10.0 EXISTING SOCIAL AND ECONOMIC ENVIRONMENT

WEST COOK INLET DEVELOPMENT

Employment Activities and Population

Currently, employment is created by three commercial developments on the west side of Cook Inlet. These are the crude oil processing and transportation facilities that serve offshore fields in Cook Inlet, the Kodiak Lumber Mills (KLM) Tyonek Timber Division chip mill, and the Chugach Electric Association (CEA) gas-fired generator station at the Beluga gas field. Total regular on-site employment from these sources is now about 100, although seasonal construction and maintenance work can increase the work force to two or three times that number.

There is only a minor residential population outside the Village of Tyonek, mostly at the Three Mile Creek subdivision near the CEA power plant and near Granite Point.

In addition to employment associated with the above commercial development, a few nonlocal fishermen work commercial set net sites along the west Cook Inlet coast during the six-week salmon season in midsummer. Also, occasional geophysical work and exploratory drilling in the area create sporadic local employment.

Granite Point and Trading Bay are landfall sites for submarine crude oil pipelines that serve several production platforms in Cook Inlet. At these sites the crude oil undergoes initial processing and metering. It is then transported by pipeline to the marine terminal at Drift River where it is stored and loaded aboard tankers for transport to U.S. refineries. The two processing plants and the marine terminal require a total of about 55 operators. However, summer maintenance and repair work involve additional temporary labor at the sites. The work force lives in dormitories and rotates regularly

between the facilities and Anchorage. Families do not live at the processing plants or the terminal.

The KLM chip mill was built in 1975 on land leased from the Tyonek Indians to process a large volume of timber infested with spruce bark beetle. At the height of operations, the mill employed 200 people. Currently, however, it is operating year-round with fewer than 20 people because of a decline in the Japanese chip market. The work force lives in dormitory and single-family housing at the plant site. It does not rotate at regular intervals to Anchorage or Kenai.

The Chugach Electric Association operates a large natural gas-fired generation facility approximately 16 miles from the Village of Tyonek. This facility provides the base load generating capacity for the Anchorage area. It has a regular operations and maintenance work force of approximately 30 people, but construction and special maintenance and repair work cause significant fluctuation in the local labor force (the dining room capacity is approximately 250).

Land Ownership, Status and Use Restrictions

Land ownership in Alaska is complicated and continuing to evolve. Land conveyances under the Alaska Native Claims Settlement Act (ANCSA) and the Statehood Act are not yet complete; and disputes remain over land rights of the state, boroughs and Natives. However, these issues have been resolved in the vicinity of the proposed project.

Since ownership is integral with land use development rights, land use planning questions are also discussed in this section. The Department of Natural Resources, Planning Section, has the authority to be the lead state agency in preparing an overall land use plan for the area. The Kenai Peninsula Borough likely would assist in developing the plan and policies to guide specific actions proposed by

industry, particularly in regard to land it owns in the vicinity of the proposed plant and town sites. The land management policies of CIRI will also be of significant influence on the area because of its substantial land holding in and adjacent to the project area.

Land Ownership and Status

Major land holdings in the area include ownership of both the surface and subsurface estates. In some cases both rights are held by the same owner and in others, by different owners. The latter case produces potential conflicts where revenues obtained from sale of mining rights are not conferred to owners of surface rights.

Key ownerships in the area are vested in the following state and private organizations:

State of Alaska
Cook Inlet Region, Incorporated
Tyonek Native Corporation
Kenai Peninsula Borough

