21	$0.63	$0.65	$0.35	$0.50	$2.13
$67.47	$0.42	$0.97	$0.35	$0.50	$2.24

Energy Pacific Corp. modified their proprietary code for constructing and operating coal and biomass-fired power plants in rural Alaska to include LRCWF production and utilization. He concluded that there were only minimal gains to be made from economies of scale for plants larger than about 1 MM tpy. As shown in Table 3, LRCWF cost estimates are strongly dependent on coal cost and illustrate the need for strategic mine planning and operation to minimize costs.

LRCWF production cost estimates for a nominal 1 MM tpy facility at Beluga were $0.77 by ICPCL, $1.50 by Energy Pacific Corp., and over $2.60 by EERC, per million Btus without the cost of coal. These differences are a result of a number of variables including, process design differences, varying capital costs, differences in the number and costs of operating personnel, differences in the percentages of debt versus equity financing and the cost of money itself. This range of cost estimates is similar to those listed by earlier studies for Great Basin lignites by Bechtel National, Inc. and Lobbe Technologies, Canada, where process costs ranged from $0.86 to $2.00 respectively and were dependent on what, if any economies of scale were assumed for the larger plants studied. These differences may be magnified even further when the issue of the cost for boiler derating is added. A significant part of the differences is due to how the EERC pilot-plant data is interpreted and how they were scaled to commercial size. These differences are illustrative of the critical need for a demonstration scale plant that will narrow the uncertainty in process costs and define actual performance data in oil-designed boilers. The lower cost estimates suggest that LRCWF is competitive with today's price for low sulfur waxy resid and provide a target of opportunity.

Table 3 -- LRCWF Production Costs for a 1 MM tpy LRCWF Plant.

Tons Per Year		**1000000**	**1000000**	**1000000**	**1000000**	**1000000**
Maximum Operation(h/y)		**7,972**	**7,972**	**7,972**	**7,972**	**7,972**
HHV as Rec'd.(Btu/lb)		**8,100**	**8,100**	**8,100**	**8,100**	**8,100**
Weight (lb/t)		2,000	2,000	2,000	2,000	2,000
Total HHV(Btu/t)		16,200,000	16,200,000	16,200,000	16,200,000	16,200,000
Coal Cost($/t)	1.00	**$12.00**	**$16.00**	**$22.00**	**$30.00**	**$0.00**
Coal in(t/h)		125.45	125.45	125.45	125.45	125.45
Total HHV(Btu/h)		2,032,214,361	2,032,214,361	2,032,214,361	2,032,214,361	2,032,214,361
Heat Reject 1(Btu/h)		94,334,889	94,334,889	94,334,889	94,334,889	94,334,889
Heat Reject 2(Btu/h)		136,697,197	136,697,197	136,697,197	136,697,197	136,697,197
Total Reject)Btu/h)		231,032,086	231,032,086	231,032,086	231,032,086	231,032,086
Process Heat(t/h)(Btu/h)	8.57	138,815,408	138,815,408	138,815,408	138,815,408	138,815,408
Power Gen.(Btu/h)		92,216,678	92,216,678	92,216,678	92,216,678	92,216,678
Stack Loss(%)	25%	34,703,852	34,703,852	34,703,852	34,703,852	34,703,852
Gross Input(Btu/h)		369,847,493	369,847,493	369,847,493	369,847,493	369,847,493
Water in Heat(Btu/h)		152,696,948	152,696,948	152,696,948	152,696,948	152,696,948
Total Heat in(Btu/h)		217,150,545	217,150,545	217,150,545	217,150,545	217,150,545
Total Motor Horse (Hp)		10,500	10,500	10,500	10,500	10,500
Processed Fuel Cost($/t)		$41.60	$46.86	$54.76	$65.28	$25.81
Process Heat Cost($/t)		$103	$137	$189	$257	$0
Operating Fuel Cost ($/h)		$161	$214	$295	$402	$0
Electric Cost Per($/kwh)		0.065	0.065	0.065	0.065	0.065
Electric Cost Per($/h)		$853	$853	$853	$853	$853
Water, Sewer, Misc.($/t)	1.00	$125	$125	$125	$125	$125
Coal Cost as Rec'd.($/h)		$1,505	$2,007	$2,760	$3,763	$0
Opn.Costs w Labor($/h)		$2,748	$3,337	$4,222	$5,401	$979
Cap. Costs @8.5%($/h)		$1,913	$1,913	$1,913	$1,913	$1,913
Total Cost($/h)		**$4,661**	**$5,250**	**$6,135**	**$7,314**	**$2,892**
Cost($/MM Btu)		**$2.57**	**$2.89**	**$3.38**	**$4.03**	**$1.59**
Cost Per Gallon ($/gal)		**$0.145**	**$0.163**	**$0.191**	**$0.227**	**$0.090**

APPENDIX 6

TO:

Gerry Groenwald, EERC	Chris Anderson, EERC
Max Hodel, OIT-Toyko	Lowell Miller, DOE Headquarters
John Sims, UCM	Tony Jensen, Placer Dome U.S.
Bob Stiles, DRven	Jim Cucullu, POWER
Dave Eberle, AIDEA	Tom Harris, Tyonek
Bill Irwin, ICPCL	Roger Kolb, EPC
Bill Noll, MI	Dan Walsh, UAF
Bill Cromy, PMS	Dick Marshall, RMS

FROM: Warrack Willson, EERC

SUBJECT: Highlights of IEA-CLM Workshop `94, Tour of Japanese CWF Production and Utilization Facilities and Meetings with Potential LRCWF Users, October 16 - 26, 1994.

By all accounts the 1994 International Energy Agency's (IEA) Coal-Liquid Mixture (CLM) Workshop held in Tsukuba, Japan was a rousing success. The attendance for the workshop which was exclusively dedicated to CLMs was over 210 and nearly half of those participated in the optional 3 days of CLM plant tours. Foreign participants whose workshop fees were waived totaled 65 with the largest delegation from China. Of the seven nations that signed the original CLM agreement only Canada, Japan, Italy and the U.S. remain.

Excellent presentations about projected energy requirements and coal-water mixture's (CWM's) role in Japan were made by Mr. Okamoto, Director of Coal Industry for MITI and Mr. Shirato, Manager Thermal Power, Tokyo Electric Power Company (TEPCo.) The former indicated that coal would play a larger role in the future and that higher efficiencies and more secure energy sources would be the primary objectives. Mr. Shirato indicated that since CWF is a sight unseen method of handling and using coal, its use is expected to continue to grow rapidly. He also indicated that in the future one of their objectives was to make CWMs from "low grade coals" and that hot-water drying was the method adopted to upgrade LRC.

John Winslow, PETC, gave a good overview of U.S. coal-water fuel (CWF) activities including, a brief discussion of the use hot-water drying (HWD) to upgrade LRCs for CWF applications and the proposed Alaska LRCWF demonstration.

In addition to our paper, there were a number of other presentations on LRCWF production. Dr. Nakanart, Dept. of Mineral Resources, Thailand outlined, the test work on HWD of Thai

LRCs to be done at the EERC. Dr. Fatia, Mineral Technology Centre, Indonesia, described their batch autoclave HWD tests with indigenous LRCs. JGC's Hashimoto described their HWD pilot plant and indicated that they hoped to begin shake-down operation shortly after the first of the year.

The most impressive part of the workshop were the visits to the CLM production and utilization facilities during the three days of optional tours. The first visit was to Japan COM Co.'s 500,000 tpy CWM production facility and its end-user facility the Joban Joint Power Co.'s Nakoso Power station near Iwaki, northwest of Tokyo. Joban, a joint venture of TEPCo and Tohuku Electric Power Co., currently uses 500,000 tpy of CWF produced from imported bituminous coal at Japan COM Co.'s production plant about 6 km away. CWF comprises about 50% of the feed to a 600 MWe boiler with the balance being 20% heavy oil and 30% pulverized coal.

We also were given a description and tour of Joban's 200 tpd IGCC plant and were driven by their HWD pilot plant, but were not allowed to see it since it's still under construction. However, the lead HWD engineer, Mr. Shibata who visited the EERC in 1991, gave an excellent briefing on HWD and their planned unit operations.

Day two featured a bullet train ride to Okayama, southwest of Tokyo to visit TAYKA Corp. and their subsidiary Takuma Co., Ltd. the commercial user of CWF produced by the Yanri CWM Corp. in China and shipped by tanker to CWM West Japan Co., Ltd. Yanri is a joint venture between JGC Corp., Nissho Iwai and the Yanzhou Coal Co. capable of producing 250,000 tpy of CWM using Chinese bituminous coal. CWM West Japan Co., Ltd. is a CWM distribution center jointly held by Nissho Iwai, Mitsui Mining, JGC and Tsurumi Yuso. About 50,000 tpy of CWM are currently being used at Takuma's new boiler designed specifically for CWM. With the low price of oil, Takuma is currently the only customer for Chinese CWM and the production plant is operating at only about 20% of capacity.

The third day featured visits to the CWM West Japan Co.'s CWM distribution station for Chinese CWM and Electric Power Development Co.'s (EPDC's) 71 MWe PFB demonstration facility near Wakamatsu on the southern island of Kyushu. According to all reports the Chinese CWM has excellent stability and low viscosity and all transportation operations are said to be routine, and virtually as easy as handling oil.

During the Workshop and subsequent tours, Bill Irwin and I had the opportunity to renew many acquaintances of old and had the opportunity to discuss LRCWF with a number of potential users. Some of the most promising discussion were held with Mr. Katoro Katagiri, Manager Technical Engineering Dept. Ube Industries, Ltd., Dr. Dong Chan Kim, Dep. Dir. KIER, Mr. Nobuo Nagata, formerly with NEDO and now with Center for Coal Utilization Japan (CCUJ) and Mr. Takeo Yamada, General Manager Technology, Idemitsu Kosan (IK).

Mr. Katagiri indicated that Ube has entered into an international agreement to market Texaco gasification. There are several potential clients that have only LRC which has apparently rekindled their interest in LRCWF. He asked for any recent publications and additional information on the Alaska CWF project.

Dr. Kim indicated that Korea is revisiting the use of CWFs and redefining process economics. He offered to talk to his contacts at Korea Electric Power Co. (KEPCo) to determine their potential interest in evaluating LRCWF in their test facilities.

On Monday, Oct. 24, 1994, Max Hodel, Director of Alaska's Office of International Trade, and his very able administrative assistant, Mariko Kuroda accompanied me to meetings which they had arranged. Our first stop was at Tomen Corp., a major trading company which has done business with Usibelli previously. They were quite knowledgeable about LRCWF thanks to earlier discussions with John Sims, UCM and promised to keep us informed whenever opportunities to market LRCWF occurred.

The second meeting was with Mr. Takeo Yamada, IK, whom I've known for over 8 years. He was quite candid and indicated that they thought that our earlier lack of enthusiasm at their initial expression of interest in the Alaskan project through AIDEA indicated that we were not interested in working with IK. I assured them that this was definitely not the case and that we would welcome their involvement. I told them that the initial hesitation on our part stemmed from IK's request for exclusive rights. I explained that some of the consortium members already had agreements with other trading companies which could make exclusivity difficult.

However, I told him that we were wide open to negotiation and that the size of the contribution would help determine what sort of rights would be granted. When asked what forms the contributions could take, I told him an in-kind contributions along the following lines would be very well received. I said that there is a critical need for transportation testing, as well as to demonstrate LRCWF in a variety of boilers. I indicated that we would be

prepared to provide them with a quantity of LRCWF at the production plant at no cost for them to test. It would be their responsibility to transport the LRCWF to Japan and test it in some of their demonstration boilers. Data from transportation and combustion testing would become the property of AK CWF, Inc. and be part of IK's cost share in the Demo.

Yamada was also very candid in his assessment of CWM's current and expected role in Japan's energy future. He said that with today's low oil prices, no CWM made economic sense and indicated that this is why the Yanri CWM Co. can only sell about 20% of its production capacity. He does think that CWM will play an increasingly larger role when oil prices begin to rise again. He credited government regulations with maintaining the CWM industry through its restrictions on new oil-fired generation. The government has banned new oil-fired generating capacity unless they are fired equally with CWM. Ultimately, they feel that fuel flexibility will provide them with the lowest cost fuel options in the future.

Our last visit was with Mr. Ogawa, Asst. Gen. Manager Thermal Power Dept., EPDC and some of his staff. This meeting brought us back down to earth and illustrated the tough hurdles LRC has to surmount in the Pacific Rim. First we learned that EPDC has no oil capacity and thus no interest in CWMs. Secondly, their thermal plants which generate less than 40% of their power, the balance is hydro, are designed "exclusively for high-rank coals." They cited all of the usual negatives concerned with LRCs and were not receptive to the attributes.

On Tuesday, Oct. 25, Mr. Nagata took me to meet his boss, Mr. Takagi and some of his colleagues at CCUJ. As shown on attachment 1, CCUJ succeeded the Coal Mining Research Center in 1991 and now works closely with NEDO on all aspects of coal utilization. As you'll note on Attachment 1, their list of research activities runs the gamut from slurry preparation to ash utilization, and includes a heading on Low-Rank Coal Utilization Technology. CCUJ seems to be in many respects the coal projects management arm of NEDO.

Following our meetings at CCUJ we met with a number of Nagata's colleagues at NEDO. Again at NEDO we heard the familiar refrain of the need to diversify Japan's energy supplies which in turn is causing them to take a long hard look at the use of abundant, low-cost LRCs. Both NEDO and CCUJ seem genuinely interested in LRCWFs and supportive of our efforts to get independent combustion tests with LRCWFs.

Copies of business cards for the key contacts are shown in Attachment 2.

In summary, Japan appears to be doing many things right, especially when it comes to establishing long-range energy policies and forming research and technology development and demonstration teams from competitors in the private sector. I think that it's safe to say the CWM is seen as playing an increasingly important role in the energy mix of the future. We also need to be aware that Japan is beginning to understand the enormous potential energy resources that reside in the world's LRCs and is making plans to incorporate them into their energy mix. We should make no mistake that they are committed to a through assessment of HWD as a preferred means of using LRCs and that our lead in this technology has shrunk to only a couple of years at best. If we don't build the demonstration plant first, I believe that Japan will win the race to commercialize HWD, just as they did with bituminous CWM technology which was developed first in Canada.

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APPENDIX 7

ALASKAN LOW-RANK COAL-WATER FUEL DEMONSTRATION PROJECT

PRELIMINARY PERMITTING STUDY

DECEMBER 1994

For More Information Contact:

Tim Dunford
Jane Rosen

ALASKAN LOW-RANK COAL-WATER FUEL DEMONSTRATION PROJECT
PRELIMINARY PERMITTING STUDY

EXECUTIVE SUMMARY

The overall objective of Phase 1 of the Alaska Low-Rank Coal-Water Fuel (LRCWF) Demonstration Project is to provide the Alaska Science and Technology Foundation (ASTF), the grantor, Alaska Industrial Development and Export Aurthority (AIDEA), the Grantee and administrator, and Alaska Coal-Water Fuel, Inc., with a closer look at the feasibility of the LRCWF Commercial Demonstration Project. The purpose of the preliminary permitting study is to determine the following:

- what environmental permits (and studies) may be required,
- the information required to obtain these permits,
- the approximate time and expenses required to obtain the permits, and
- any implications in obtaining the necessary permits.

As permitting may be one of the restraining parameters of the project, it is important to look at all of its potential implications. It should be noted that this study is not all-inclusive. There may have been some permits and/or regulatory requirements that were not discussed. However, POWER has tried to discuss all of the major permits and requirements for construction of the proposed Demonstration Project. In addition to the permits required for construction of the project, there are on-going requirements for operation. Some of these were discussed briefly, such as the air quality operating permit requirements and worker safety issues. However, this study did not attempt to describe in full, all on-going requirements.

In addition to determining the feasibility of the Demonstration Project, another purpose of this investigation was to perform a comparative analysis between three potential host sites and to get a better idea of the funding that will be required for the project. The summary section of this report includes a comparison of the major permits and costs for obtaining these permits for each site. The costs provided are a rough estimate and could end up being substantially different due to regulatory changes, technology changes, the economy, etc. POWER did try to give an idea of the probable costs of obtaining each permit but is not responsible for any deviations from the estimates provided.

In summary, it appears that all permits required for the Demonstration Project will be obtainable in a reasonable amount of time and for a reasonable amount of money. The University of Alaska at Fairbanks (UAF) site appears to be the easiest to permit, due to many existing amenities. However, it is in an air quality non-attainment area for carbon monoxide, potentially making the air quality permit process more costly. However, if the net emissions from the Demonstration Project at UAF were not increased, the increased difficulty could be avoided.

1.0 INTRODUCTION

Three potential sites have been evaluated for the location of the LRCWF Demonstration Project: the University of Alaska Fairbanks (UAF), the Seward Sawmill, and Tyonek North Forelands. In performing this study, POWER researched the regulations which may apply to the LRCWF Demonstration Project. This report includes an explanation of the general regulatory framework for each category of requirements (i.e. Air, Wastewater, etc.). These requirements are then specifically discussed as they apply to each of the three sites. The information in this report will be used as part of the criteria for site selection.

Project Specifications and Assumptions

Some of the specifications for the LRCWF Demonstration Project which may be pertinent to the permitting process are listed below:

- Boiler: 50,000 lb/hr
- Coal Converting Equipment Required: pumps, piping, valves, pressure vessels, heat source. Fuel may be converted on-site or at another site.
- Wastewater- Boiler blowdown: fairly clean water containing some dissolved solids Ca, NaCl, Silica, etc.). If high pressure, maybe a few hundred ppm dissolved solids; if low pressure, maybe 3,000 ppm dissolved solids. Wastewater will include carbon in the form of coal fines @ 400-500 ppm, Iron @ 2 ppm, Nickel, Brass, Copper @ 5 ppm, sodium @ 5,000 ppm. The project is considering a zero discharge system that would leave a sludge, or if evaporators are used, would leave a powder for disposal.
- The project will apply for DOE funding and therefore Federal funds will be used in the future.
- Air Emissions: A 5.25 hour test burn of 480 lbs of beluga coal at a heat input rate of 621,500 Btu per hour yielded the following dry flue gas analysis: O2=3%, CO2=16.3%, CO = N/A, SO2=80ppm, NO2=600ppm.
- It is assumed that there will be approximately 85 million Btu per hour of heat input for the boiler and about 10 million Btu per hour for the coal conversion process for this demonstration project.
- It is assumed that approximately 25 gallons per minute of water will be required for the process and domestic water use associated with the project.

Site Specifications and Assumptions

The following table describes specifications at each of the three sites:

	UAF	TYONEK	SEWARD
LOCATION	University of Alaska @ Fairbanks (On Campus) Fairbanks North Star Borough	North Foreland Site, approx. 2 mi. from the village of Tyonek, about 30 minutes by air, west of Anchorage.	Former Seward Forest Products Sawmill on the west side of Ressurection Bay near the prison- Kenai Peninsula Borough Nash Road, Seward
DISTRICT	N. Regional DEC Office	S. Central Regional DEC Office	S. Central Regional DEC Office
OCCUPIED	PP is in operation; PICO building will be available.	Not presently occupied. Previously used for wood chipping operation.	Sawmill is shut down but another operator may be interested.
EXISTING EQUIPMNT	Boilers Two oil-fired units 100,000 lbs steam/hr Oper temp: 730 °F Oper press: 600 PSI Has stack with opacity, CO, O2 monitors. Baghouse will be needed. * also 2 coal-fired boilers are present Turbines 3 steam turbines: 1-10MW w/autoextract 2-1.5MW non condensing Coal Handling/Storage Coal delivered by truck; Ball mill would be needed to further crush coal. Raw material/ product can be stored near PICO bldg.	Dock Dock previously held a pneumatic wood chip ship loading pipe. Can be made to handle LRCWF pipeline Tank Farm 7 tanks @ 20,000 gals 1 @ 300,000. 3" underground pipeline to beach for fueling.	Oil Storage Fuel Oil storage tanks, unknown capacity Crane Capacity 10 tons of crane capacity, rail mounted. Coal Space Limited space in yard due to wood storage from previous operator. Excess capacity may be available at the Sun Eel Terminal for coal storage.
EXISTING BLDGS.	PICO- Polar Ice Coring Bldg.- Could be used for coal processing. Will require ceiling extension for reactors and insulation and heating. Univ. coal/oil-fired power and heat plant. PP is < 150 yrds from PICO bldg.	Severely damaged; will require substantial renovation including new skin, insulation, wiring and structural repairs. There is a camp w/n 2 mi which has water treatment plant, sewage treatment facility, equipment shops and runway.	Power plant building is 1/2 vacant. There are 2 incomplete foundations w/ rebarr stubbed out- original design to hold 2-3MW steam turbines. Will need minor modification to roof for reactors. Has control room.
UTILITIES	Electricity, Sewer, Water, Solid Waste Disposal services are available.	Electricity- Chugach Electric Association substation. Water and Sewer at camp.	City utility. There is also on-site diesel generators but use is not anticipated. City water and on-site septic system.
PIPING OF LRCWF	Will need to be piped 150 yrds from PICO bldg. to PP.	Dock can handle pipeline but needs to be installed.	10 tons crane capacity
CONTACT	Dan Walsh Professor of Mineral Eng. Robert Trent, Dean of Mineral Engineering Charles Ward, Mechanical Eng. 907-474-7351 Kathleen Schedler, Planning and Project Services. 907-474-6265 Edie Curry, UAF Fire Dept. 907-474-7721	Thomas Harris, CEO, Tyonek Native Corp (TNC) Lou Nelson, Controller, TNC 907-272-0707 Tyonek Village Office 907-583-2201	David Eberle, AIDEA Taylor Jones, City Mgr. Mike Yenez, Ass CM Seward City Offices 907-224-3331

2.0 AIR QUALITY PERMITTING

2.1 General Regulatory Framework

The Clean Air Act, as administered by the Federal Environmental Protection Agency (EPA), sets standards to ensure the air quality in the United States. The 1990 Clean Air Act Amendments resulted in major air quality programs. States are required to submit a State Implementation Plan (SIP) to the EPA for administering the programs; the EPA has one year to review a State Plan once submitted. The State agency in charge of air pollution control in the State of Alaska is the Department of Environmental Conservation. Following is a brief description of some of the major air quality programs:

New Source Performance Standards:

These standards apply to operation of new, modified or reconstructed facilities in specifically listed industrial categories. They require the use of "best demonstrated technology", resulting in specified emission limits for listed industrial categories. This program also has operations monitoring, emissions testing, and reporting requirements. Two of the listed industrial categories describe operations related to the LRCWF Demonstration Project: Steam Electric Coal Generating Facilities with less than 100 million Btu/hr. heat input (Subpart Dc) and Coal Processing Facilities (only applies if greater than 200 tons per day are processed; Subpart Y). It is assumed that only Subpart Dc will apply to this Demonstration Project as the project is expected to handle only 6 tons per hour of coal.

The State of Alaska Department of Environmental Conservation (DEC) has not been delegated authority to manage this program. Therefore, air quality permit applicants in the State of Alaska must notify the EPA directly. The contacts at Region 10 of the EPA are John Keenan (206) 553-1817 and Jim McCormick. There is presently no EPA fee for the NSPSs. However, Title V of the Clean Air Act will require all states to have an approved State Implementation Plan (SIP) to implement the new requirements. This will probably not occur in the State of Alaska for over a year. However, once Alaska's SIP has been given authority, the EPA will not have to be contacted directly. Alaska will most likely charge fees for this program on the same basis as their other air programs (per agency hour spent). Pertinent facilities (those considered major and those emitting less in non-attainment areas) will have to re-submit Title V permit applications, once the SIP has been approved.

The NSPS now requires various notifications to the EPA including a notice of: new facility construction 30 days after the date of starting construction; the anticipation of start-up 30 to 60 days prior to the start-up date; within 15 days after start-up; any change to an existing facility 60 days before change; and the date which demonstration of the continuous monitoring system (CMS) performance commences, opacity observations and monitoring at least 30 days prior (as applicable). Records are required to be recorded and a summary report and exceeded emissions reported to the EPA. Performance testing and reporting is also required. As mentioned above, the Subpart Dc performance standards will have to be adhered to for the subject process.

Prevention of Significant Deterioration (PSD):

This program applies to construction of major new sources in attainment areas. It requires these sources to determine the extent to which their project would worsen air quality and then to install state-of-the-art equipment to ensure that the damage is kept to a minimum. Sources are considered major and subject to this program if they emit greater than 250 tons per year of a criteria pollutant or exceed the following significant increment levels for a modification: 15 TPY PM10; 100 TPY CO; 40 TPY NOx; 40 TPY SO2; 25 TPY PM. (There are specific listed sources which would be considered major if they emitted greater than 100 tons per year, however, the subject project is not a listed source.) Under this program, firms must use "best available control technology" (BACT) to prevent additional pollution of more than a small incremental amount and must be at least as stringent as required by the NSPSs. The increments are set by area: Class I (some national parks, wilderness areas, etc.); Class II (everything else in Alaska); and Class III (does not presently apply in Alaska). The Demonstration Project would have to conform to the Class II increment levels. The State of Alaska does have authority to administer this program.

For a facility requiring PSD review, the owner/operator must provide the following:

a) Ambient monitoring data. This is required for one year but existing data, if available, may be used. This may not be required if ambient emissions are expected to be less than the regulated concentrations.
b) An ambient demonstration. A detailed evaluation of the effect on ambient air of the expected maximum emissions, demonstrating that expected emissions will not cause violation of AQ standards (using an EPA model).
c) BACT determination: Best Available Control Technology
d) Analysis of Air Quality Related Values (noise, odor, visibility, vegetation, and soils).

A Public Notice and Hearing is also required. Permitting of a PSD source as opposed to a non-PSD source will require more information in the application process, including an explanation of BACT, a detailed evaluation of the effect on ambient air, an analysis of the impact of emissions from the facility, and modeling of the proposed facility. Additionally, a series of public notifications prolong the permit process. It is expected that permitting of a PSD source could take from six months up to a year from the receipt of a complete application.

PSD Avoidance Permit:

In Alaska, the owner of a facility may apply for a construction permit that contains physical or operational limitations to reduce actual emissions of the non-attainment air contaminant for a non-attainment area or stay below the PSD triggering levels. These limitations would be written into the permit and are federally enforceable. If the project did not have to go through PSD permitting, the permit process should take from two to three months after the department receives a complete application. This includes a 30 day public notice period.

Non-Attainment Area New Source Permitting:

Construction of new sources in a non-attainment area must satisfy several requirements to obtain permits. The requirements include state-of-the-art control technology, reduction of existing emissions either at the plant or from other sources by enough to offset the new pollution (in Alaska at a ratio of 2:1) and a demonstration that all other area facilities under the company's control are in compliance with applicable regulations. The following requirements must be met for a new source in a non-attainment area:

a) LAER determination (Lowest Achievable Emissions Rate: proof that emissions of the non-attainment air contaminant are controlled to the lowest achievable emission rate.)
b) Offsets (An owner or operator in a non-attainment area can apply for a construction permit containing limitations reducing actual, or allowable, emissions which is the basis for providing offsets.)
c) Demonstration of compliance for other sources under common ownership
d) Demonstration of net benefit (A demonstration that the benefits of construction, operation or modification will significantly outweigh the environmental and social costs incurred due to the location, construction or modification, considering such factors as alternative sites, sizes production processes, and environmental control techniques.)

Operating Permit:

Once a facility is constructed under a permit to construct, an operating permit must be obtained which requires ongoing recordkeeping, monitoring and reporting requirements. When questioned about whether the operating permit requirements would be more strict for a facility permitted in an attainment area versus a non-attainment area, the DEC responded that it shouldn't make much of a difference. Especially in the case of the proposed project, the facility may be required to monitor to ensure avoidance limitations are being adhered to. In a non-attainment area, the non-attainment pollutant would also have to be carefully monitored. The ongoing emission fee rate listed in the proposed plan is $5.07 per ton of assessable emissions. The present rate is $3.30 per ton of assessable emissions. The fee listed for a general operating permit in the proposed regulations is $300.

Permit Process:

As mentioned previously, the State of Alaska does not yet have full implementation of the air quality program. Regulations have recently been proposed which may change parts of the permit process. The air quality permit required for the proposed project will either be a new permit source or a modification to an existing permit, depending upon if the project is going to be constructed at an existing permitted source. One variable in the permit requirements is whether the facility is in an attainment or non-attainment area. The Fairbanks urban area has been designated non-attainment for carbon monoxide. Tyonek and Seward are not listed as designated non-attainment areas. Additionally, all three sites reviewed are in a Class II geographic area.

If the project is to occur at an already permitted site, an amendment to the existing permit would be required. The addition to the permitted site should be evaluated to determine the expected net emissions from the operation. For example, although the proposed project will emit pollutants, will an existing emission source or sources be shut down, thus resulting in an equivalent total emissions or even a decrease in total emissions? If the net gain in emissions from an existing permitted source remains under the PSD increment levels, a fairly uncomplicated non-PSD permit process will result. However, if the addition results in the exceedance of significant increment levels (15 TPY PM10; 100 TPY CO; 40 TPY NOx; 40 TPY SO2; 25 TPY PM, etc.), the more complicated and lengthy PSD permit process will have to be followed. As mentioned previously, the amendment could limit the emissions via federally enforceable limitations to below these increment levels, thus avoiding PSD review.

To determine the affects that the project may have on the ambient air, computer modeling will be required. Model requirements will begin with an EPA Screen Model. The model will predict whether the proposed source will result in ambient air quality levels which meet the national ambient air quality standards (NAAQS) and do not exceed Class II increment levels. The emissions are not allowed to exceed the ambient air quality standards. If concentrations are less than the baseline concentration, no increase above the baseline concentration (as defined in the operating permit) may exceed the Class II increment levels. Depending upon the results of the screen model, (and if a facility has to go through PSD review) more complex models may be required, which are based on actual meteorological data. Meteorological data exists for Seward and Fairbanks. Although there is no existing data for Tyonek, there is data for a Chugach Power Plant in nearby Beluga for which data could be used. If existing meteorological data is not available, an additional year may be added on to the permit process to collect this data. When performing the dispersion modeling, the surrounding terrain becomes extremely important. If there is a nearby hill or mountain, the contaminants will not be dispersed as much and the measured concentration of contaminants would therefore be much higher. Dispersion would depend upon distance to hills and the stack height. Topography should be an important factor in the site selection process.

Permit Fees:

The State DEC charges fees on the basis of dollars per hour of service provided. The present rate is $65 per hour. The proposed regulations raise this permit administration fee to $78 per hour of department service. Therefore, the fee for a more complicated PSD review will be more than for a non-PSD review. A PSD avoidance permit now requires a retainer of $2005, however, the proposed regulations raise this retainer to $7,000. Although the fees for permits undergoing PSD review have varied, they have recently ranged from $3,500 to $12,000. It was estimated that the proposed project would presently cost in the neighborhood of $5,000 to permit, assuming a complete application is received. The proposed regulations list the retainer fee for a significant permit modification at $3,000 and a PSD permit at $13,000. Any funds not used from the original retainer would be returned to the permittee. It was mentioned that the proposed plan is at least a year away from being implemented. The yearly emission fee rate listed in the proposed plan is $5.07 per ton of assessable emissions. The

present rate is $3.30 per ton of assessable emissions. The fee listed for a general operating permit in the proposed regulations is $300.

Regulatory Agency Contacts:

The regulatory agency in charge of air quality permitting in Alaska is the Department of Environmental Conservation (DEC), Division of Environmental Quality. POWER contacted the DEC for information on Air Quality Permitting of the proposed project as described below for each site. PSD sources are all handled out of the Juneau Headquarters Office (Al Bone: 907-465-5100). Gerry Guay is the monitoring/modeling expert at the Juneau office. Non-PSD sources are handled by regional offices. The contact at the South Central Region (which includes the area to the south border of McKinley south) is Bill McClarence at 907-273-4238. The proposed sites handled by this region would include Seward and Tyonek. The contact at the North Regional Office is Jack Coutts at 907-451-2132. The proposed site handled by this region is UAF.

2.2 Application to Specific Sites

UAF:

UAF has an existing PSD avoidance permit. The LRCWF Demonstration Project proposes to modify an already permitted oil boiler at the subject site and add the coal conversion process. The first step in permitting this site would be to try to determine the net increase in emissions from the Demonstration Project. This should be added to the actual emissions to determine which contaminants may exceed permitted emissions specified in the existing permit. If the addition of the LRCWF Demonstration Project does not result in an increase of emissions, a minor modification to the existing permit would be required to describe the changes in the source. However, if there is an increase in emissions, the permit would be required to go through a significant modification. The more lengthy and complicated PSD review would be required, if the increase were to exceed the PSD triggering levels. If requested, the DEC could specify limitations in the operating permit to ensure emission levels will not be exceeded.

For a construction permit at an existing source, the application must contain a detailed specification of the physical or operational limitations necessary to ensure permanent reductions in actual emissions of the non-attainment air contaminant. Because the UAF site is in a non-attainment area for CO, offsets may be required. Any increase in CO emissions would require offsets in a ratio of 2:1. These offsets could be received by limiting already permitted emissions from the UAF site (which would be written into the permit) or they could be purchased from an outside source. If purchased from an outside source, limits would also be written into the permit for the outside source, requiring a permit amendment for this source.

Although the area near the site is fairly flat, there is a significant topography rise near the site which may impede the dispersion. Additionally, it was mentioned that the distance to measurement would be fairly short (thus less dispersion), as the border of the other areas at UAF (student housing, classes, etc.) would be considered the place of measurement. The existing stacks are lower than the level of the surrounding terrain

and below what is considered good engineering practice. Therefore, if the terrain modeling does not depict adequate dispersion to meet the NAAQS and Class II levels, one remedy may be to raise the stack height.

Mr. Jack Coutts of the North Regional DEC office advised that if the proposed project stays under the PSD increment levels, air permitting should not be a major process. Mr. Coutts advised that he will want to see a fuel analysis to ensure that the grain loading standard of .05 grains/cubic foot would not be exceeded (18.AAC 50.050). (18.AAC 50.050 actually states that for coal-fired steam generating units with less than 250 million Btu/hr. heat input could emit .1 grains per cubic foot of exhaust gas.) Mr. Coutts also stated that they would probably first make a short term amendment to the permit (with a letter describing the amendment) to test the fuel. If the process works, they will have to implement a full permit modification, including performing dispersion modeling of SO2 and particulates. A valley model or industrial source complex with terrain model will have to be used due to the nearby hill.

Mr. Charles Ward, Mechanical Engineer at UAF was contacted. When questioned about potential dispersion problems, Mr. Ward advised that they are near a small hill. The #4 Boiler is closest to the hill; #3 is further away from the hill. He also stated that they do not have tall stacks. He advised that the facility is borderline with their SO2 emissions. However, they are presently emitting less than 10 tons per year of particulates and are permitted for 120 tons per year. Mr. Ward sent POWER a copy of the existing air quality discharge permit for UAF.

Following is a list of the advantages and disadvantages of air permitting at UAF:

Advantages:

- May only require minor modification since UAF appears to have room in their permitted emission limitations.
- Existing staff at UAF may assist in some of the reporting and recordkeeping requirements.

Disadvantages:

- Non-attainment area for CO may require purchase of CO offsets and will require an LAER analysis.
- Adjacent terrain may create dispersement problems.

Tyonek:

The Tyonek site would require a new permit to construct and operate. Mr. Bill McClarence of the South Central Regional DEC office, was contacted regarding permitting at this site. Mr. McClarence did not think that the air quality permitting would be a major process. He advised that if PSD is avoided, the permit process could take about a month, however, the emissions would be limited to 250 TPY. If a PSD permit is applied for, permitting may take about six to nine months and emissions would only be limited by that which occurs using the Best Available Control Technology. He further stated that the application for PSD and non-PSD sources is very similar, however, there

may be more time spent between the permit consultant and engineer, figuring out what control equipment is required and the resulting emissions. Tyonek appears to be fairly flat and should not encounter much problem with dispersion of contaminants.

Advantages:

- Attainment area.
- Surrounding terrain should not impede dispersement.

Disadvantages:

- This site would require a new permit rather than a modification, though the process should be similar.
- There may not be good ambient data to use in modeling, if required.
- May be limited by ice fog conditions.

Seward:

Mr. Bill McClarence of the South Central Regional DEC office, advised that there is an existing permit for the Seward Sawmill site which could be modified for the Demonstration Project. Mr. McClarence also advised that dispersion of contaminants would be impeded by the terrain at this site. The contaminant plume would rise and be trapped by the mountains and then come down, close to the facility, with little dispersement. The contaminant concentration would be measured at the nearby road. The source emissions as measured at the road would be required to be under the National Ambient Air Quality Standards (NAAQSs-given in micrograms/cubic meter). Therefore, in order to be permitted, the operation may require greater limitations placed upon it, to ensure these NAAQSs are not exceeded.

Advantages:

- May only require minor modification, if expected emissions are less than the limitations in the existing permit.
- Attainment area.

Disadvantages:

- Surrounding terrain may impede dispersment.
- May be limited by ice fog conditions.

3.0 WASTEWATER PERMITTING

3.1 General Regulatory Framework

The Federal Clean Water Act (CWA) directs EPA to regulate both industrial and municipal discharges of conventional, toxic, and certain non-conventional pollutants. The prime regulatory program for administering this act is the National Pollutant Discharge Elimination System (NPDES). This system requires that all industrial and government sources discharging effluent and stormwater directly into surface waters comply with permitted effluent limitations. Industrial sources discharging to publicly owned treatment works (POTWs) must often pre-treat their raw industrial waste before allowing it to pass into the municipal system based upon permits with these local POTWs who must then comply with their own NPDES permit. The permit with the POTW takes the place of the NPDES permit for this discharge. Alaska has not assumed delegation of the federal NPDES program, however, they do issue permits for facilities not covered by the Federal program. It should be noted that some municipalities may not have adequate POTWs. Firms are therefore encouraged by the Federal agency to ask questions concerning the status of the municipal POTW in case a Federal construction ban is implemented. Additionally, firms whose waste is insufficiently treated before entering a POTW may be named as co-defendants in lawsuits against municipalities. In addition to regulating industrial wastewater, NPDES permits regulate stormwater runoff from specific categories of facilities.

Non-Domestic Wastewater Discharge:

The exact composition of the wastewater stream is not known at this time. However, it is expected that the boiler blow-down will be fairly clean water containing some dissolved solids (Ca, NaCl, Silica, etc.). The wastewater is expected to include carbon in the form of coal fines @ 400-500 ppm; Iron @ 2 ppm; Nickel, Brass, Copper @ 5 ppm; and sodium @ 5,000 ppm. The project is considering a zero discharge system that would leave a sludge, or if evaporators are used, would leave a powder for disposal. For the purposes of this study, POWER has researched the permit requirements for each site and the discharge limitations that may apply. This will allow a comparison of the permit requirements at each location without knowledge of the specific wastewater composition.

Mr. Joe Wallace of EPA Region 10 was contacted regarding clarification to the NPDES permit process for wastewater discharge. Mr. Wallace advised that although the State of Alaska would write a permit for wastewater discharge from a minor facility, an EPA NPDES permit would also have to be applied for to ensure compliance. The fairly lengthy permit application must be submitted at least 180 days in advance of discharge. If the facility is considered high priority, it may be reviewed within 180 days, but this is unlikely for the subject project. The application would first go through a review to determine if the discharge is minor or major. If minor, a letter would be sent out to the operator to go ahead and operate under the State discharge regulations, without an EPA NPDES permit. Technically, this is not legal, but if brought to court, the operator would have a good defense with this letter. If major, the application would go

into a work load pool and could take 2 years to process. Chuck Rice, EPA Region 10 (206-553-8504), may be contacted for more specific information on this permit.