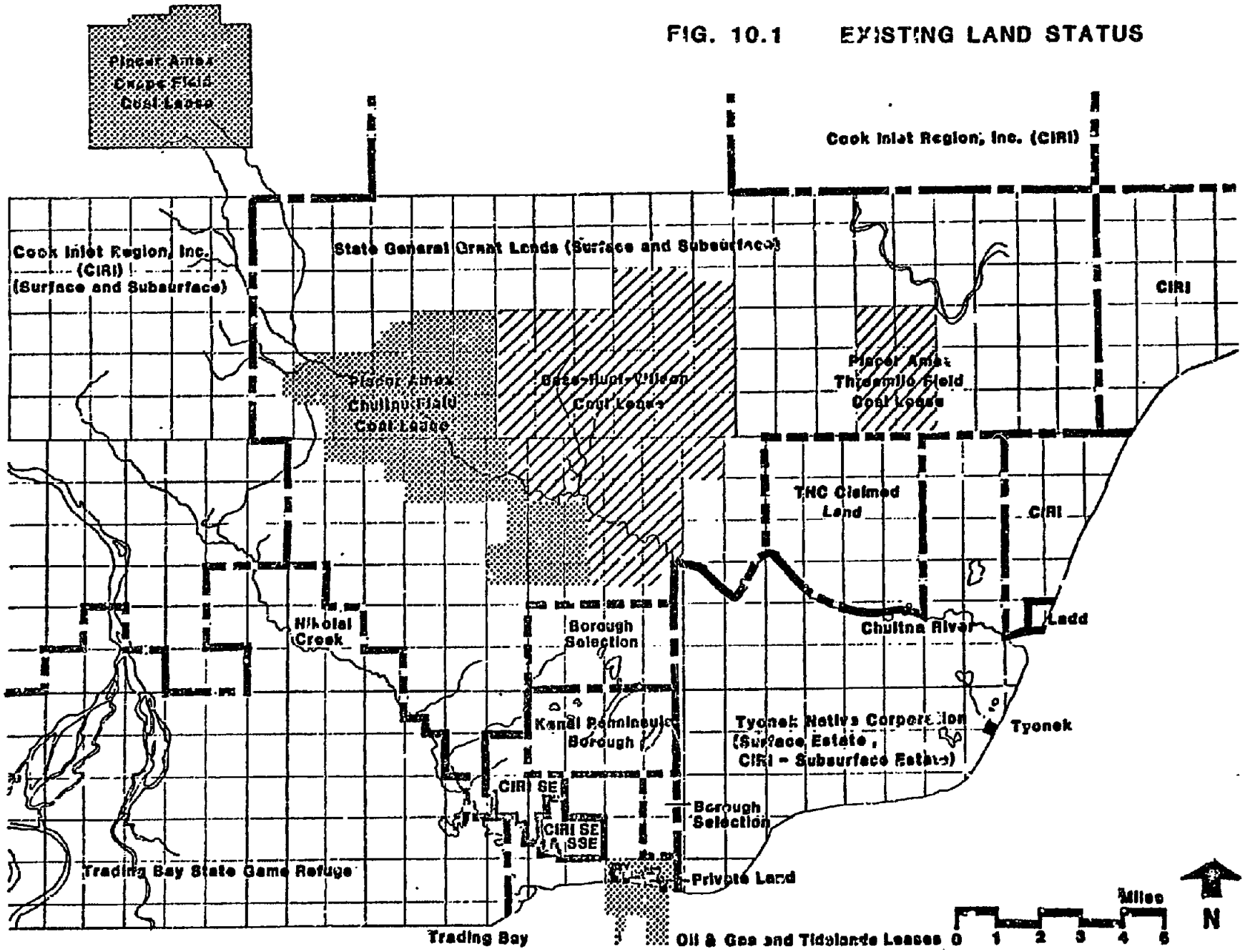
Other smaller holdings such as Native Allotments, the Native Village of Tyonek, Inc., and other Native lands subject to reconveyance under Section 14(c) of ANCSA are not discussed here.

Blocks of land owned by these organizations are shown in Figure 10.1, along with subsurface mining leases.

° State of Alaska

A substantial portion of the Beluga coal district is patented state land, excluding the Capps Field area that would be developed by this proposal. These lands were transferred by the federal government under the 1958 Statehood Act (General Grant Lands), and the 1956 Mental Health Enabling Act (Mental Health Lands,

FIG. 10.1 EXISTING LAND STATUS



providing a State General Fund revenue base on which to meet needs of the Mental Health Program). In 1978 the state redesignated Mental Health Lands to General Grant Lands, to allow municipalities to select land, of which not less than 30% is to be disposed for private ownership. This redesignation does not affect any prior leases, permits, or easements. The redesignation also allows the state to dispose of lands to private parties more easily than was possible under its status as Mental Health Lands. The third major category of state lands on the west edge of the district is the Trading Bay State Game Refuge, established in 1976.

The state Department of Natural Resources (DNR) classifies General Grant Lands and tidelands in this vicinity into one of four categories: Resource Management Lands, Industrial Lands, Reserved Use Lands, and Material Lands. This system describes a capacity for use or multiple use which can be modified for the public interest. Once lands have been classified, they may be disposed (by lease, sale, grant or exchange) to municipalities or private parties.

Resource Management Lands

Most of the state land in the Beluga coal district is classified as Resource Management Lands, portions of which are in the following uses: coal prospecting and leasing, mining permits, timber sales, and oil and gas leasing. Two Placer Amex leases and the Bass-Hunt-Wilson (BHW) lease are located on Resource Management Lands (the Capps Field is located on land owned by CIRI).

Kodiak Lumber Mills is authorized to harvest timber from 223,000 acres until August 1983. About 6 million board feet of spruce-beetle-infested trees are to be harvested. Numerous primary and secondary logging roads have been built on state, CIRI, and TNC land in the area in association with these activities under authority of 20-year leases between Kodiak Lumber Mills, CIRI, and

Tyonek Native Corporation and the state. No public rights-of-way are associated with these logging roads.

The Trading Bay State Game Refuge is a separate category from Resource Management Lands. Established by the state legislature in 1976, this refuge and the Susitna Flats Game Refuge east of the Beluga coal district are managed by the state Department of Fish and Game (DF&G). Pre-existing rights-of-way for roads and pipelines are excluded from the refuges, and will become part of the refuges when permits or applications expire.

° Industrial Lands

Specific facilities such as the CEA power plant near Tyonek are operated as Industrial Lands, subject to Kenai Peninsula Borough building and zoning codes. These sites may only be used for the designated purposes. Most of Sections 27 through 30, T11N R12W, including tidelands along Trading Bay are also classified as Industrial Lands.