Mr. Robert Dolan (907-563-6529) of the DEC would handle State permitting of discharges to waters from small facilities (not actually an EPA NPDES permit). Mr. Dolan advised that an EPA NPDES permit would take a couple of years and the EPA does not normally write permits for minor facilities. The process through the State would be applicable to any type of discharge, including soil absorption or direct discharge to water. However, the NPDES permit would not be required for discharge to soil since this program only covers discharge to surface waters. For a State Non-Domestic Wastewater Discharge Permit, the applicant is to complete a 4 page application form with attachments such as a site map. The Tyonek and Seward facilities would also require completion of a Coastal Project Questionnaire (described later), in order to start the Public Notice process. There is a 30-day Public Notice period once a complete application is received. The application could be approved in 60 days if a complete application is received. The fee is approximately $200. If an ocean outfall is used, that would also require a permit which should not be a major process. The permit may require pre-treatment of the wastewater prior to discharge, which would probably consist of a settling pond at a minimum.

Sewage Discharge:

If a septic system were required for sewage waste, the plans would be reviewed by the State DEC Kenai Peninsula District Office for the Seward and Tyonek sites (David Johnson 907-262-5210). Fees would be based upon flow (from 0 to 500 gpm: $100 and from 501 to 2,500 gpm: $150). Engineered plans would be submitted but no application is required. A permit is not actually issued unless it is a very large system. If greater than 2,500 gallons per day were going to be disposed of, the DEC may ask the permittee to do a nitrate analysis to determine the potential impact.

Mr. Johnson faxed POWER a recent copy of the State code for non-domestic wastewater disposal which contains the permit fees. The State code (72.610) states that for an initial NPDES permit for a non-domestic wastewater system, the fee is $1,500; for a renewal the fee is $750. For an initial permit other than an NPDES permit for a non-domestic wastewater system, the fee is $200. For a plan review required under 72.600, the fee is $400. The fee for a domestic wastewater general permit is $100.

NPDES Permit for Stormwater:

There are a few types of NPDES permits that may be required for a facility. One type is for industrial discharge from a facility to waters of the United States. This was discussed previously for those locations which may need to discharge their process wastewater to other than a municipal sewer system. Another NPDES permit is needed for stormwater runoff from construction activities that will disturb greater than 5 acres. It is assumed that less than 5 acres of land will be disturbed at any site and therefore, this permit will not be required. A third type of NPDES permit applies to stormwater discharge associated with industrial activity. This is defined to mean a stormwater

discharge which is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. One of the categories of facilities considered by EPA to be engaging in such industrial activity includes steam electric power generating facilities, including coal-handling sites.

Mr. Joe Wallace, EPA Region 10 (206-553-8399), advised that a listed facility such as steam electric power generating facilities, should be very careful in making the determination that the facility is not in need of a permit because all operations are enclosed. Mr. Wallace pointed out that in 40 CFR, Section 122.26 (b)(14), even the roads which trucks use to carry raw materials are covered, even if the raw materials are always enclosed in the trucks. In any event, the permit process is not very complicated. A notice of intent (NOI) must be submitted to the EPA. A pollution prevention plan (PPP) must be written for the processes at the facility, including an explanation of Best Management Procedures (BMPs). The submittal of a completed NOI is the approval for stormwater discharge. The PPP must remain on-site and be available for inspection. A typical NOI and PPP can be completed for approximately $5,000 of engineering time. If a NOI has already been submitted and a PPP already exists for a facility, it should be amended to reflect any changes that materially affect the new operations at the facility.

3.2 Application to Specific Sites

UAF:

The UAF site is connected to the City Sewer System, though there is a preliminary collection system at the UAF. According to Mr. Charles Ward of UAF, the facility is already approved to discharge boiler blowdown from their 4 boilers. They are presently experiencing 1% blowdown. Mr. Ward did not think that they had an actual permit with the City for disposal but just had to comply with the City's requirements. Mr. Ward advised that UAF does have an NPDES permit for discharge as well. They used to discharge cooling water but cannot do that anymore due to the high benzene content of their water.

The City of Fairbanks was contacted to determine their water discharge requirements. The City advised that UAF has its own system. UAF has a contract with the City. When questioned if the Demonstration Project would have to adhere to the City's requirements they said no: a facility would only have to adhere to the UAF's requirements. It should be noted that UAF must meet discharge standards specified by the City which would have to ultimately comply with the Federal requirements.

According to Mr. Charles Ward, UAF does not need an NPDES permit for stormwater as their operations are totally enclosed in buildings and do not have access to stormwater. This was verified with Mr. Robert Nolan of the DEC. However, the Demonstration Project should ensure that all coal handling areas are also enclosed in buildings and do not come into contact with stormwater or a permit would be required. Based upon discussions with the EPA Regional Office, an NPDES permit for stormwater associated with industrial activities may actually be required, following strict interpretation of the regulations.

Advantages:

- No non-domestic or septic permit should be required.

Disadvantages:

- Wastewater discharge must still ultimately comply with Federal requirements.
- A NOI and PPP may be required for stormwater.

Tyonek:

The Village advised that they do have a sewer system within their village limits. The subject site is not within their limits and the Village, therefore, would have no specific requirements for wastewater discharge. It is assumed that the facility would require either a soil absorption system or NPDES permit to discharge any wastewater. A septic system may be required for sewage disposal at this site.

If any stormwater discharge comes in direct contact with manufacturing, processing or raw materials storage areas, an NPDES permit for stormwater associated with industrial activity would be required. Again, strict interpretation of the regulations should be taken to avoid potential penalties.

Advantages:

- None.

Disadvantages:

- A non-domestic wastewater discharge permit will be required for disposal of industrial wastewater. This may be an NPDES/DEC permit for discharge to surface waters or a DEC soil absorption permit for discharge to soil. Pretreatment would most likely be required. State and Federal standards must be met.
- A septic permit would be required for sewer discharge.
- An NOI and PPP may be required for stormwater.

Seward:

The city offices were contacted to determine their sewer system requirements. The Public Works Supervisor, Mr. Ainsworth, advised that the City sewer system stops about 1/4 mile from the Seward Sawmill site. Mr. Ainsworth advised that the site is not connected to city sewer, though they have plenty of city water. Mr. Ainsworth stated that the facility does have a septic system that was permitted by the DEC. The DEC, David Johnson, looked up the file for this site and did not find any records. He did mention that the mill was next to the Seward Industrial Plant that is on the City sewer system. It is assumed that the facility would require either a soil absorption system or NPDES permit to discharge any wastewater. A septic permit modification may be required at this facility

If any stormwater discharge comes in direct contact with manufacturing, processing or raw materials storage areas, an NPDES permit for stormwater associated with industrial activity would be required. Again, strict interpretation of the regulations should be taken to avoid potential penalties.

Advantages:

- If there is an existing septic system and permit, it may be able to be modified for the Demonstration Project.

Disadvantages:

- A non-domestic wastewater discharge permit will be required for disposal of industrial wastewater. This may be an NPDES/DEC permit for discharge to surface waters or a DEC soil absorption permit for discharge to soil. Pretreatment would most likely be required. State and Federal standards must be met.
- An NOI and PPP may be required for stormwater.

4.0 SOLID AND HAZARDOUS WASTE PERMITTING

4.1 General Regulatory Framework

The Resource Conservation and Recovery Act (RCRA) gives EPA "cradle to grave" authority to control hazardous and solid wastes from their generation to their ultimate disposal. It is the responsibility of the generator to determine which solid wastes are hazardous. An EPA ID number is required if hazardous waste is generated at a facility. There is a two page application which would be submitted to the EPA Region 10. The contact at the EPA Region 10 is Pat Hanley at 206-553-0157. EPA ID numbers are facility specific. Other requirements of hazardous waste generators include specific storage, disposal, and recordkeeping requirements. Disposal of hazardous wastes does not relieve the generator of liability; a generator of a waste has a "cradle to grave" responsibility for the waste. Therefore, the best way to limit liability is to limit the hazardous waste generated and to try not to take ownership of hazardous waste.

The EPA also regulates the disposal of non-hazardous solid waste by regulating municipal solid waste disposal facilities.

4.2 Application to Specific Sites

UAF:

The UAF site already has an EPA ID number. Hazardous waste generated at this facility would be disposed of under the existing number and would be "registered" under the name of UAF, rather than the project operator. The contact at the Risk Management Division at UAF is Joe Adams at 907-474-5496. This division is in charge of hazardous and non-regulated waste at UAF. They have an outside and inside storage facility. They are not presently a permitted treatment, storage and disposal facility (TSD), however they plan on obtaining a TSD permit next year. They presently have an EPA ID number for generating hazardous wastes and are responsible for all of the hazardous waste generated at UAF. They now transfer hazardous waste on a 90 day cycle to disposal facilities (mostly in Washington). They do not presently charge for this service; their services are paid for out of the University's general fund. They would not charge for small quantities of waste disposal from the Demonstration Project but would probably need to charge the operator if excessive amounts of waste required disposal.

Advantages:

- Hazardous waste generated will be listed under UAF's EPA ID number. The Demonstration Project may not actually ever take ownership of this waste and therefore may not have as much liability.
- An EPA ID number will not have to be applied for.
- Solid waste disposal will not have to be arranged for by the project management.
- Solid & hazardous waste disposal will not be paid by the project unless excessive.

Disadvantages:

- None.

Tyonek:

Hazardous waste generated at this facility would require an EPA ID number and the waste would be the responsibility of the project operator. There is a village landfill, however, it is not designed to accept industrial waste.

Advantages:

- There is a village landfill nearby which will accept non-industrial, non-regulated waste.

Disadvantages:

- An EPA ID number will have to be applied for.
- Hazardous waste generated will be listed under the project's EPA ID number. The Demonstration Project will have ownership of any hazardous waste generated and its resulting liability.
- Solid and hazardous waste disposal will have to be paid for by the project.

Seward:

Hazardous waste generated at this facility would require an EPA ID number and the waste would be the responsibility of the project operator. There is a city landfill with a new baling system.

Advantages:

- There is a City landfill nearby which will accept non-regulated waste.

Disadvantages:

- An EPA ID number will have to be applied for.
- Hazardous waste generated will be listed under the project's EPA ID number. The Demonstration Project will have ownership of any hazardous waste generated and its resulting liability.
- Solid and hazardous waste disposal will have to be paid for by the project.

5.0 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

5.1 General Regulatory Framework

NEPA ensures that environmental information is available to public officials and citizens before beginning a major project which may involve Federal funds, Federal lands or Federal agencies. The regulations are intended to help persons make decisions that are based on an understanding of the environmental consequences and to take actions that protect, restore and enhance the environment. NEPA requires that an Environmental Impact Statement (EIS) or the less complex Environmental Assessment (EA) be performed for projects which affect Federal funds, use Federal lands or require major Federal permits. The purpose of these reports is to investigate and document the affected environment in a report which will be reviewed by the involved regulatory agencies. The Demonstration Project proposes to apply for DOE funds, thus NEPA would be triggered. A lead Federal agency must be named for the preparation of each EIS or EA. Although it is up to the affected agencies, it is likely that the DOE would be the lead agency. The lead agency will determine the type of report (EIS or EA) which will be required, based upon specified guidelines. A typical time frame for preparation of an EA is 3 to 6 months and cost along the lines of $50,000 and an EIS can take 18 months or longer and cost a few hundred thousand dollars. NEPA may also be triggered by a Federal permit such as an air quality permit or NPDES permit.

The DOE was contacted on 2/7/95 to get a better idea of the scope, cost and time frame of what may be required. Ms. Evon Weber (202-586-3136) was contacted regarding the potential NEPA requirements. Ms. Weber advised that she did not think that the project would be categorically excluded as any change in pollutant emissions would preclude it from this exclusion. Ms. Weber further stated that it is most likely that an EA would be the required documentation for the proposed project. Ms. Weber suggested that Mr. Lloyd Lorenzie of the Pittsburgh Energy and Technology Center (a DOE facility) be contacted to get a better idea of the cost of preparing an EA for this type of project. Mr. Lorenzie (412-892-6159) advised that the most inexpensive EA they have produced cost under $50,000, however, they typically range from $50,000 to $100,000. Mr. Lorenzie thought that it would take about four to six months to complete. (It should be noted that this is a government entity whose costs for completing this type of work generally run high.)

5.2 Application to Specific Sites

At this point, the NEPA process is not readily comparable for each site, however, the trigger of NEPA should be the same at any of the three sites examined. Therefore, a NEPA requirement comparison would not be pertinent at this time.

COMPARISON OF ESTIMATED COSTS OF THE MAJOR PERMIT REQUIREMENT *

PERMIT/ REQUIREMENT	UAF	TYONEK	SEWARD	COMMENTS
NEPA	$50,000	$50,000	$50,000	Assuming EA not EIS
COASTAL ZONE MANAGEMENT APPROVAL	$0	$2,000: Applic.	$2,000: Applic.	
PHASE I SITE ASSESSMENT	$5,000	$5,000	$5,000	Does not include any sampling or additional investigations.
AIR QUALITY PERMIT TO CONSTRUCT	$3,000-$7,000: DEC Fee $15,000: Appl. (for significant modification or PSD avoidance) $25,000: May be additional costs for LAER and other reqmts. in non-attainment area.* or $13,000 DEC Fee $60,000 Appl. (for a PSD permit) *Does not include potential purchase of offsets.	$7,000: DEC Fee $15,000: Appl. PSD Avoid. Permit or $13,000 DEC Fee $60,000 Appl. (for a PSD permit)	$3,000 - 7,000: DEC Fee $15,000: Appl. (for significant modification or PSD avoidance) or $13,000 DEC Fee $60,000 Appl. (for a PSD permit)	If continuous emission monitoring (CEM) equipment is required, each CEM analyzer may cost $100,000. The costs listed for AQ permit to construct do not include any control equipment costs. For a PSD permit that may have to be reiterated due to emission problems, the permit application cost may be as high as $90,000. UAF and Seward may require additional modification, controls and/or limitations due to surrounding terrain affecting dispersion.
AIR QUALITY PERMIT TO OPERATE AND NSPSs	$300: DEC Fee $1,200/yr: DEC Emis. $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time *Some of the testing and reporting costs may actually be less at UAF, due to help from UAF staff.	$300: DEC Fee $1,200/yr: DEC Emis $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time	$300: DEC Fee $1,200/yr: DEC Emis $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time	The permit to operate may be substantially changed when Alaska's SIP is approved. A new Title V permit application may be required at that time. If the State gets full approval, the NSPS reporting would be handled by the DEC and fees and requirements may change.
WATER QUALITY PERMITS- NPDES OPERATION: STATE WASTEWATER DISPOSAL PERMIT	$0	$1,500: DEC $5,000: DEC Appl $400: DEC Plan Re $10,000: NPDES Appl. to EPA	$1,500: DEC $5,000: DEC Appl $400: DEC Plan Re $10,000: NPDES Appl. to EPA	Either NPDES permit for disposal to surface water or disposal to soil (below) may be required for Tyonek or Seward.
SOIL ABSORPTION SYSTEM FOR WASTEWATER DISPOSAL	N/A	$200: DEC $5,000: DEC Appl $400: Plan Review	$200: DEC $5,000: DEC Appl $400: Plan Review	
SOLID WASTE DISPOSAL (Non-Regulated)	$0	Disposal Costs	Disposal Costs	
HAZARDOUS WASTE DISPOSAL PERMIT (EPA ID#)	$0	$3,000 Appl. + Disposal Costs + Lab Costs	$3,000 Appl. + Disposal Costs + Lab Costs	
PLAN REVIEW	100% UBC Table IIIA $3,000 Appl.	65% UBC Table IIIA $5,000 Appl.	100% UBC Table IIIA $5,000 Appl.	

SEPTIC PERMIT	$0	$150: DEC Fee $3,000: Appl. $400: Plan Rev	$150: DEC Fee $3,000: Appl. $400: Plan Rev	
WORST CASE TOTALS *	$222,500	$260,000	$260,000	This does not include UBC Table IIIA costs, waste disposal fees, and yearly fees after the first year in operation.

*The costs provided are a rough estimate and could end up being substantially different due to regulatory changes, technology changes, the economy, etc. POWER did try to give an idea of the probable costs of obtaining each permit but is not responsible for any deviations from the estimates provided.

6.0 LAND/WATER USE REQUIREMENTS

6.0 General Regulatory Framework

Alaska Coastal Management Program, Consistency Review:

The State of Alaska uses a multiple agency coordinated system for reviewing and processing all resource-related permits, leases and other authorizations which are required for proposed projects affecting coastal areas of Alaska. This system, called "project consistency review," is based on the Alaska Coastal Management Program (ACMP) and is designed to improve management of Alaska's coastal land and water uses. The process requires completion of a nine page Coastal Project Questionnaire and Certification Statement. The review time will be from 30 to 60 days if no public notice is required and from 50 to 80 days if public notice is required. A fee may be required, depending upon the project. This would only be required for the Tyonek and Seward sites.

Land Use:

Local planning and zoning regulations require that the use of the land be consistent with the City or County zoning requirements. If this is not the case, a conditional or special use permit will be required. In addition to completion of an application and submittal of specific site information, this process normally involves public notice and/or a hearing. All of the potential Demonstration Project sites have been used for industrial facilities before and, therefore, it is not expected that a conditional or special use permit will be required.

Water Usage:

Rights to use water directly from the ground or from a surface water is regulated. It is expected that approximately 8,000 lbs of water per hour (959 gals/hr or 16 gals/min) are used in the hot water drying process. With the additional water that may be needed for amenities, it is assumed that the facility will require approximately 25 gals/min of water. Though the expected water usage is not substantial, it has been investigated to ensure that the project will have access to the required amount of water. If City or surface waters are not available, a well may have to be drilled to obtain groundwater. If this is the case, additional permits may be required to develop the well.

Comprehensive Response, Compensation and Recovery Act (CERCLA):

CERCLA, as amended by the Superfund Amendments and Reauthorization Act, enables the Federal government to seek payment for clean-up of contaminated property from any potentially responsible party (PRP). A PRP may be anyone who has had ownership or a management role in a piece of property, whether or not that entity had actually caused the contamination. CERCLA does allow an entity to qualify for an innocent landowner defense to CERCLA liability. This defense includes practices that

constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice." Phase I Environmental Site Assessments have been developed to perform this appropriate inquiry. In addition to being a defense to CERCLA liability, Phase I site assessments can prevent future owners or operators from taking ownership of a worthless or even negative "asset". It is recommended that a Phase I site assessment be performed at any of the proposed sites chosen for the Demonstration Project. The site assessment could also prove to be a valuable tool for describing the baseline condition of the environmental integrity of the site.

Other (Corps of Engineers Water-Protection Programs, Surface Mining Control and Reclamation Act (SMCRA), Endangered Species Act, Fish and Wildlife Act, etc.):

POWER has investigated whether other land and water use regulations may affect the subject site. The Corps of Engineers Water-Protection Programs and the Fish and Wildlife Act should not affect the subject site as long as water ways, wetlands and shorelines are not affected. It is expected that no endangered species will be disturbed at any of the already-developed sites. Mr. Glen Wa of the Office of Surface Mining was contacted to determine if the Demonstration Project would be exempt from SMCRA since the project will perform coal processing. Mr. Wa advised that as the processing plant is not at, near, or in conjunction with a permitted mine or a portion of a mine, it would be exempt from SMCRA requirements. It is assumed that none of these "other" regulations will affect any of the potential subject sites.

6.2 Application to Existing Sites

UAF:

The UAF site would not be affected by the Alaska Coastal Management Program as it is not in a coastal area. The proposed project consists of the same types of activities which are already occurring at UAF and therefore, special or conditional use permits should not be required. The existing water supply at UAF should be able to supply the water required for the process and any domestic use, without acquiring any permits. Although the land at UAF is not going to be purchased, a Phase I Environmental Site Assessment is recommended to establish a baseline of the environmental integrity of the site. It is not expected that any waters, shorelines, endangered species or fish and wildlife will be used or disturbed in any way; therefore these "other" regulations should not affect the project construction at UAF.

Advantages:

- The project at UAF should not be affected by the Coastal Management Program, zoning requirements, water use permits, Corps of Engineers Water-Protection Programs, SMCRA, Endangered Species Act and the Fish and Wildlife Act.

Disadvantages:

- As the UAF site is not an "untouched" state, it is recommended that a Phase I Environmental Assessment be performed to determine its environmental integrity, prior to any construction activities.

Tyonek:

The Tyonek site would trigger the Alaska Coastal Management Program, as it is in a coastal area. A conditional or special use permit should not be required at this site as the proposed industrial use is similar to previous industrial uses at the site. The Tyonek site has a fresh water supply at the nearby camp. According to Mr. Lou Nelson of the Tyonek Native Corporation (TNC), this water supply would be available as long as the level of the lake was not drawn down. It is likely that the lake water supply would be sufficient for the project. In the event that wells are required to supplement the water usage at Tyonek or the other sites, the appropriate water well permits would be required to develop the well(s). These permits are not described in this report as it is assumed that existing water supplies will be sufficient. It is also assumed that water rights will not be required to use the water at the Tyonek site. A Phase I Environmental Site Assessment is recommended to establish a baseline of the environmental integrity of the site. It is not expected that any waters, shorelines, endangered species or fish and wildlife will be used or disturbed in any way; therefore these "other" regulations should not affect the project construction at Tyonek. If wastewater is disposed of into the ocean, or if the transportation of the coal is via the ocean, these other regulations should be re-examined.

Advantages:

- The project at Tyonek should not be affected by zoning requirements, water use permits, Corps of Engineers Water-Protection Programs, SMCRA, Endangered Species Act and the Fish and Wildlife Act.

Disadvantages:

- As the Tyonek site is not an "untouched" state, it is recommended that a Phase I Environmental Assessment be performed to determine its environmental integrity, prior to any construction activities.
- The Consistency Review for the Alaska Coastal Management Program would be triggered at Tyonek.
- If the ocean is used for wastewater disposal or coal transportation, additional regulations would come into play.
- It is not certain whether there will be a sufficient water supply at this site.

Seward:

The Seward site would trigger the Alaska Coastal Management Program, as it is in a coastal area. A conditional or special use permit should not be required at this site as the proposed industrial use is similar to previous industrial uses at the site. The City of Seward advised that a water main runs near the subject site and therefore the Seward site should have access to plenty of City water, though a lift station may be required. A Phase I Environmental Site Assessment is recommended to establish a baseline of the environmental integrity of the site. It is not expected that any waters, shorelines, endangered species or fish and wildlife will be used or disturbed in any way; therefore, these "other" regulations should not affect the project construction at Seward.

Advantages:

- The project at Seward should not be affected by zoning requirements, water use permits, Corps of Engineers Water-Protection Programs, SMCRA, Endangered Species Act and the Fish and Wildlife Act.
- City water is available.

Disadvantages:

- As the Seward site is not an "untouched" state, it is recommended that a Phase I Environmental Assessment be performed to determine its environmental integrity, prior to any construction activities.
- The Consistency Review for the Alaska Coastal Management Program would be triggered at Seward.

7.0 BUILDING PERMITS

7.1 General Regulatory Framework

It appears that all three sites will need some building renovation to accommodate the proposed project. The Alaska State Fire Marshall's office has been given Statewide Authority for plan reviews and does such unless a city has been granted legal deferral. Mr. Ken Lee of the State Fire Marshall's office advised that UAF, Tyonek and Seward have not been given deferral. The actual plan reviews would be handled by the regional offices. The process is basically the same for all of the sites. The plans should be sent to the regional office with any additional information that may be necessary for their valuation, i.e. engineering estimates. Once the departments receive the plans, they will value the project within three days and request a fee. Once a fee is received, the department will actually begin the plan review. They usually take 10 working days to respond with any comments on the plans or to approve the plans as is. The fee for plan review is 65% of Table IIIA of the Uniform Building Code (UBC). The time for approval could be as short as three weeks, depending upon how quick the applicant responds with the fee and if there are any comments. Mr. Lee advised that POWER should also check with the individual cities to see if they have any additional requirements. He advised that UAF may have a person on staff with their own fire department who should be contacted for more information. The 1991 UBC, UNC, UPC and UFC are used and the 1993 NEC is used by the State.

7.2 Application to Specific Sites

UAF:

The UAF Fire Department advised that the State Fire Marshall's office was mistaken and that they have full authority for plan review for any buildings on their campus. Ms. Edie Curry, Assistant Fire Chief (907-474-7721) advised that POWER should contact Kathleen Schedler of the office of Planning and Project Services who would coordinate all of those activities. Ms. Schedler advised that they would coordinate the plan review. The review should take approximately two weeks and fees will be assessed based upon valuation as in Table IIIA of the 1991 UBC.

The contact at the State Fire Marshall at the Fairbanks regional office is:
ATT: Lee Davis (907-465-4002)
Alaska Department of Public Safety
Division of Fire Prevention
1979 Peger Road
Fairbanks, AK 99709

Advantages:

- The building permit at UAF is organized and performed at UAF, enabling an efficient and thorough permit process in about two weeks.

Disadvantages:

- UAF charges 100% of the UBC, Table III A, as it performs a thorough on-site inspection in addition to the plan review.

Tyonek:

The village office was contacted to inquire if there were any additional requirements for plan review. They advised that there were none. The regional Fire Marshall's office is:
ATT: Dave Aden (907-269-5846)
Alaska Department of Public Safety
Division of Fire Prevention
5700 E. Tudor Road
Anchorage, AK 99507

Advantages:

- The State Fire Marshall's office performs only the plan review (no on-site inspection) and therefore only charges 65% of the UBC, Table IIIA.

Disadvantages:

- A thorough on-site inspection is not conducted.
- The permit process will take a minimum of three weeks.

Seward:

Bob Fergeson (907-224-3331 x 317) does the plan review for the city of Seward. Mr. Fergeson advised that the State Fire Marshall's office sometimes does only the Fire and Life Safety review and the city does the electrical, plumbing, civil, etc. Sometimes the city handles all of it. Mr. Fergeson suggested that both he and the State Fire Marshall be contacted for plan review. The review time for the city will depend upon the time of year: winter - approximately 2 weeks.; spring - approximately 4 weeks. However, the process could be speeded up, if required. The city charges the fee directly out of the UBC. Mr. Fergeson was very enthusiastic about the proposed project and advised that the city would be very cooperative in assisting in the permit process.

The State Fire Marshall contact at the Anchorage regional office is:
ATT: Dave Aden (907-269-5846)
Alaska Department of Public Safety
Division of Fire Prevention
5700 E. Tudor Road
Anchorage, AK 99507

Advantages:

- The city advised that they were very enthusiastic about the project and, if needed, could hasten the permit process which usually takes from two to four weeks, depending upon the time of year.

Disadvantages:

- It appears that the City may perform parts of the building inspection and the State Fire Marshall's office may perform the remaining parts of the review. This may lead to some confusion and a greater permit time.
- Between the City and State Fire Marshall's Office, it appears that 100% of the UBC Table IIIA will be charged.

8.0 HAZARDOUS MATERIAL USE/STORAGE

8.1 General Regulatory Framework

Oil Discharge and Contingency Plans/SPCC Plans:

An oil discharge and contingency plan is required for those facilities handling greater than 10,000 barrels or 420,000 gallons of oil. The definition of oil includes "other liquid hydrocarbons", so it is unclear whether this even applies. If more than this quantity of oil is stored, the DEC should be contacted. A contact at the South Central DEC Office is Joe Sautner 907-349-7755. It appears that the liquefied coal is actually a suspended solid rather than a true liquid and the above definition may not apply.

Spill Prevention, Control and Countermeasure (SPCC) plans are required for those facilities which store over 660 gallons of oil in a single container or 1,320 gallons of oil in multiple containers, which could reasonably be expected to get into waters of the United States if spilled. These Federal regulations apply to oil defined as follows: "means oil of any kind including petroleum, fuel oil, sludge, oil refuse and mixed oil." Carl Kitz at the EPA Region 10 Office (206-442-1263) was contacted to verify whether the liquefied coal would fit this definition. Mr. Kitz advised that the liquefied coal fuel for the proposed project would not appear to meet the definition of oil under this requirement and, therefore, no SPCC Plan would be required for storage of the liquefied coal.

Hazardous Material Storage and Reporting Requirements:

SARA Title III of the 1986 amendments to CERCLA provides for emergency planning, emergency notification, community right-to-know reporting on chemicals and routine toxic chemical release reporting. The Federal regulations include annual reporting of hazardous material use and limited emergency response information. Many States have enacted more stringent reporting and emergency response planning. Alaska does not presently have more stringent requirements for the storage and reporting of hazardous materials; therefore the Federal requirements must be adhered to. The majority of these requirements consist on-going inventory reporting. The State Fire Marshall will also have requirements relating to the storage of hazardous materials. These include adherence to the Uniform Fire Code, which should be covered in the Building Plan Review process.

Worker Safety Requirements:

The Occupational Safety and Health Act has numerous requirements that relate to worker health and safety. These will not be covered specifically in this report since they are on-going requirements. It should be noted, however, that these requirements also apply to construction workers and, therefore, should be reviewed prior to the construction of the Demonstration Project.

8.2 Application to Specific Sites

UAF:

The Risk Management Division of UAF handles hazardous material storage for the University. They supply such items as flammable and corrosive storage cabinets. They have an emergency response plan and would assist in incorporating the Demonstration Project into their existing plan. Mr. Adams, of this Division, verified that the State of Alaska does not have a specific requirement for an emergency plan for the handling of hazardous materials.

Advantages:

- Although many hazardous material storage requirements may not apply to the Demonstration Project, the Risk Management Division at UAF is available and will assist in any emergency plans which may be prudent.
- The Risk Management Division at UAF will supply such items as Flammable Storage Cabinets.
- The UAF Fire Department and Risk Management Division will be nearby and available to handle spills and other hazardous material-related problems at the site.

Disadvantages:

- None.

Tyonek and Seward:

These facilities do not have any existing management or specific hazardous material storage requirements.

Advantages:

- None.

Disadvantages:

- Any hazardous material storage requirements must be handled by the operators of the Demonstration Project.
- There are no existing on-site emergency response operators at these sites.

9.0 SUMMARY

The following tables provide a summary of this permit study for each site, a table indicating how each site compares to each other, and an estimate of permit costs for each major permit at each of the three locations.

ALASKAN LOW-RANK COAL-WATER FUEL DEMONSTRATION PROJECT
TYONEK SITE PERMIT REQUIREMENTS

PERMIT/ REQUIREMENT	REGULATORY AGENCY/CONTACT	TIME/REQUIREMENT
COASTAL ZONE MANAGEMENT APPROVAL	Office of Management and Budget Division of Governmental Coordination S. Central Regional Office 3601 "C" Street, Suite 370 Anchorage, Alaska 99503-2798 907-561-6131 Fax: 561-6134	9 Page Coastal Project Questionnaire and Certification Statement must be submitted to coordinating agency. Review time may be 30 to 60 days or 50 to 80 days if public notice is required. Fees may be required.
AIR QUALITY PERMIT TO CONSTRUCT	Dept. of Environmental Conservation Environmental Quality Division S. Central Regional Office Bill McClarence 907-273-4238	Requires New Source Review for Attainment Areas If emissions are limited to below PSD levels. Submit application; EPA Screen Model on ambient air affects; Public Notice Approx. Fees: $7,000 (proposed regulations) Approx. Permit Time: 90 days If PSD: Approx. Fees: $13,000 Approx. Permit Time: 6 to 9 months
AIR QUALITY PERMIT TO OPERATE	Dept. of Environmental Conservation Environmental Quality Division S. Central Regional Office Bill McClarence 907-273-4238	Monitoring, recordkeeping and reporting requirements. Permit Fee: $300 (proposed regs) Annual Operating Fee $5.07 per ton (proposed regs)
AIR QUALITY NEW SOURCE PERFORMANCE STANDARDS (NSPS)	Environmental Protection Agency Region 10 John Keenan 206-553-1817 or Jim McCormick	Notifications to EPA required starting 30 days after date of construction. Continuous Monitoring System may be required and various recordkeeping and recording requirements. No fee from EPA but when DEC takes over program (about 2 yrs.), they will charge fees, incorporate NSPS into their operating permit and may require submittal of Title V permit.
NPDES STORMWATER-OPERATION OF FACILITIES ASSOCIATED W/ INDUSTRIAL ACTIV.	EPA Region 10 Seattle, WA Joe Wallace 206-553-8399	Notice of Intent (1 page form) Pollution Prevention Plan on site No fees Valid when complete NOI is mailed in.
SOLID WASTE DISPOSAL	Tyonek Native Corporation 907-583-0707	May need to get non-hazardous waste documentation if there is any reason to believe waste is regulated.
EPA ID # FOR HAZARDOUS WASTE DISPOSAL	EPA Region 10 Seattle, WA Pat Hanley (206) 553-0157	Would be required if any hazardous wastes were generated on site. 2 page application Should take 3-5 working days to get a number No fees. Waste would be custody of project operator. Waste disposal costs could be high and the operator would have the liability of "owning" the waste.

BUILDING PERMIT/PLAN REVIEW	ATT: Dave Aden (907-269-5846) Alaska Department of Public Safety Division of Fire Prevention 5700 E. Tudor Road Anchorage, AK 99507	Send in plans and any additional info. (i.e. engineers estimates) Will valuate and request fee w/n 3 days. Will review plans w/n 10 days. Fee: 65% of 1991 UBC Table IIIA
WASTEWATER DISPOSAL: NON-DOMESTIC WASTEWATER DISCHARGE PERMIT AND/OR NPDES PERMIT	State Discharge Permit: Robert Dolan (907-563-6529) Department of Environmental Conservation S. Central Regional Office NPDES US EPA, Region 10 Chuck Rice (206-553-8504)	4 page application form w/ attachments i.e. site map 30 day public notice once complete appl is received Application could be approved w/n 60 days Discharge must comply with water quality standards; treatment may be required and limitations applied. Permit includes plan review of system. Fee: Approx. $200 (based upon water flow) The NPDES permit application is fairly lengthy and must be submitted at least 180 days prior to discharge. It will most likely be considered a minor source and the permittee will be instructed to operate under State permit (above). No Fees.
WATER USE	Tyonek Native Corporation Lou Nelson (907) 272-0707	There is a lake which is used for water supply and a water treatment facility. Lou Nelson, TNC, advised that they would allow limited use of this water as long as there was not substantial drawdown. Otherwise wells may be drilled for water.
SEPTIC PERMIT	David Johnson (907-262-5210) Kenai Peninsula District Office Department of Environmental Conservation	Plans will be reviewed by the district office. Fees will be assessed per amount of flow (about $150). No application. Nitrate analysis may be required for discharges > 2,500 gals/day. There is a sewage treatment facility at the camp.

ALASKAN LOW-RANK COAL WATER FUEL DEMONSTRATION PROJECT
SEWARD SAWMILL SITE PERMIT REQUIREMENTS

PERMIT/ REQUIREMENT	REGULATORY AGENCY/CONTACT	TIME/REQUIREMENT
COASTAL ZONE MANAGEMENT APPROVAL	Office of Management and Budget Division of Governmental Coordination S. Central Regional Office 3601 "C" Street, Suite 370 Anchorage, Alaska 99503-2798 907-561-6131 Fax: 561-6134	9 Page Coastal Project Questionnaire and Certification Statement must be submitted to coordinating agency. Review time may be 30 to 60 days or 50 to 80 days if public notice is required. Fees may be required.
AIR QUALITY PERMIT TO CONSTRUCT	Dept. of Environmental Conservation Environmental Quality Division S. Central Regional Office Bill McClarence 907-273-4238	There is an existing AQ permit at this site which may be able to be modified.* If the project could remain under PSD limits, application would be simpler: Submit application; EPA Screen Model on ambient air affects; Public Notice would not be required if permit is modified. Approx. Fees: $3,000 to $7,000 (proposed regs.) Approx. Permit Time: 30 to 90 days If PSD: Submit application, modeling, BACT and public notice Approx. Fees: $13,000 Approx. Permit Time: 6 to 9 months *Additional limitations may be required from lack of dispersment of contaminants, due to surrounding terrain.
AIR QUALITY PERMIT TO OPERATE	Dept. of Environmental Conservation Environmental Quality Division S. Central Regional Office Bill McClarence 907-273-4238	Monitoring, recordkeeping and reporting requirements. Annual Operating Fee = $5.07 per ton (proposed regs)
AIR QUALITY NEW SOURCE PERFORMANCE STANDARDS (NSPS)	Environmental Protection Agency Region 10 John Keenan 206-553-1817 or Jim McCormick	Notifications to EPA required starting 30 days after date of construction. Continuous Monitoring System required and various recordkeeping and recording requirements. No fee from EPA but when DEC takes over program (about 2 yrs.), they will charge fees, incorporate NSPS into their operating permit and may require submittal of Title V permit.
NPDES STORMWATER-OPERATION OF FACILITIES ASSOCIATED W/ INDUSTRIAL ACTIV.	EPA Region 10 Seattle, WA Joe Wallace 206-553-8399	Notice of Intent (1 page form) Pollution Prevention Plan on site No fees Valid when complete NOI is mailed in.
SOLID WASTE DISPOSAL	City of Seward 907-224-3331	May need to get non-hazardous waste documentation if there is any reason to believe waste is regulated.
EPA ID # FOR HAZARDOUS WASTE DISPOSAL	EPA Region 10 Seattle, WA Pat Hanley (206) 553-0157	Would be required if any hazardous wastes were generated on site. 2 page application Should take 3-5 working days to get a number No fees. Waste would be custody of project operator. Waste disposal costs could be high and the operator would have the liability of "owning" the waste.

BUILDING PERMIT/PLAN REVIEW	ATT: Dave Aden (907-269-5846) Alaska Department of Public Safety Division of Fire Prevention 5700 E. Tudor Road Anchorage, AK 99507 City of Seward Bob Fergeson 907-224-3331	It is recommended that both the State and the city be contacted for plan review in Seward. They each handle certain aspects; sometimes the city handles all of it. The States procedures are as follows: Send in plans and any additional info. (i.e. engineers estimates) Will valuate and request fee w/n 3 days. Will review plans w/n 10 days. Fee: 65% of 1991 UBC Table IIIA The City advised that they would take 2 to 4 weeks to review the plans, depending upon how busy they are and would charge 100% of the UBC Table IIIA if they did the entire inspection.
WASTEWATER DISPOSAL: NON-DOMESTIC WASTEWATER DISCHARGE PERMIT AND/OR NPDES PERMIT	State Discharge Permit: Robert Dolan (907-563-6529) Department of Environmental Conservation S. Central Regional Office NPDES US EPA, Region 10 Chuck Rice (206-553-8504)	4 page application form w/ attachments i.e. site map 30 day public notice once complete appl is received Application could be approved w/n 60 days Discharge must comply with water quality standards; treatment may be required and limitations applied. Permit includes plan review of system. Fee: Approx. $200 The NPDES permit application is fairly lengthy and must be submitted at least 180 days prior to discharge. It will most likely be considered a minor source and the permittee will be instructed to operate under State permit (above). No Fees.
SEPTIC PERMIT	David Johnson (907-262-5210) Kenai Peninsula District Office Department of Environmental Conservation	Plans will be reviewed by the district office. Fees will be assessed per amount of flow (approx. $150). No application. Nitrate analysis may be required for discharges > 2,500 gals/day.

ALASKAN LOW-RANK COAL-WATER FUEL DEMONSTRATION PROJECT
UAF SITE PERMIT REQUIREMENTS

PERMIT/ REQUIREMENT	REGULATORY AGENCY/CONTACT	TIME/REQUIREMENT
AIR QUALITY PERMIT TO CONSTRUCT	Dept. of Environmental Conservation Environmental Quality Division North Regional Office Jack Coutts 907-451-2132	Would require a modification to an existing permit in a non-attainment area for CO* Assuming emissions limited to below PSD levels: Submit application which includes a detailed spec. of phys. or oper. limitations necessary to ensure permit reductions in actual emissions of non-attainment pollutant; EPA Screen Model and Public Notice may be required Approx. Fees: Retainer of $7,000 (proposed regs.) Approx. Permit Time: 90 days or 2 weeks if public notice is not required. If PSD is triggered: BACT, Public Notice and Hearing Approx. Fees: Retainer of $13,000 (proposed regs) Approx. Permit Time: 6 mths to 1 year *Ice Fog limitations may be written into permit.
AIR QUALITY PERMIT TO OPERATE	Dept. of Environmental Conservation Environmental Quality Division North Regional Office Jack Coutts 907-451-2132	Monitoring, recordkeeping and reporting requirements. Annual Operating Fee = $5.07 per ton (proposed regs)
AIR QUALITY NEW SOURCE PERFORMANCE STANDARDS (NSPS)	Environmental Protection Agency Region 10 John Keenan or Jim McCormick 206-553-1817	Notifications to EPA required starting 30 days after date of construction. Continuous Monitoring System may be required and various recordkeeping and recording requirements. No fee from EPA but if DEC takes over program (about 2 yrs.), they will charge fees, incorporate NSPS into their operating permit and may require submittal of Title V permit.
NPDES STORMWATER-OPERATION OF FACILITIES ASSOCIATED W/ INDUSTRIAL ACTIV.	EPA Region 10 Seattle, WA Joe Wallace 206-553-8399	Required if any facility operations can contact stormwater, including access roads used by carriers of raw material and storage areas. Notice of Intent (1 page form) Pollution Prevention Plan on site No fees Valid when complete NOI is mailed in.
SOLID WASTE DISPOSAL	UAF, Risk Management Division Joe Adams 907-474-5496	Handled through UAF. They do not presently charge for this service; funding comes from general fund.
EPA ID # FOR HAZARDOUS WASTE DISPOSAL	UAF, Risk Management Division Joe Adams 907-474-5496	UAF has an EPA generator number; any waste generated at UAF would be disposed of under that number. They do not presently charge for disposal services but may if it became excessive.
BUILDING PERMIT/PLAN REVIEW	UAF Fire Department Edie Curry, Assistant Fire Chief 907-474-7721 Coordinated by Kathleen Schedler, Office of Planning and Project Services.	Plan review by UAF would take about 2 weeks Fees are assessed based upon Table IIIA of the 1991 UBC.
WASTEWATER DISPOSAL: NON-DOMESTIC WASTEWATER	UAF, Utilities Division Charles Ward, Mechanical Engineering 907-474-7351	UAF has their own sewer collection system which is already approved to discharge boiler blowdown from their 4 boilers. Mr. Ward did not think that any permit changes would be required to discharge waste from the demonstration project.

SEPTIC PERMIT	UAF, Utilities Division Charles Ward, Mechanical Engineering 907-474-7351	Existing sewer system should not require any changes due to demonstration project.

COMPARISON OF MAJOR PERMIT REQUIREMENTS*

PERMIT/ REQUIREMENT	UAF	TYONEK	SEWARD	COMMENTS
NEPA	NEPA would be triggered the same for all 3 sites, as no federal lands would be affected at any one site. The potential future use of DOE funding may trigger NEPA. The outcome of a potential NEPA process could not be effectively compared at this time. If only a simple EA is required, it could take about 3 months and cost about $50,000. An EIS may take up to 18 months at a cost of approximately $300,000. These numbers are just rough guesses at this point.			
COASTAL ZONE MANAGEMENT APPROVAL	Would not be required.	Would be required.	Would be required.	Only required for coastal zones.
LAND AND WATER MANAGEMENT	Not required.	Not required.	Not required.	No State lands are involved
PLANNING APPROVALS (LAND USE)	Not required.	Not required.	Zoned Industrial (not required)	Allowed use.
PHASE I ENVIRONMENTAL ASSESSMENT	Recommended.	Recommended.	Recommended.	Not required but highly recommended for each site.
AIR QUALITY PERMIT TO CONSTRUCT	Modification of existing permit will be required if there will be a gain in net emissions. - May require CO offsets since non-attainment area for CO - May take less time and $$ to permit since modification (Unless substantial amount of CO Offsets will be required.) - May have ice fog limitations - May require change in stack height or other restrictions due to surrounding terrain.	New permit to construct in attainment area	Modification to permit in attainment area - May be more restrictive in limitations due to surrounding terrain - May take less time and $$ to permit since modification	There are many variable associated with the AQ permit. The surrounding terrain should be carefully considered as it affects dispersment of contaminants. The PSD triggering amounts, NAAQSs and the expected CO emissions (UAF) need to be carefully examined and evaluated.
AIR QUALITY PERMIT TO OPERATE AND NSPSs	Would be required from DEC/EPA.	Would be required from DEC/EPA	Would be required from DEC/EPA	Once a facility is constructed, an AQ permit to operate is required from the DEC. Presently the EPA has to ensure compliance with the NSPSs.
CRITICAL HABITAT AREA PERMIT	Not required.	Not required.	Not required.	The Fish and Game department advised that no critical habitat areas would be disturbed unless a stream was crossed.

WATER QUALITY PERMITS- NPDES OPERATION: STATE WASTEWATER DISPOSAL PERMIT	Not required. UAF has wastewater disposal system.	A State DEC permit would be required and an EPA NPDES permit may have to be applied for depending upon disposal method.	A State DEC permit would be required and an EPA NPDES permit may have to be applied for depending upon disposal method.	There is no existing wastewater disposal system for the Seward and Tyonek sites. On-site disposal options include disposal to navigable waters, requiring an NPDES permit or an approved land absorption system. It is expected that there will be about 50,000 gals/yr of wastewater.
OIL- SPCC PLAN (MAYBE- OIL HANDLING FACILITIES; OIL SPILL PERMIT FOR SCIENT. FAC.; PIPELINE ROW)	Oil handling facility would not apply due to qty on site and liquefied coal is actually a suspended solid rather than a liquid hydrocarbon. SPCC Plan not required since not considered oil. It is assumed that any piping will occur within facility boundaries, thus no additional requirements would be incurred.			No specific requirements.
NON-HAZARDOUS SOLID WASTE DISPOSAL	Handled by UAF.	There is a village landfill for non-hazardous solid waste; it was not designed to handle industrial waste.	Within city limits so that city contractor will pick up non-regulated solid waste.	
HAZARDOUS WASTE DISPOSAL PERMIT (EPA ID#)	If waste was generated, would be considered UAF's waste and would be handled through their Risk Management Division. Fees would only be incurred if excessive. It appears that liability for waste would be UAFs.	If waste is generated, an EPA ID# would be required. Operator would have ownership of waste, incur liability, and would have to pay for costly disposal.	If waste is generated, an EPA ID# would be required. Operator would have ownership of waste, incur liability, and would have to pay for costly disposal.	
PLAN REVIEW	Minor renovation to building would be required. Plan review would be conducted by UAF. Fee, according to 1991 UBC, Table IIIA	Major renovation would be required. Plan review would be conducted by State Fire Marshall. Fee would be 65% of 1991 UBC, Table IIIA	Major renovation would be required. State Fire Marshall and/or City of Seward would conduct review. A total of 100% of the 1991 UBC, Table IIIA would be assessed.	
WATER RIGHTS	Existing water available at UAF.	Lou Nelson of the TNC advised that water is available from the nearby camp, as long as it doesn't cause drawdown of lake.	City Water Available. There should be plenty for the 25 gpm for the operation, 25 persons on-site and fire protection. There is an existing main near the site. User pays for meter and for amt. of water used.	It is assumed that no water rights will be required at any of the sites.
SEPTIC PERMIT	Not required; UAF wastewater system will be used.	No septic system exists at site, though there is one at nearby site. Would require permit for site.	Existing septic system may exist but DEC could not find records. Would have to be re-permitted anyway due to change in use.	For domestic waste.
STORM WATER NPDES PERMIT; CONSTRUCTION DISTURBING > 5 ACRES	Not required as construction will not disturb > 5 acres.	Not required as construction will not disturb > 5 acres.	Not required as construction will not disturb > 5 acres.	

HAZARDOUS MATERIAL STORAGE PERMIT	Not required but UAF has on-site emergency plan and will supply storage cabinets.	Not required.	Not required.	
GRADING PERMIT	Not required.	Not required.	Not required. There is a digging permit required to prevent hitting utilities. There is no fee for this.	
PERMIT TO DISTURB TOPSOIL	Not specifically required.	Not specifically required.	Not specifically required.	Dust creating activities (fugitive emissions would be covered in AQ permit)
PIPELINE PERMIT	Not required, assuming no transfer off-site and substance is not considered petroleum or gas product.	Not required, assuming no transfer off-site and substance is not considered petroleum or gas product.	Not required, assuming no transfer off-site and substance is not considered petroleum or gas product.	

* It should be noted that this study is not all-inclusive. There may have been some permits and/or regulatory requirements that were not discussed. However, POWER has tried to discuss all of the major permits and requirements for construction of the proposed Demonstration Project. In addition to the permits required for construction of the project, there are on-going requirements for operation. Some of these were discussed briefly, such as the air quality operating permit requirements and worker safety issues. However, this study did not attempt to describe in full, all on-going requirements.

COMPARISON OF ESTIMATED COSTS OF THE MAJOR PERMIT REQUIREMENTS *

PERMIT/ REQUIREMENT	UAF	TYONEK	SEWARD	COMMENTS
NEPA	$50,000	$50,000	$50,000	Assuming EA not EIS
COASTAL ZONE MANAGEMENT APPROVAL	$0	$2,000: Applic.	$2,000: Applic.	
PHASE I SITE ASSESSMENT	$5,000	$5,000	$5,000	Does not include any sampling or additional investigations.
AIR QUALITY PERMIT TO CONSTRUCT	$3,000-$7,000: DEC Fee $15,000: Appl. (for significant modification or PSD avoidance) $25,000: May be additional costs for LAER and other reqmts. in non-attainment area.* or $13,000 DEC Fee $60,000 Appl. (for a PSD permit) *Does not include potential purchase of offsets.	$7,000: DEC Fee $15,000: Appl. PSD Avoid. Permit or $13,000 DEC Fee $60,000 Appl. (for a PSD permit)	$3,000 - 7,000: DEC Fee $15,000: Appl. (for significant modification or PSD avoidance) or $13,000 DEC Fee $60,000 Appl. (for a PSD permit)	If continuous emission monitoring (CEM) equipment is required, each CEM analyzer may cost $100,000. The costs listed for AQ permit to construct do not include any control equipment costs. For a PSD permit that may have to be reiterated due to emission problems, the permit application cost may be as high as $90,000. UAF and Seward may require additional modification, controls and/or limitations due to surrounding terrain affecting dispersion.
AIR QUALITY PERMIT TO OPERATE AND NSPSs	$300: DEC Fee $1,200/yr: DEC Emis. $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time *Some of the testing and reporting costs may actually be less at UAF, due to help from UAF staff.	$300: DEC Fee $1,200/yr: DEC Emis $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time	$300: DEC Fee $1,200/yr: DEC Emis $60,000: Source Testing $15,000/yr: DEC Reporting $10,000: NSPS Reporting $10,000 DEC Review Time	The permit to operate may be substantially changed when Alaska's SIP is approved. A new Title V permit application may be required at that time. If the State gets full approval, the NSPS reporting would be handled by the DEC and fees and requirements may change.
WATER QUALITY PERMITS- NPDES OPERATION: STATE WASTEWATER DISPOSAL PERMIT	$0	$1,500: DEC $5,000: DEC Appl $400: DEC Plan Re $10,000: NPDES Appl. to EPA	$1,500: DEC $5,000: DEC Appl $400: DEC Plan Re $10,000: NPDES Appl. to EPA	Either NPDES permit for disposal to surface water or disposal to soil (below) may be required for Tyonek or Seward.
SOIL ABSORPTION SYSTEM FOR WASTEWATER DISPOSAL	N/A	$200: DEC $5,000: DEC Appl $400: Plan Review	$200: DEC $5,000: DEC Appl $400: Plan Review	
SOLID WASTE DISPOSAL (Non-Regulated)	$0	Disposal Costs	Disposal Costs	
HAZARDOUS WASTE DISPOSAL PERMIT (EPA ID#)	$0	$3,000 Appl. + Disposal Costs + Lab Costs	$3,000 Appl. + Disposal Costs + Lab Costs	

PLAN REVIEW	100% UBC Table IIIA $3,000 Appl.	65% UBC Table IIIA $5,000 Appl.	100% UBC Table IIIA $5,000 Appl.	
SEPTIC PERMIT	$0	$150: DEC Fee $3,000: Appl. $400: Plan Rev	$150: DEC Fee $3,000: Appl. $400: Plan Rev	

*The costs provided are a rough estimate and could end up being substantially different due to regulatory changes, technology changes, the economy, etc. POWER did try to give an idea of the probable costs of obtaining each permit but is not responsible for any deviations from the estimates provided.

10.0 RECOMMENDATIONS

It is recommended that the permit process begin as soon as possible as some of the requirements may take a year to complete. Additionally, the permit costs can be more accurately assessed once the permit process has begun with the regulatory agencies. Some of the permit requirements, such as air quality and wastewater control equipment, will require substantial interaction with the design engineers and may even require changes in design. Communication becomes an important factor in successful permitting.

APPENDIX 8

WILLIAMS TECHNOLOGIES, INC.
320 SOUTH BOSTON, SUITE 831
TULSA, OKLAHOMA 74103-3718

TELEPHONE: (918) 582-5811 FACSIMILE: (918) 584-0474

OCT 3 1 RECD

H. J. Brolick
Executive Vice President

October 27, 1994

Mr. Warrack G. Wilson
Coal-Water Fuel Technology
Alaskan Office
12212 Old Glenn Hwy. - Suite 8
Eagle River, Alaska 99577

Dear Warrack:

Attached are letters which have previously been received by Black Mesa, which verify these agencies consider the slurry a non-hazardous, non-toxic material. In the event of leaks, Black Mesa has encountered no environmental damage of any substance or duration other than the sometimes unsightly coal on the ground. In some cases, we remove the coal or in many cases, the coal is simply left on the ground to gradually be mixed with the soil. Usually this is less of a disruption to the area than a major clean-up effort.

You may also be aware the ETSI Pipeline received rulings from various agencies that the slurry was non-hazardous and non-toxic. You may be able to obtain this information from previous ETSI owners.

If we can be of further help in any other way, please let me know.

Yours truly,

H. J. Brolick

Attachment

EARLY ALERT

2800

SUBJECT: BLACK MESA COAL SLURRY PIPELINE RUPTURE

2/25/86

MINS-6-1

FROM: STATE DIRECTOR, ARIZONA

BACKGROUND: The Black Mesa Coal Slurry Pipeline runs 275 miles from Black Mesa coal mine near Kayenta to the Navajo Generating Station near Bullhead City, all in Arizona. Black Mesa Pipeline, Inc.; a subsidiary of Southern Pacific Pipelines, Inc., has a contract from Peabody Coal Company to operate the pipeline.

The pipeline ruptured sometime during the weekend of February 22, 1986, spilling coal slurry on approximately five miles of dry wash on public land. The flow was later stopped by Black Mesa Pipeline.

STATUS: The Environmental Research Response Coordinator at EPA, San Francisco is to be alerted.

We are investigating the terms and stipulations in the right-of-way grant for the pipeline and will contact the pipeline operator to determine the chemistry of the spill and the operator's intentions and plans for clean-up.

We will provide additional information on status tomorrow, February 26, 1986.

BLM PHOENIX DISTRICT

FEB 2 - '86

DM
ADM
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Action By
Due Date

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MAR - 3 1986
BUREAU OF LAND ...
KINGMAN RA - PF...

MAIL BENEFIT 30 Black Mesa Coal Slurry Pipeline Rupture

EARLY ALERT

2800

SUBJECT: BLACK MESA COAL SLURRY PIPELINE RUPTURE

2/26/86

MINS-6-2

FROM: STATE DIRECTOR, ARIZONA

BACKGROUND: See Early Alert, dated 2/25/86, Control Number MINS-6-1.

STATUS UPDATE: EPA was informed of the situation. Their determination is that the material described to them is not a toxic substance, and poses no threat to the environment. Discussions with the Arizona Department of Game and Fish indicate that they handled a similar spill from the same pipeline in 1977. Their chemical tests confirmed that the slurry material is non-toxic and inert. The 1977 spill was allowed to dissipate with rainfall.

It is our understanding that some if not all of the affected area is in a Wilderness Study Area (AZ-02-024); the exent has not been determined.

We plan to monitor the operator's replacement of the damaged pipeline section. The company will clean up the area in the immediate vicinity of the rupture, and rainfall will dissipate the remaining affected area. Compliance checks are planned. We expect full cooperation of the pipeline company with respect to minimizing impacts brought about by repair efforts and the spill.

Signed by:
Tom Allen
Associate

Tom Allen

Authenticated by:
Patricia Day
Records Manager

.s
.end

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
KINGMAN RESOURCE AREA
2475 Beverly Avenue
Kingman, Arizona 86401

A-00438
2800 (026)
TG

February 26, 1986

Memorandum

To: Area Manager, Kingman Resource Area

From: Tom Gey, Realty Specialist

Subject: A-00438 - Black Mesa Pipeline Coal Slurry Spill

On Monday February 24, 1986, Mike Berch and I visited the area of the pipeline break and coal slurry spill. The line had been shut down and employees of Black Mesa Pipeline were on-site beginning repair activities.

The break occurred in T. 21 N., R. 20 W., section 35, SE¼NW¼. From the break, the slurry mixture flowed down the wash approximately 5 miles to section 31, SW¼SE¼. The deposition of coal slurry generally varied from 1-3 inches in depth over a width of 3-6 feet. The slurry consists of finely powdered coal mixed with water. Jim Shelley of Black Mesa Pipeline estimated the spill at 400 to 1,200 tons or 540 to 1,600 cubic yards. Jim stated that the pH of the slurry varied between 7.6 and 8.2 depending upon the coal.

Tom Lyles of the Arizona Game & Fish Department confirms that based on a chemical analysis of a spill in Sacramento Valley in 1977, the coal slurry is inert and non-toxic. Mr. Lyles stated that past experience showed the material will incorporate into the environment in several months with no adverse effects.

Based upon the chemical nature of the slurry, the spill is not ecologically damaging. The slurry spill does pass through two miles of the NW¼ of the Mt. Nutt WSA (2-24). The spill will be evident for several months until it is diluted by rains, and incorporated into the alluvial wash.

The pipeline right-of-way was issued February 6, 1967. The grant does not contain specific provisions for cleanup of spills, but includes a general stipulation that the Secretary may impose additional conditions for the protection of public health and safety, the environment etc. If it becomes necessary, the grant is sufficiently flexible and the Holder appears amenable to any reclamation that we deem necessary.

The company is proceeding with replacement of the broken segment of pipe. At this time it does not appear feasible or necessary to reclaim the area by removing the coal slurry spill material.

Upon completion of repair activities, Mike Berch or I will visit the site to determine if any further reclamation is necessary.

Tom Gey

The spill occurred in Big Horn Sheep Habitat so human presence in the area should be minimized.

CAP
PPTI
LLS

Arizona
State Land Department

1616 WEST ADAMS
PHOENIX, ARIZONA 85007

ROSE MOFFORD
GOVERNOR

M.J. HASSELL
STATE LAND COMMISSIONER

S 4/15

February 24, 1989

Mr. J. A. Shelly
General Manager
Black Mesa Pipeline, Inc.
1509 E. Butler Avenue
Flagstaff, Arizona 86001

Re: Coal Slurry Pipeline Rights of Way

Dear Mr. Shelly,

The Arizona State Land Department (the Department) is in receipt of your letter of February 3, 1989.

The Environmental Projects Unit has completed its audit of your leases with review of the information provided.

It is the determination of the Department that the materials transported through your pipeline and related facilities are designated as non-hazardous under current Federal and State statutes. Therefore, your pipeline is considered exempt from permitting requirements of ARS Title 49.

Further, you have provided adequate information to demonstrate that coal slurry has been designated as non-hazardous in the event of spillage. Apparently, EPA procedure in the event of such spillage has not been established.

It is the request of the Department that your Company inform the Environmental Projects Manager in the unlikely case that such an event were to occur on State Trust lands.

It is the finding of the Environmental Projects Unit that, at the time of audit, the Black Mesa Pipeline, Inc. is in substantial compliance with the terms and conditions of its leases regarding environmental permits.

For further information, please contact the undersigned, at 542-2668.

Your cooperation in this matter has been greatly appreciated.

Sincerely,

J. A. S.

FEB 28 1989

C. K. G.

Dale A. Altshul
Environmental Projects Coordinator

Copied 2/28/89 by J. A. Shelley for H. J. Brolick.

RECEIVED
FEB 27 1989

copy: Bill Fish, Rights of Ways

RECEIVED
FEB 27 1989

TOTAL P.02

APPENDIX 9

1.0 LRCWF DEMONSTRATION PROGRAM

The proposed three year demonstration project is seeking funding of $10,250,000 from the U.S. Department of Energy to supplement the $3,800,000 provided by the Alaska Science and Technology Foundation and the $6,930,000 provided by Alaska Coal-Water Fuel, Inc. The following sections provide detailed information on the process, projected costs and demonstration schedule.

1.1 Process Flow Diagrams: Figure 1.1 is an overall process flow diagram for the proposed 6 tph hot water drying/LRCWF Production Facility to be installed in the PICO building adjacent to the UAF Power Plant. The demonstration plant will be situated in the PICO building with its approximately 5,600 ft2 x 24' high laboratory space. Following is a brief description of each process area.

AREA 100 (Raw Coal Handling): The process flow begins at the UAF power plant, Area 100, where run of mine coal is received in two coal hoppers for operation of two coal-fired boilers. Coal is then fed through a hammer mill and reduced to -3/4" material. The coal is then transported via conveyor and bucket elevator, where it will be screened, using a vibratory screen deck, to remove -1/4" material (fines). As the coal fines are separated, they go to a fines storage bin and are then transferred to a bulk storage area via truck. A conveyor feeds the material from the storage area to another fines receiving bin where it enters Area 200.

AREA 200 (Slurry Preparation): The coal fines are brought into Area 200 using a bucket elevator which carries the coal fines to a dump hopper inside the hot water drying building. A dust collection system is installed with an exhaust hood to eliminate fugitive dust emission during the process, prior to wetting. A weighbelt feeder transfers the coal to a surge bin, at a rate of 6 tons per hour, which feeds a ball mill along with water. Based on coal feed rate, water input is metered to produce the proper dilution. The ball mill, which is a wet grind process, reduces the coal fines to approximately - 250 micron. After the ball mill, an approximately 50/50 water/coal slurry is pumped to a screen deck to remove over sized coal particles from the slurry. The oversized material is fed back into the front of the ball mill, along with overflow caught in the sump, for further reduction. Coal slurry with the desired particle size distribution is pumped to a high pressure slurry pump and metered into area 300 at approximately 1500 PSI.

Area 200 also includes a water tank, which serves as makeup water for the wet grind process, and a source of clean water for the high pressure flush system. The high pressure flush system includes a high pressure pump, which will be used between runs to purge the system for inspection and cleaning. Water used to flush the system is returned to a flush tank, along with filtrate from the rotary filtration system, and returned to the ball mill or used for makeup water in the final product.

AREA 300 (Hot Water Drying): Coal slurry under pressure enters a heat exchanger in area 300, which is fed steam from UAF's power plant at approximately 32,000 lbs/hr. The

heat exchanger is designed to uniformly heat the coal slurry and begin the transformation from coal slurry to LRCWF. Partially transformed coal slurry then goes through a series of reactors which ensure proper residence time under proper temperature and pressure conditions where the hot water drying process takes place and converts the coal slurry to LRCWF. The LRCWF exits area 300 through a water cooled heat exchanger, which reduces the heat in the LRCWF prior to pressure let down. Heat recovered from the water heat exchanger, as well as condensate from the steam heat exchanger, is returned with the water to the water tank in area 200 and used in the ball mill and/or high pressure flush system, to help reduce energy consumption for raw slurry heating.

AREA 400 (LRCWF Conditioning and Storage): The dilute LRCWF pressure let down system includes an accumulator and a series of let down valves and separator tanks, which allow high pressure LRCWF to be brought to ambient conditions. The separator tanks allow vapors generated during the let down to be separated and sent to a condenser. Condensate then passes through a knock out tank where it is separated from gases formed during the process. The small quantities of low Btu gases from the process are piped to UAF's boiler to be burned or flared. The condensate is returned to the makeup water tank and reused in the final LRCWF preparation.

Once the LRCWF has been reduced to atmospheric conditions, it goes through a product tank and mixed to insure uniform particle distribution. The LRCWF is then pumped to a rotary drum vacuum filter to remove excess water. The filtration system produces a cake material which is fed by a weighbelt feeder to another product tank, as make up water is metered in. Once again the LRCWF is mixed and then pumped through a series of shear units which break up any weak aggregates that form during hot water drying, which helps to decrease viscosity and increase solids loading at a given viscosity. After the shear units, LRCWF passes through a flow meter, which determines whether or not the proper solids loading conditions exist. If the LRCWF does not meet the proper specifications, it is returned to the product tank for reformulation. The final product is sent to an inside day storage tank, and then to the 280,000 gallon insulated heated storage tank outside, or pumped to the UAF oil fired boiler for test burns.

1.2 Site Evaluation/Selection: The purpose of the site visits was to obtain sufficient information to evaluate three sites, Fairbanks, Seward and Tyonek, for hosting the Alaska Low-Rank Coal-Water Fuel Commercial Demonstration project. Based on the information obtained from site visits and interviews with personnel from all potential site locations and regulatory agencies, Alaska Coal-Water Fuel, Inc., determined University of Alaska Fairbanks (UAF) to be the preferred site to host the demonstration project.

In the original proposal, the proposed site for the demonstration project was the Knik Arm Power Plant (KAPP) owned by Hobbs Industries, Inc. located in Anchorage. The KAPP, originally designed to burn coal, had some valuable features that would facilitate the project. Hobbs Industries, Inc., fell on hard economic times and in March of 1994 declared bankruptcy. Other hurdles facing doing the project at KAPP included, getting the facility permitted in a non attainment area for both CO and PM-10, as well as re-zoning of the

property. Because of these unfortunate circumstances, the former Low-Rank Coal-Water Fuel Consortium elected to seek an alternative site to host the demonstration project.

Key elements in selecting UAF as the host site included the following: UAF's power plant has several important pieces of equipment which will be made available to the project. Most notable is a Zurn manufactured, oil-fired boiler rated at 100k/lbs of steam per hour with operating temperatures of 730 degrees F and operating pressures of 600 PSI, suitable for process steam. A baghouse used for their coal-fired boilers can also serve for particulate emissions capture, with modifications to exhaust ducting. Other equipment available include waste water treatment equipment, Mineral Industry Research Laboratory's (MIRL) analytical equipment and other miscellaneous equipment such as a fork lift, truck, etc.

UAF has made available to the project, a building formerly used for their Polar Ice Coring Operation (PICO) contract. The PICO building has a number of valuable characteristics for use in the demonstration project. Divided into two parts, the warehouse/shop portion of the building has approximate dimensions of 70' x 70' x 24', which is more than adequate for the coal preparation and hot water drying process equipment. The only upgrades to the facility that would be required, are insulation, heating, three phase electrical service and possibly individual slabs for heavy equipment skids.

The balance of the building consists of two stories with laboratory, office space and showers. This area of the building is completely insulated and heated. The coal laboratory area used by the MIRL, has a variety of equipment in place which will be very useful in conducting necessary analysis throughout the project. Some of the equipment, available for the project, include an autoclave, complete coal sample grinding equipment, several high capacity exhaust hoods, sand bed reactor and rheology instruments.

Perhaps the most desirable aspect of the building is its proximity to UAF's power plant, approximately 200 yards. This is important in considering piping process steam to the facility, and LRCWF back to the power plant. There is sufficient yard space for storage of the raw coal and tanks for LRCWF storage.

Both steam and electricity will be provided to the project from the UAF power plant. In the case of process steam, the hot water drying process will require approximately 25,000 lbs per hour of process steam for use in heat exchangers. The steam can easily be delivered through an existing utilidor, approximately 5' wide x 6' high. Electricity required for the project is approximately 1 MW for startup and 600 kW during operation and will also be provided through the utilidor

Permitting at the UAF site, while not in the scope of the site assessment, was an important part of the evaluation. UAF offered clear advantages with regard to the ease of permitting. Air quality permitting in particular can save the project substantial time and money because the proposed project represents a modification to an existing permitted facility. Other permits, such as solid waste and waste water disposal will not be required

at the UAF site since the Fairbanks North Star borough and Municipal Utility Systems already have permitted solid waste and waste water treatment systems available to the project.

The Fairbanks community has served the oil and mining industry for many years, and have qualified personnel available to serve the project. In addition, UAF, through MIRL and UAF Utilities, have staff and students with experience in coal-water fuel technology and coal/oil-fired utility systems design, operation and maintenance. Also, the staff is experienced in coal analysis, which is required to operate much of the complex laboratory equipment for the project.

The Fairbanks location is ideal from the stand point of receiving coal from UCM's Healy mine with both rail and truck carriers already established. In addition, UCM will be providing the majority of the project's coal requirements, which will allow the project to receive coal on an as needed basis, allowing smaller stock pile requirements, because of the relatively short distance between the mine and UAF.

UAF staff and administration have both demonstrated a keen interest in the project, as well as, a willingness to provide support. UAF has agreed to commit facilities, equipment, utilities and personnel to the project.

When all of the above factors and infrastructure are considered, UAF offers a substantial cost and time savings to the project.

1.3 Project Costs: The process flow diagram for the hot water drying plant to be installed in the UAF PICO building is shown in Figure 1.1. The schematic layout in the PICO building is shown in Figure 1.2.

proprietary drawings removed.

The design and equipment specifications makes use of information provided by the EERC for a greenfield demonstration plant using all new equipment. The EERC design was modified to make as much use as possible of existing equipment and facilities at UAF. For example, by installing a fines removal system downstream of the UAF hammer mill, all the project's requirements for fine coal (-1/4") will be met. Fines removal will not only provide sized coal for the project, thereby eliminating crushing equipment, but will significantly enhance UAF stoker-fed boiler performance. The project will modify one of the existing Zurn oil-fired boilers for LRCWF testing and use an existing baghouse for particulate. The largest single contribution by UAF will be to provide all the process heat and power for the project. Process heat in the form of high temperature steam will eliminate a thermal fluid boiler and its handling system. Waste heat from the process will provide heat to the laboratory and 280,000 gal product storage tank.

The modified design was evaluated by International Coal Prep. Consultants, Ltd. and Energy Pacific Corp., and their recommendations, based on years of commercial experience, were incorporated. Some of their key changes included using a conventional ball mill rather than a conical ball mill and inclusion of a sizing operation around the ball mill. The high solids loss and maintenance requirements for a continuous centrifuge are eliminated by switching to rotary vacuum belt filter. Heat exchange design options, including thermal fluid boilers and direct steam exchangers were also evaluated by Energy Pacific Corporation. However, contribution of all the process energy enabled us to go to a simple steam heated exchangers. The design requirements and process options were then evaluated by POWER Engineers to arrive at the proposed design shown in Figure 1.1.

In an effort to minimize demonstration costs, the redundancy of dual trains in most areas was eliminated. The multi-train concept, of course, would be required for a LRCWF production plant dedicated to an operating power plant. However, for the planned UAF demonstration, which has large excess of capacity for the planned UAF tests, it becomes an unnecessary additional cost. Instead, some down time is planned and spare parts to repair areas of expected high wear, i.e., valves and pumps, will be maintained.

Equipment costs for the hot water drying plant are shown in Table 1.1. Operating personnel costs for the 3 year demonstration are shown in Table 1.2. High multipliers were used to provide a conservative estimate for the installed equipment costs at UAF in Table 1.3. These costs were combined with operating costs and other supply costs not borne by UAF to arrive at the total budget for the Demonstration Project of $21,023,000.

Table 6.4.1 LRCWF Demonstration Project -- Equipment Specifications and Costs

Cost Estimates for 150 tpd HWD Plant Located in the Univ. of Alaska Fairbansk PICO Bldg.	

Assumptions: *1) All process coal from fines from UAF Power Plant; 2) All process heat and power provided by UAF; 3) Use of single trains rather than parallel; 4) All process water, filtrate and condensate are reused in CWF formulatio therefor, no wastewater treatment is used - wash down, sump overflow, etc. is discharged with UAF wastewat to MUS treatment plant.*

Prices listed are vendor quotes to ACWFi, EERC, EPC and/or POWER Engineers.

Area 100 -- Coal Fines Recovery and Storage						
CODE	HP	QTY	UNIT $	TOTAL $	DESCRIPTION	SOURCE
SS-110	5	1	8,000	8,000	Sieve Screen	FMC
FG -120+cntrl	20	1	22,398	22,398	Dust Control	UPE
TT-140		1	6,449	6,449	Fines Bin	UPE
C-112	10	1	9,939	9,939	Conveyor+Controls	UPE
C-111	10	1	12,898	12,898	Vibtating Feeder	UPE
C-112	10	1	9,939	9,939	Conveyor+cntrl	UPE
TT-140		1	6,449	6,449	Fines Bin	UPE
CB-150		1	35,000	35,000	Fine Coal Bunker	DW-UAF
AREA 100 TOTAL:	**55**		**$111,072**	**$111,072**		

Area 200 -- Slurry Preparation						
CODE	HP	QTY	UNIT $	TOTAL $	DESCRIPTION	SOURCE
SC-223		1	10,000	10,000	Single Deck Screen & Sump	FMC
TT-240		1	6,449	6,449	Fines Bin	UPE
BE-230	7.5	1	9,939	9,939	25 Bucket Elevator+cntrls	UPE
DC-220	20	1	22,398	22,398	Dust Control	UPE
BF-252	5	1	2,500	2,500	Weigh belt feeder 24" by 12'	Wolf & Assoc.
ST-265	10	1	12,650	12,650	Slurry surge Tank w/agitator	Marion Mixers Inc.
BM-220	200	1	200,000	200,000	Ball mill 8' x 60" w/Pumps & Controls	UPE
HP-260	200	1	140,000	140,000	Slurry pump Md: ZGL/135K11025M270HD	Toyo Pump Sys.
WT-270	5	1	26,000	26,000	Water Tank w/transfer pumps & indicators	Aaron Equip.
J-262	3	1	1,000	1,000	Water Transfer Pumps	Pump Systems
F-278		1	5,700	5,700	Flowmeter; Panametrics PT868	Tech. Sales Inc.
J-261 A,B, C, D	20	4	2,800	11,200	Toyo Feed Pump	Toyo Pump Sys.
WT-280	3	1	2,600	2,600	Water Tank w/Transfer Pumps: 23,000	Pump Systems
F-278		1	5,700	5,700	Flowmeter	Tech.Sales
J-290	100	1	26,500	26,500	High Pressure Flush	Pump Systems
AREA 200 TOTAL:	**541**	**17**	**$474,236**	**$482,636**		

Table 6.4.1 LRCWF Demonstration Project -- Equipment Specifications and Costs (Cont'd)

Area 300 -- Hot-Water Drying						
CODE	HP	QTY	UNIT $	TOTAL $	DESCRIPTION	SOURCE
HE-310		2	145,000	290,000	Heat Exchaner-2/double pass (1 spare)	TD-PE
HE-330		1	16,700	16,700	Water Cooled HE	TD-PE
R-320		2	38,546	77,092	Reactors:2-1'diax16'	Avd Fluid Control
F-354		1	5,700	5,700	Flowmeter; Panametrics PT868	Tech Sales Inc.
AREA 300 TOTALS:	**20**	**20**	**$205,946**	**$389,492**		

Area 400 -- LRCWF Preparation						
CODE	HP	QTY	UNIT $	TOTAL $	DESCRIPTION	SOURCE
LC-451		1	46,268	46,268	Liquid Level Indicator	EnerFab
HE-413		1	7,500	7,500	Condenser: Gas inlet tan. 190 F, out	Aaron Equip.
S-410 - 430		3	30,000	90,000	Liq./gas Separators 3 in series w/P	EnerFab
SV-411 - 431, PCV - 412-432		9	21,333	192,000	Control Valves 2" Lipstick & 3" Swee Valves: staged Let down 2000 to 800	Swanson Flow Sys.
ST-440	20	1	15,500	15,500	Product Tank w/agitator, 10,000 gal	Marion Mixer
F-482		1	5,600	5,600	Flowmeter Panamaetric PT 868	Tech Sales Inc.
V-483		1	23,500	23,500	Viscometer Sofraser Model 600 series	Haake
O-450	33	1	106,000	106,000	Rotary Vac Filter & Vac. and Control 6'x8'	UPE
BC-452	10	1	10,000	10,000	Weigh Feed Conveyor: 10' x 48" wide	Wolf & Assoc.
ST-460	5	1	12,650	12,650	Product Tank w/agitator	Marion Mixer
SU-470	20	2	49,000	98,000	Shear Units: 3 rotors: DR 3-9/6p	IKA - Works
ST-480	15	1	24,000	24,000	Product Tank w/agitator, 21,000 gal	Marion Mixer
J-481 A, B, C, D	20	4	2,000	8,000	Slurry Transfer Pump	Pump System
BFT-444	25	1	244,000	244,000	280k gal.heated-stirred product tank	CB&I
B-490	5	1	25,000	25,000	6" lined Secondary Combustion	Vulcan Iron Works
or Fan/Cntrls/Pipe	5	1	25,000	25,000	Blower, Piping & Cntrls. to UAF Boiler	WAG
Steel Platform		1	25,000	25,000	Structural Steel Platform	PE
Contingency				95,800	10 % Contingeny for HWD Pressure Letdown	PE
AREA 400 TOTALS:	**133**		**$672,351**	**$1,053,818**		
TOTAL ALL AREAS:	**809**			**$2,037,018**		

Table 6.4.2 LRCWF Demonstration Project -- Operating Costs

Title	$/Hr.	#	Y1	#	Y2	#	Y3	TOTAL
Program Manager (3)	$70	1	$145,600	1	$145,600	1	$145,600	$436,800
Plant Engineer (3)	$65	1	$135,200	1	$135,200	1	$135,200	$405,600
Process Engineers (Safety, Env.)(3)	$60	2	$249,600	2	$249,600	2	$249,600	$748,800
Purch./Accounting (3)	$35	1	$72,800	1	$72,800	1	$72,800	$218,400
Secretary/Clerk (4)	$30	1	$62,400	1	$62,400	1	$62,400	$187,200
Operators (4)								
Area 100-400	$32	0	$0	4	$266,240	8	$532,480	$798,720
Shift Supervisors	$38	0	$0	2	$158,080	3	$237,120	$395,200
Mechanic/Shop	$38	0	$0	0.5	$39,520	1	$79,040	$118,560
Elec./IT	$38	1	$79,040	1.5	$118,560	2	$158,080	$355,680
Lab Tech.	$30	0	$0	1	$62,400	2	$124,800	$187,200
Sub-total (5)		7	$744,640	15	$1,310,400	22	$1,797,120	$3,852,160
Contingency @ 20% (6):			$148,928		$262,080		$359,424	$770,432
Sub-Total:			$893,568		$1,572,480		$2,156,544	$4,622,592
Cost of Living 5%/Y			$0		$37,232		$131,040	$168,272
Sub-Total:			$893,568		$1,609,712		$2,287,584	$4,790,864
Consultant & Marketing Costs (7)			$200,000		$210,000		$220,125	$630,125
TOTAL:			$1,093,568		$1,819,712		$2,507,709	$5,420,989

Notes

1) Operating personnel may be employed by ACWFi, contract operating company or UAF using locals.
2) Wages and benefits equivalent to those at UAF.
3) Salaried personnel has 1.5 multiplier.
4) Hourly personnel has 1.75 multiplier.
5) Wages based on an average of 5 days of sick leave, 9 days holiday, 10 days vacation.
6) 20% contingency is based on possible overtime; short-term contract help, marketing expenses, etc.
7) Consultant and Marketing costs -- Consultants that will play key roles in plant deisgn and boiler modifications include, R.Kolb, EPC, and W.Irwin, ICPCL; other who will have mainly functions will include, W.Noll, MI, W.Cromey, PMS, and R.Stiles, DRven.

Table 6.4.3 Total Demonstration Project Costs (Fabrication, Installation & Operation Costs)

A. Equipment		
Coal Fines Rec./Storage		$111
Slurry Preparation		$483
HWD		$389
LRCWF Preparation		$1,054
Boiler		$282
Equipment Total:		$2,319
Shipping		$116
Delivered Equipment Total:		**$2,435**
B. Other Direct Costs		
PICO Bldg. Upgrade		$300
Del. Equip. Multiplier %		
Equip. Install	40%	$974
Piping Install	35%	$852
Elec. Install	15%	$365
Instruments	10%	$244
Sub Total	####	$2,735
TOTAL DIRECT:		**$5,170**
C. Indirect Costs		
Engineering	10%	$517
Const.Fee	10%	$517
Contingency	25%	$1,293
Permitting		$100
AIDEA Mgmt Fee		$60
Cnstn Power (by UAF)		$0
TOTAL INDIRECT:	45%	**$2,487**
D. Total Plant		**$7,657**

E. Operation Costs	
Labor	$5,421
Other Operating Costs	
Elec/Steam(provided by UAF)	$0
Utils/Lab (provided by UAF)	$0
Ins, Supplies, Travel, Phone/Fax, etc. (18%)	$973
OPERATIONS TOTAL:	**$6,394**
F. Total Costs without Coal:	**$14,051**
G. Coal Costs - provided by members	$2,750
H. UAF Contributions	$4,222
I. DEMONSTRATION TOTAL COST	**$21,023**

Table 1.4 lists the various cost shares which wll be used to match federal funds. In-kind contributions, coupled with the $3.8 million in funding from ASTF, should be sufficient to match funds requested from the Department of Energy.

TABLE 1.4

Alaska Coal-Water Fuel Inc.
Cost Share

Contribution	Value	
University of Alaska Fairbanks		
Use of existing oil-fired boiler	302,000	- avoided costs
Use of coal prep. equip. & baghouse	200,000	- avoided costs
Office & Lab. to house LRCWF prod.	622,000	- rental fee
Process power & steam	1,571,000	- energy requirement
Faculty & Staff time	292,000	- release time
Indirect costs of contributions	1,236,000	
sub-total:	**4,223,000**	
Usibelli Coal Mine, Inc.		
30,000 tons of coal delivered to UAF plus personnel time	**1,500,000**	
Beluga Coal Company		
10,000 tons of coal delivered to UAF	**1,250,000**	
Private Sector Cost Share Total:	**$6,973,000**	
ASTF	**$3,800,000**	
TOTAL ALASKA:	**$10,773,000**	

1.4 Demonstration Schedule: The project schedule (Figure 1.3) was developed with the assumption that once the US Department of Energy funding has been approved, Phase 2 ASTF funds will be accessible to begin critical tasks such as engineering and environmental permitting, which have a major impact on the duration of the project.

Secondly, it is assumed that the Department of Energy funds for equipment purchase will be available at the time preliminary approval of the air quality permit is received.

Task 1, Contract Negotiations, includes negotiating contracts with AIDEA/ASTF, which should progress smoothly since the successful negotiation of the Phase 1 contract can serve as a model for Phase 2. The Department of Energy contract, to be completed by month 3, will take longer since ACWFi has had no previous relationship with that agency. It is anticipated that selection of environmental permitting and A&E firms will commence prior to project funds being released. This will allow design and permitting activities to proceed on a fast track soon after release of ASTF funds, and reduce the potential for permitting or design delay.

Task 2, Permitting, involves the air quality permit application and preliminary approval, modifications and final approval and other permits such as building permits, etc. UAF will take the lead in submission of the air quality permit since the project will be located at their facilities. A critical point in the air quality permit will be at the end of month 5 of the project, when the Department of Environmental Conservation has had an opportunity to review the application and give a preliminary approval or determine that more information and review is required.

Task 3, Plant design, will begin prior to air quality permitting, with staff engineers and consultants to initialize the design using design criteria developed previously by EERC and others during Phase 1. This data will be presented to the selected A&E firm to finalize detail design by the end of the month 6.

Task 4, Procurement of long lead time equipment and fabricated items, will begin at the end of month 3 with discussions on equipment specifications with potential vendors and fabricators. This will allow for placing orders immediately after preliminary approval of the air quality permit from the Department of Environmental Conservation. Delivery of long lead items are scheduled to take place by the end of month 11 to coincide with site construction activities.

Task 5, Construction Contracting, will begin at the end of month of 4, with preparation of the solicitations for site construction and equipment installation. Bids will be received and evaluated by month 8 and contract negotiations completed with the successful bidders by the end of month 10.

Task 6, Construction, will be shortened by several months from the originally proposed schedule due to the change in plant design. While the process remains very similar to the original design, the equipment design will be modular, to reduce field construction time and cost. There will be a 30 to 60 day time lag between contract award and mobilization, putting the contractors on-site in the middle of month 11. Construction activities, with the exception of finalizing as-built drawings, will be complete by the end of month 17.

Task 7, System Testing, will be performed as modular sections and controls are installed. This is expected to run primarily throughout the construction period. Final startup testing will take place in months 19 and 20. The final startup testing will involve running the entire system to work out bugs.

Task 8, The Demonstration, will begin in month 21 and run through month 36. During the demonstration, a test burn of LRCWF will be conducted in UAF's number 3 oil-fired boiler for a combined period of two to four weeks during months 24, 25 and 26. Fuel will also be made available to potential end-users for test burns in their own facilities throughout the demonstration period.

Task 9, Marketing and Commercialization, continued from Phase 1, will take place throughout the project, beginning in month 2. Activities will include:

- Business/Commercialization Plans - This will consist of developing a business/commercialization plan for ACWFi and a business/project development plan for an Alaska LRCWF commercial plant. The ACWFi business/commercialization plan will focus on LRCWF and technology marketing while the business/project development plan will focus on building a profitable LRCWF production facility in Alaska.
- LRCWF Market Development - Establish recognition of LRCWF in the primary target market sector (Japan Utility Sector) and establish an on-going heavy fuel oil tracking system, which would track demand, prices, changes in purchasing practices and market penetration by Orimulsion® and Coal-Water Fuel.
- LRCWF Marketing - Market test burn samples of LRCWF to primary target sectors (Japan Utility Sector, Hawaiian Electric Power and at least one West Coast U.S. utility). This task would start at month 18 before the first test burn at UAF and after the heavy fuel oil market tracking system is in place.
- Commercial Project Design - This will start some time after the beginning of the construction of the demonstration plant, however, the completion of a project prospectus could not be completed until toward the end of the demonstration. One of the goals of this activity is to set an economic and financial model which can be "tweaked" to fit sites other than those in Alaska.
- Technology Marketing - will begin once we have the demonstration plant up and running, month 21. Some very initial market development activities could be initiated sooner, however, these would be limited to identifying some potential targets.

The above activities will be performed throughout the demonstration, and finalized once defensible cost data and other market information is generated by the demonstration facility and end-user/market input from off-site test burns is received.

LRCWF DEMONSTRATION PROJECT
PHASE II SCHEDULE

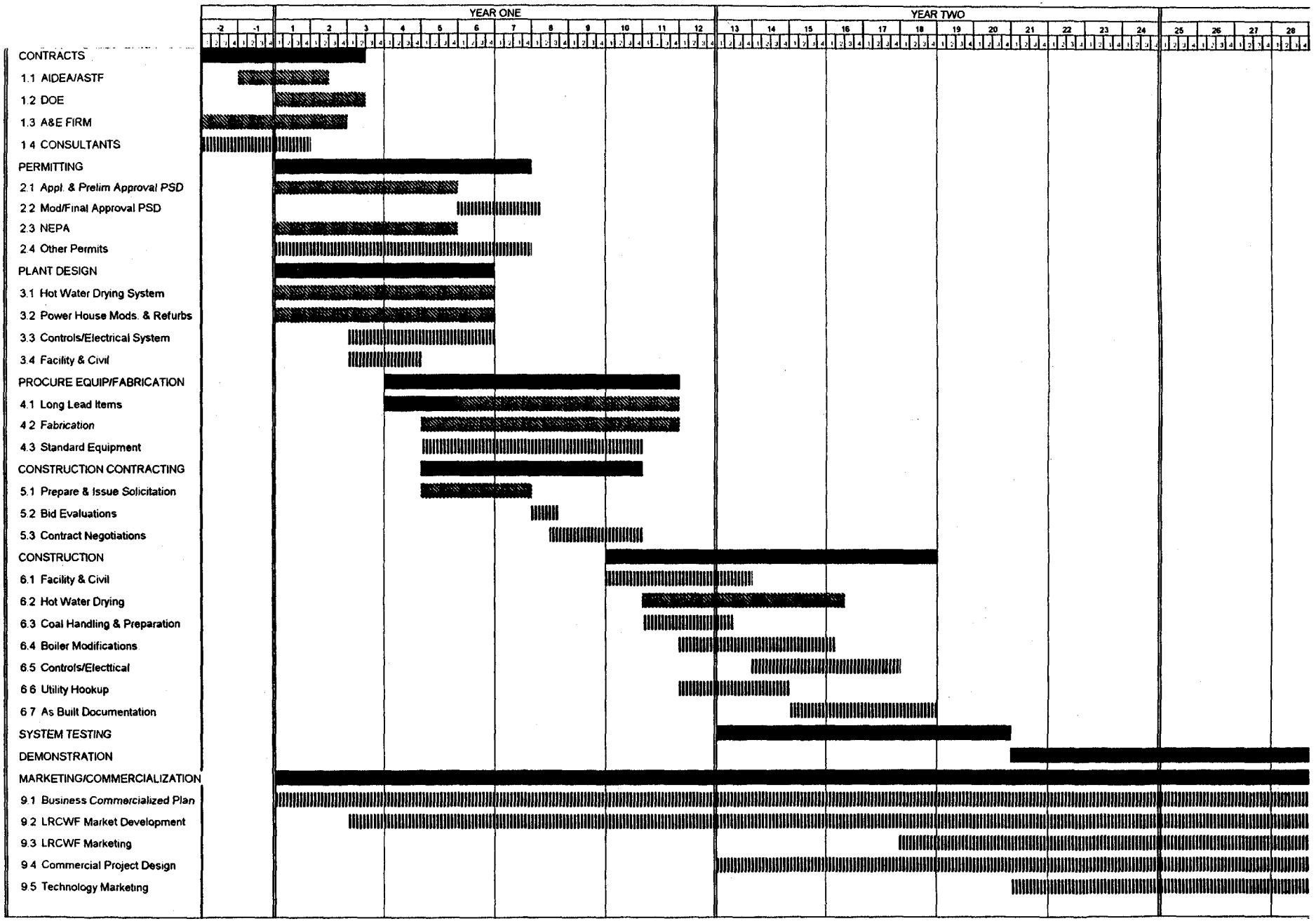
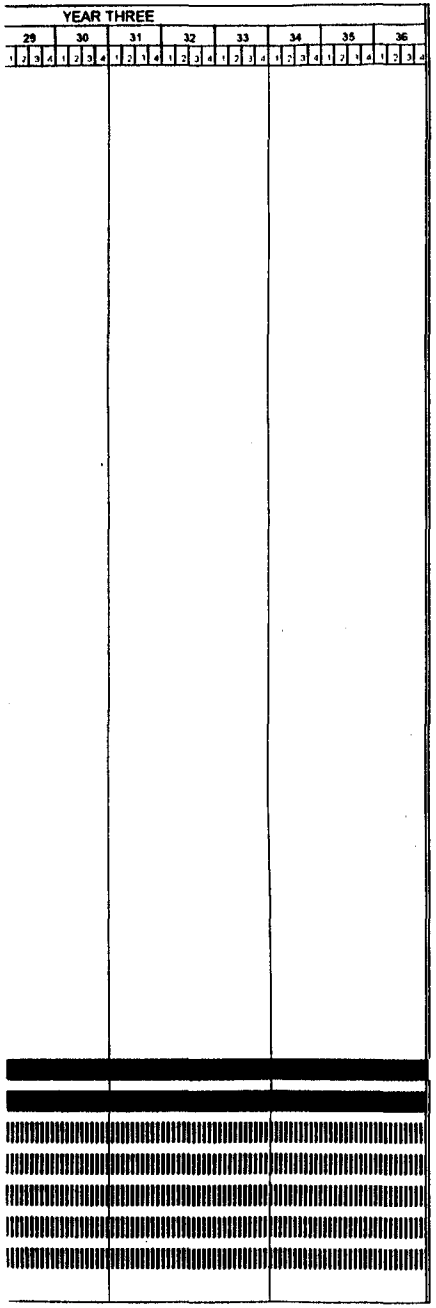


FIGURE 6.3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POWER ENGINEERS

April 25, 1995

Warrack Wilson
Alaska Coal Water Fuel, Inc.
P.O. Box 112252
Anchorage, AK 99511

Subject: 126019-01 LRCWF Evaluations

Dear Warrack:

POWER Engineers, Inc. has provided review of the process flow information, equipment selection and project cost estimate for Phase 1 of the Alaska Low-Rank Coal Water Fuel (LRCWF) Demonstration project. The data for this review was received data from the Energy and Environmental Research Center (EERC) and Alaska Coal Water Fuel, Inc. (ACWFI).

The process review for the LRCWF project involved the examination of EERC's pilot test plant and process design for the demonstration plant. A site visit to the pilot plant demonstrated how the Hot Water Drying process (HWD) was accomplished. The HWD batch process is proven through the operation of this pilot plant. Theoretically, a continuous process could be practical using a letdown system. EERC and Masoneilan personnel designed as an initial operational concept for this system, however, allowance should be made for modification and upgrade to it. The remaining equipment for the plant outside the HWD area will be based on readily available standard components.

The process design which was based on the EERC's pilot plant required various modifications to make the project commercially viable. One factor that played a significant role in the process modifications was University of Alaska, Fairbanks (UAF) involvement. By placing of the plant at the University, the project was able to utilize various facilities which would have had to be purchased. The use of existing coal handling equipment at the UAF facility eliminates the need for a substantial amount of the coal preparation equipment that a "Green Field" facility would require. The close proximity to the University's boiler and storage areas to the proposed project site (within 150 yards) allows smaller storage facilities near the project site.

The initial concept included a dual train process stream. From conversations with ACWFI personnel, it became apparent that a "no stop" process would not be necessary. Individual batch runs of the LRCWF will require the plant to be down between runs. By utilizing a single process stream we can eliminate unnecessary equipment and doubling changes and costs to the system if a equipment or process stream modification or replacement are required.

3940 Glenbrook Drive • P.O. Box 1066 • Hailey, Idaho 83333 • (208) 788-3456 • Fax: (208) 788-2082

A review of permitting issues indicates that disposal of excess water not required for the coal water fuel should not require special handling before disposal. Therefore, the need for water treatment facilities is not required.

The free supply of steam by UAF boiler simplifies the hot water drying process by eliminating the heater, storage and pumps for the Dowtherm Arrangement. A flush tank and pumps were added to the system to allow storage of the coal slurry during shutdown and maintenance periods. These modifications allow the system to be more effective on a cost and operational standpoint. POWER generated two modified PFD drawings based on EERC initial design with changes showing the steam supplied and Dowtherm HWD configurations. In addition, a general arrangement drawing was completed to show the equipment layout in the UAF's PICO building. ACWFI modified EERC's initial cost estimate on this project based on these drawings.

As for the cost estimate review, our initial evaluation of EERC's equipment selection and cost looked reasonable. The modified process design required additional quotations for various equipment such as the heat exchangers, high pressure slurry pump, ball mill, vacuum belt filter and UAF boiler upgrade. Construction allowances are relatively high due to the preliminary nature of the design. Also, a 25% contingency on the overall project is needed for plant modifications during the operational phase. These multipliers which EERC based on the Chemical Engineer's reference materials are within the range that Mean's Construction Cost Estimation Manual uses. However, due to UAF involvement in the project and modifications made to the process, ACWFI cost estimate appears reasonable for this project.

In summary, POWER Engineers, Inc. feels that the cost estimate for this project, with the design and equipment modifications, meet sound engineering and cost estimating practices. Based upon the information provided and modifications to the design and cost estimate, this project appears to have adequate allowances for a successful completion

We appreciate being of service to you on this project. If you have any questions or comments, please call me at (208) 788-0564.

Sincerely,
POWER Engineers, Inc.

Timothy D. Dunford, P.E.

TD:db
cc: File
Bill Lewis

PEI-IILY 31-282

APPENDIX 10

ALASKAN LOW-RANK COAL WATER FUEL DEMONSTRATION PROJECT

SITE VISIT EVALUATION REPORT

JANUARY 1995

For More Information Contact:

Jim Cucullu
Warrack Willson

TABLE OF CONTENTS

ALASKA LOW-RANK COAL-WATER FUEL DEMONSTRATION PROJECT - PHASE ONE

Site Visit Reports

INTRODUCTION

The purpose of visiting the three sites included in this report was to obtain sufficient information to evaluate them on a technical basis for hosting the low-coal-water fuel demonstration project. The evaluation as well as other information obtained was used by Alaska Coal-Water Fuel, Inc., to select the most appropriate site for the Alaska Low-Rank Coal-Water Fuel commercial demonstration project.

In the original proposal, the proposed site for the demonstration project was the Knik Arm Power Plant (KAPP), owned by Hobbs Industries, Inc. and formerly operated by Chugach Electric Association. The KAPP, originally coal designed, had many valuable features which would enhance the project. Some of the features included its location in the Port of Anchorage, overhead crane, rails through the facility for unloading coal, coal handling equipment, and sufficient space to install the hot-water drying and oil-designed boiler equipment as well as office and fabrication space. In addition to donating the facility to the project, Hobbs Industries, Inc. pledged a substantial amount of engineering and operating labor to the project which in total, added up to a substantial portion of the $11 million cost share Some of the major items not found at the KAPP were an oil designed boiler, waste-water treatment plant and pollution control equipment. In addition to lacking some major equipment items, there were two other hurdles which had to be over come, these included, getting the facility permitted in a non attainment area for both CO and PM-10, as well as rezoning of the property. In March of 1994, Hobbs Industries, Inc. fell on hard economic times and declared bankruptcy. Because of these and other unfortunate circumstances, the former Low-Rank Coal-Water Fuel Consortium, elected to seek an alternative site to host the demonstration project.

The following is a summary of findings during the site visits at Seward, Tyonek and University of Alaska Fairbanks (UAF).

FAIRBANKS - UNIVERSITY OF ALASKA FAIRBANKS

A site visit was conducted at the University of Alaska Fairbanks (UAF) power plant by Jim Cucullu representing POWER Engineers, Inc. and Warrack Willson with EERC/Alaska Coal-Water Fuel, Inc., accompanied by Dan Walsh Professor of Mineral Engineering at UAF. The site visit arranged by Mr. Walsh, conducted on September 13, 1994, began at a meeting with Robert Trent, Dean of Mineral Engineering, and continued

with tours of the Polar Ice Coring building, (PICO), and the University's coal/oil-fired power and heat plant.

Dean Trent was very supportive and confirmed the school's interest in vigorously assisting the project. He felt confident that the PICO building, built to store equipment used for polar ice coring operations, could be made available in support of the project for the hot-water drying (HWD) and low-rank coal-water fuel (LRCWF) production facility. He also encouraged our meeting with the Director of Utilities for UAF, Mr. Gerald England. Dean Trent felt that UAF had a lot to offer the project and that a commercial scale LRCWF demonstration facility would be a valuable asset to the University, especially the Mineral Industry Research Lab.

In follow-up meetings with Dan Walsh, and subsequent correspondence with Mr. Michael Rice, Vice Chancellor, their support for the project continued to grow. On behalf of UAF, Mr. Rice pledged a commitment to the project in the form of providing, steam and electrical power, as well as a subsidized lease on the PICO building. UAF committed a high level of cooperation by its staff towards the successful completion of the project.

Findings

Transportation/Access

Access to the Fairbanks area is not a problem, having at least three major airlines with regularly scheduled flights throughout the week. Fairbanks is situated at the northern most end of the Alaska Railroad Corporations rail line with both passenger and freight service. Additionally, the Alaska highway system, which is maintained throughout the year, ties Fairbanks to Anchorage as well as other port communities, such as Valdez and Seward.

Coal Delivery

Usibelli coal is currently transported via truck and rail to the Fairbanks area. UAF receives their coal by truck under a current contract and it is likely that the same contract hauler could transport Usibelli coal for the project.

Beluga coal will cost substantially more delivered to Fairbanks than it would at the other sites because of the long distance from tide water to the UAF site. However there may be some cost benefit if coal shipments could be arranged with back hauls of empty coal cars from Seward to Healy and then trucked or railed to Fairbanks. In addition, there may be merit in approaching the Alaska Railroad Corporation to provide shipping as a cost share to the project, since it is in the States best interest to encourage this type of economic development.

Infrastructure

The power plant tour included a meeting with Mr. Gerald England who gave an overview of the plant's capacity and various loads throughout the year, as well as anticipated load growth. Mr. England expressed a great deal of interest and was very helpful in providing information on equipment and operating data.

The facility consists of four Zurn manufactured boilers, two stoker-fed coal-fired boilers, and two oil-fired units. The two oil-fired units, which were of primary interest, are each rated at 100k/lbs of steam per hour with operating temperatures of 730 degrees F and operating pressures of 600 PSI. These units are identified as units #3, installed in the mid-1970's, and #4 installed in the mid 1980's

Each unit has 6 soot blowers, dual burner nozzles and Zurn burner management systems. Unit #3 is equipped with Bailey analog controls and has no heat recovery equipment incorporated in its design. Unit #4 is integrated in the plants Bailey Net 90 control system and has an air preheater. Mr. England provided a contact at ZURN Energy Division, Mr. Bill Gloekler, in Erie PA, who has provided blue prints, cost estimates for CWF burner and ideas on how to model the derating when switching from oil to CWF.

The power plant building is fairly tightly designed. There are two oil-fired units on opposite ends of the building, two coal-fired units in the middle, one 3 MW and two 1.5 MW steam turbines towards the front of the building.

The power plant originally received coal by rail, but found it more economical to receive coal by truck and recently signed a new contract for transporting their coal. These same trucks could haul coal directly to the hot-water drying (HWD) facility with no need for additional unloading facilities. The coal is received into two hoppers at approximately 2" minus. Coal is then fed to a crusher, which sizes the product to 3/4" minus, and then on to inside storage bins. During the visit Mr. England mentioned because of the quantity of fines in the delivered coal, approximately 20% to 25%, plus the additional fines generated during the crushing process, the capacity of the plant is reduced. This is primarily due to excessive particulate, caused by the fines, which limit the capacity of the bag house to handle the boilers flue gas at their rated capacity. He also indicated that when they run the plant with minimal fines, the capacity increases by about 15%.

The above situation brings up a couple of possible options which may warrant further investigation. One possibility is that the coal to be used in the demonstration project could go through the sizing operation and then fines, minus 1/4", could be separated and used as feed to the HWD plant. If the fines are removed following crushing, they could supply all of the coal for the HWD process and eliminate the need for a separate coal preparation facility. However, a ball mill would still be required to further reduce the size of the coal prior to or directly following the HWD system. In addition, Beluga coal would have to be crushed before it goes through the ball mill, to at least 1/2".

With UAF's current fuel consumption of 60,000 TPY of coal, approximately 20% fines as received or 12,000 TPY, plus fines generated from crushing, estimated at 10% to 15% by Mr. England, would conservatively yield approximately 20,000 TPY of fines to the project. These tonnage's could be as high as 30,000 TPY. In considering this option, a closer look at space availability, to separate fines, needs to be taken, because of confined space between the crusher and bucket elevators which transport the coal to the storage bins within the power plant.

Another option is to separate the fines prior to UAF's sizing process. This would still enhance the performance of the boiler plant and yield approximately 12,000 TPY of usable fines for the HWD process. Separating fines prior to UAF's crushing circuit may create a dust problem if the operation has to be done outside. This should be taken into consideration in the permitting process as it could have some impact on the air quality permit thus triggering the addition of a particulate control system. It is also important to note that the ability to economically make use of the excess fines would require an analysis of the coal fines to determine the characteristics and percentage of ash.

Both steam and electricity would be available for the project from the UAF power plant. In the case of process steam, the HWD process will require approximately 30,000 lbs per hour of process steam for the LRCWF heat exchanger plus additional heat for outside storage of LRCWF. This steam could be delivered through the existing utilidor, approximately 5' wide x 7' high. Electricity required for the project is approximately 1 MW for startup and 600 kW during operation.

Other utilities available at the site include sewer, water and solid waste disposal. These utilities, as well as steam and electricity, will be provided to the project as in-kind contributions

Existing Buildings

The PICO building has a number of valuable characteristics for use in the demonstration project. Divided into two parts, the warehouse/shop portion of the building has approximate dimensions of 75' x 75' x 24', which is more than adequate for the coal preparation and HWD process. The only other upgrade of the facility that would be required, is insulation and heating, since the warehouse has neither.

The balance of the building consists of two stories with laboratory, office space and showers. This area of the building is completely insulated and heated. The coal laboratory area used by the Mineral Industry Research Laboratory (MIRL), has a variety of equipment in place which would be very useful in conducting necessary analysis throughout the project. Some of the equipment present and available for the project, include an autoclave, complete coal sample grinding equipment, several high capacity exhaust hoods, sand bed reactor rheology instruments.

The office and lab areas also include a room ideally designed and situated to be a control room. This room has a large window allowing visual contact with the HWD and coal prep equipment and personnel, and is located directly between the laboratory area and warehouse area. There is additional office space located on the first floor, as well as shower areas. The second floor is still unfinished, but requires little more than ceiling tiles and walls to complete it. In fact, it is desirable in its present state to the extent that it can be laid out in the most effective way without remodeling.

Perhaps the most desirable aspect of the building is its proximity to the power plant, approximately 200 yards. There is sufficient yard space for storage of the raw coal and tanks for LRCWF storage.

Personnel

The Fairbanks community has served the oil and mining industry for many years, and have qualified personnel available to serve the project. In addition, UAF, through MIRL and UAF Utilities, have staff and students with experience in CWF technology and coal/oil-fired utility systems design, operation and maintenance.

The rental market for residential housing in the Fairbanks area is fairly tight during the summer months with vacancy rates going up in the winter months. Depending on when the funding becomes available will determine the ease of finding housing. However there is adequate housing on a long-term basis.

Personnel have a wide range of entertainment available including both winter and summer outdoor recreation, as well as indoor recreation. Fairbanks is a well developed community with most of the conveniences found in metropolitan areas, such as supermarkets, convenience stores, movies, live-entertainment, as well as division 1 college hockey. There is also all of the essential service such as hospitals, schools, banks, etc. available and convenient to the potential host site.

Local Support

Fairbanks is viewed as a very pro-development community and would likely enthusiastically support this project. In discussions with UAF staff, at various levels, there is strong support for the project. UAF views this project and the technology as something that can be beneficial to the future operation of their power plant by providing an alternative fuel and as a valuable training facility for engineering students and faculty.

Permitability

As indicated in the permitting study, Fairbanks has the most to offer with regards to permitability. The power plant has existing air quality permits, which could provide adequate flexibility with only minor amendments, to allow the burning of LRCWF. UAF's

current agreement for waste-water discharge into the city of Fairbanks' waste-water treatment system is a major benefit not only from the standpoint of bi-passing additional permits, but also eliminating the need for major equipment purchases and installation. Since the project will be within UAF's existing buildings with minor modifications, the plan review will be conducted by the university engineering department rather than the states Fire Marshall, which should expedite the process. Other permits not required at the UAF site are the coastal zone review and solid-waste disposal permit. Solid-waste, including hazardous wastes generated during the project, assuming they are not excessive, would be handled by the University.

TYONEK - NORTH FORELANDS

The Tyonek site visit was conducted on July 20, 1994, arranged by Mr. Thomas Harris, CEO of Tyonek Native Corporation, (TNC). A meeting was held one week prior to the site visit in which Mr. Harris and Mr. Lou Nelson, controller for TNC, explained the layout of the North Forelands area as well as the remaining facilities. During this meeting Mr. Harris explained that there was interest by others in using part of the remaining structures and the dock for various commercial operations.

Participants in the site visit included Mr. Harris and Mr. Nelson, TNC; Mr. Warrack Willson, EERC/Alaska Coal-Water Fuel, Inc.; Mr. Jim Cucullu representing Power Engineers, Inc.; Mr. Roger Kolb, Energy Pacific Corp.; Mr. Don Standifer, former TNC President, and Mr. Peter Merryman.

Findings

Transportation/Access

Tyonek is serviced by a gravel airstrip which is well-maintained year-round by the Tyonek Village Corporation. The airstrip, approximately one mile long, appeared to be in excellent condition and capable of handling many twin engine propeller driven aircraft.

The airstrip does occasionally have fog problems, however this problem rarely restricts flights into the area for the entire day. Air taxi pilots that service the area daily, say it is not very common to be weathered out of Tyonek for days at a time.

Tyonek also has ocean access, with a dock designed to handle 34' draft vessels at Mean Low water. Handy size vessels can be handled at the dock, however, there is a problem with silt buildup on the southwest side of the vessel during outgoing tides. This problem can likely be avoided if the vessel departs on a high tide, or the dock is dredged. With test shipments not exceeding 10,000 tons, the Tyonek dock will be more than adequate for the project. Equipment for the project would be transferred by barge, which would be landed on the beach for unloading and would not be affected by silt buildup problems at the dock. This type of operation has been successfully completed in the past with the oil industry.

Coal Delivery

Shipping Usibelli coal to the Tyonek site will be fairly expensive since the area is not serviced by the Alaska Railroad or highway system. Estimates to deliver coal from Seward by barge is approximately $5 per ton, or $150,000 for 30,000 tons, from Anderson tug and barge. This price does not include transportation from Healy to Seward, ship loading at Seward, or unloading at Tyonek, however, it does include standby time at both sites. Each barge load would be approximately 3000 tons and would require shipments to be completed during the summer months because of ice flows in the upper Cook Inlet area and the difficulty it presents to Anderson's tugs and barges.

Its proximity to the Beluga coal reserves, provide Tyonek with the least expensive access to Beluga coal. The site is within 20 miles of the area that test coals would be mined. It was also pointed out during the site visit that outcroppings of coal on the beach were within a few miles of the site. However there has been no detailed investigation into the disposition of these resources, such as permitability, resource ownership and recoverable resources.

The Tyonek site also lends itself well to test shipments of coal from other sources outside of Alaska, as well as sending test shipments of LRCWF out side of Alaska because of its tide water access.

Infrastructure

The Tyonek site, which was previously used for a wood chipping operation, has some potentially useful facilities still remaining. Existing infrastructure includes a dock capable of receiving barges and some larger vessels. The dock is equipped with a series of pipe saddles which previously held a pneumatic wood chip ship loading pipe and can be made to handle a LRCWF pipeline. On-site fuel storage consists of seven tanks, each 20,000 gal, horizontally mounted on concrete foundations, and one approximately 300,000 gal fuel storage tank mounted on a concrete slab. The tank farm is linked by a 3" pipeline which runs underground to the beach for fueling.

Electricity to the site is provided through a Chugach Electric Association (CEA) substation which should provide adequate power for the project according to Mr. Dan Rogers of CEA. The substation is 3.75 Mva, with a 24.9 kv feed and 12 kv service. The village consumes approximately 600 kW, that leaves more than adequate capacity to handle the power required for the demonstration project. It was also mentioned by Mr. Rogers that the substation was due to be rebuilt in the not to distant future.

Existing Buildings

Buildings left over from the wood chipping operation were vandalized and damaged by heavy snow loads. One building in particular, approximately 50' wide x 75' long x 30'

high, would make an ideal location for the HWD plant. Due to the damaged it will require substantial repairs, including new skin, insulation, wiring and some structural repairs. However, even with the extensive repairs necessary to house the HWD plant, it would likely still be more economical then building a new facility, because of permits, designs, new foundations, etc.

Tyonek Native Corporation has a 100 man camp within two miles of the site, which has a DEC approved water treatment plant, a heavy equipment shop and light equipment shop. In addition, the camp has its own runway, however, it is not anticipated that the runway would be maintained for this project alone.

Personnel

Tyonek is a small community and does not have a large amount of skilled labor available for operation and maintenance during the demonstration project. There does however appear to be interest in gaining the technical expertise required to operate a commercial scale facility. In addition, there is at least one local contractor in the area that is experienced in civil construction projects gained through working with the oil industry.

There are numerous outdoor recreation opportunities available locally, however there is no shopping or indoor recreation to speak of available, including essential services, such as grocery stores, hospitals, etc. The Tyonek camp would provide adequate housing for all personnel at the project, in the form of multifamily apartments, which appear from the outside to be in good shape.

Local Support

In discussions with TNC representatives as well as some of the residents, there appears to be support for a project of this type that could bring jobs, training and revenue to the community. Because of their native status, the community of Tyonek and TNC could also bring substantial political support to the project, as well as open alternative funding sources, such as those outlined under the Indian Energy program of the Energy Policy Act of 1992.

Permitability

Air permitting in the Tyonek area should not pose a problem, since it is an attainment area and not in a class 1 area. There are however several permits which could require a significant amount of time depending on how they are viewed by the state agencies. Some of these permits include waste water discharge permit and solid waste disposal permit. In addition, the Tyonek site would require a Coastal Zone Review.

Other Considerations

Because the site was used previously by others, a closer look may be required to insure that there are no contaminated soils or other hazardous materials remaining from previous operators. The site had a substantial amount of what appeared to be new brush growth, which made it difficult to identify any contaminated soils on the surface or discarded containers which may have hazardous residue. However, no signs of contaminated soils were noted during our site visit.

SEWARD - SAWMILL

The Seward site visit was conducted on May 12, 1994. Parties involved with the site visit included Mr. David Eberle, AIDEA, Mr. Warrack Willson, EERC/Alaska Coal-Water Fuel, Inc., Mr. Jim Cucullu representing Power Engineers, Inc. and Mr. Roger Kolb, Energy Pacific Corporation. Meetings were held with the city, Mr. Tyler Jones, City Manager and Mr. Mike Yenez, Asst. City Manager.

Findings

Transportation/Access

Seward's primary means of access is by the Seward Highway, which runs between Seward and Anchorage, and by Ocean for both freight and passenger service. The highway system is maintained throughout the year and, with the exception of occasional winter avalanches, provides trouble free access. The port is capable of handling panamax class vessels and is ice-free throughout the year. Seward also has scheduled air taxi and bus service

Coal Delivery

Usibelli coal to the Seward site is not a problem since nearly 750,000 tpy are already shipped on a regular basis by via Alaska Railroad system.

Beluga coal can be barged into Seward through Resurrection bay which is an ice free port year-round. Seward is also ideally situated to export test shipments of LRCWF and receive other coals from outside of Alaska.

Infrastructure

The former Seward Sawmill is somewhat limited in space to store coal because of large quantities of wood-waste generated from the previous owner and still stored on-site. There is however, excess capacity at the Sun Eel terminal for coal storage, if an agreement could be reached with the operator for use of the land.

The mill facility currently has the capability of getting electricity from two sources, the city owned utility and diesel generation installed at the mill. The utilities service to the mill site is at 12470 volts, with a 277/480 transformer. Diesel generation at the mill consists of three 1.2 MW Detroit Diesel generators, and one caterpillar generator rated at approximately 600 kW. It is not anticipated that the diesel engine would be used to generate power for the project because of the high expense in operating as well as difficulty in permitting them.

The mill is equipped with on-site fuel storage tanks, capacity unknown, used for fuel oil storage. In addition, the power plant has approximately 10 tons of crane capacity which travels the full length of the power plant and is rail mounted.

Existing Buildings

The power plant building is approximately 50' x 100'. One half of the facility is occupied by switch gear and the three Detroit Diesel generator sets. The other half consists of two incomplete foundations with rebarr stubbed up and originally designed to hold two 3MW steam turbines. The unoccupied half of the plant should be adequate for housing the HWD equipment with minor modifications to a small area of the roof to accommodate the reactor vessels. The building also has a control room overlooking the operating floor which should provide ample room for additional controls and monitoring equipment.

Personnel

Seward is a small rural community that has been very successful in developing a diverse economy. The community offers personnel experienced in various types of construction and operations of industrial facilities. Some indication of the capabilities within the Seward community is the diverse businesses that have developed there, such as the Seward Saw Mill, Sun Eel coal terminal and the Ship repair facility. In addition, Seward has a very successful vocational & technical training program which brings in students from around the state.

There is year-round indoor and outdoor activities available . During the summer Seward is major center for sport fishing charters and tourism to the Kenai Fjords as well as Harding Ice Field. There are numerous shops, restaurants, and grocery stores as well as medical facilities. Although housing is available, it is a fairly tight market and fluctuates with the tourist seasons.

Local Support

Seward is a somewhat divided community with regards to how economic development is achieved, whether through tourism or industrial development. In discussions with city officials, the community does however, seem to be in general agreement as to where these developments will take place within the community. Overall, the Seward community

would likely support the project, particularly as a means to replace lost jobs caused by the recent shut-down of the saw mill.

Permitability

Air quality permitting issues surrounding the Seward host site are more complex then either Tyonek or Fairbanks. Because of complex terrain surrounding the site, primarily a high bluff adjacent to the plant, which does not allow emissions to evenly disburse, the former mill was rarely, if ever, able to operate in compliance with their air quality permit. This is not to say that the demonstration project could not comply, but there would likely be extensive modeling associated with the permitting process as well as more stringent operating guidelines.

Other Considerations

The future of the mill is currently unknown. Although it was recently shutdown for economic reasons, there is speculation that another operator is looking at buying the mill. However, as explained by former mill person, the economic viability is largely dependent on being able to access logs closer to the mill operation, which to date, they have been unsuccessful in doing. Because of this, there is no single group or entity with which Alaska Coal-Water Fuel, Inc. can develop a site utilization agreement. Having changed ownership and been closed several times over the last five years, makes it difficult to develop a long-term agreement for the Seward site.