° Reserved Use Lands

Reserved Use Lands are set aside for such public uses as expansion of town sites and new town sites. Small sites in the Beluga area are being used for creek access, barge landing sites (e.g., Beluga River), and other DF&G requests.

° Material Lands

Material Lands are administered by the DNR to sell sand, gravel and other materials located on state-owned tidelands and uplands. The Department of Natural Resources can influence the location of coal port and transshipment facilities through its ownership of tidelands. The state land in the Beluga area which was transferred to CIRI or TNC includes sand, gravel and other materials as part of their estate

The DNR will have an important role in guiding coal-related development because of its management responsibilities for extensive state holdings in the area. In addition to its aforementioned control of tidelands and surface minerals, DNR also regulates temporary access and rights-of-way across state land and the appropriation and use of surface water and groundwater. It will ultimately prepare a land use plan to guide the department in reclassifying state land for the proposed project.

° Cook Inlet Region, Inc. (CIRI)

The regional Native corporation holds both surface and subsurface title to much of the inland area of the Beluga coal district. The Placer Amex Capps lease is within this area. CIRI also owns approximately 3,000 acres adjoining and including a portion of the proposed plant site. As a profit-oriented corporation, CIRI is encouraging coal development in the area. It was granted a 300-foot wide, unspecified location right-of-way easement to connect its holdings in the Capps Field to the beach at the eastern edge of Trading Bay. The corporation also holds subsurface rights to the land whose surface rights are held by the Tyonek Native Corporation.

Revenues from subsurface development rights are distributed to stockholders of CIRI, TNC, and other Native corporations.

° Tyonek Native Corporation (TNC)

Tyonek Native Corporation, the village corporation created under ANCSA, has surface title to the 27,000-acre former Moquawkie Indian Reservation, as well as other lands north of the Chuitna River. Its claim to about 11 sections of state land north and west of the Chuitna River (known as the Moquawkie Reserve Lands) is in litigation.

Potential developers in the area negotiate with TNC for surface use and with CIRI for subsurface use of the TNC lands. TNC has leased land to Kodiak Lumber Mills for the chip mill.

Tyonek Native Corporation is opposed to rights-of-way and easements across its lands (DCED - Land Tenure, 1978). After passage of the ANCSA in 1971, the village corporation attempted to obtain title to its former Moquawkie Reservation lands, but objected to the number of public easements proposed by the federal government. Easements are discussed later in this section under Transportation and Power Infrastructure.

- Kenai Peninsula Borough

The borough owns eight sections of land that include most of Congahbuna Lake (with the exception of State Special Use Lands immediately around the lake, and a smaller lake to the east). The proposed construction camp site and a portion of the proposed transportation corridor are located on borough land. This area also has been considered as a possible alternative town site for a permanent community. The borough has not yet developed policies on lease of its land for industrial or community development (Battelle, 1979).

Land Development Planning Authority

In addition to the management responsibilities associated with land ownership described above, other governmental and private corporations have jurisdiction over land use in the area. This section discusses these responsibilities with particular reference to control of land use and transportation access.

Agencies and organizations which will guide development in the Beluga coal district, in addition to those discussed above include:

Governor's Coal Policy Group
State Beluga Interagency Task Force
Kenai Peninsula Borough
Village of Tyonek, Inc.

° Governor's Coal Policy Group

This cabinet-level group will provide the governor's office with recommendations in three areas: possible royalty and severance taxes on mining (none exist at present); state response to industry requests to provide infrastructure; and land reclamation. The governor will review coal policies with industry before adoption. Legislation may not be required. For example, the Alaska Industrial Development Authority may be a logical state instrument for provision of certain infrastructure. This public corporation assists in providing low-interest loans for industrial projects.

° Beluga Interagency Task Force

This technical group is responsible for assisting the governor's policy group on energy development in the Beluga area. At present it is primarily an interagency informational forum. It is chaired by the Department of Commerce and Economic Development (supported by its own Division of Energy and Power Development) and includes departments of Environmental Conservation, Natural Resources, Community and Regional Affairs, and Fish and Game, as well as the Office of the Governor Division of Policy Development and Planning (DPDP). The Department of Community and Regional Affairs will address issues of public facilities and services with respect to possible town site development.

° Kenai Peninsula Borough

Overall planning and zoning responsibility for the Beluga area rests with the Kenai Peninsula Borough. Although no specific

land use plan has been developed, its Draft Coastal Management Plan (September 1978) proposes a special management district and recommendations for the area. Development within this district, or Area Meriting Special Attention (AMSA), could be governed by a comprehensive development program. The proposed program would be coordinated with state and other agencies and approved by the Alaska Office of Coastal Management. At this time, however, the status of the coastal development planning for the borough is in doubt. The borough assembly adopted a resolution to rescind the state act on which the plan is based, and there is no apparent schedule for finalization of the draft plan.

Eventually, borough involvement would include reviewing plans for town site development including zoning, subdivisions, schools, solid waste and other permits. Only subdivision review is now required in the Beluga area, entirely designated as "unrestricted" use in its Comprehensive Plan. The Tyonek Village Council believes borough planning, zoning and subdivision authority does not extend over any activities in the vicinity of its land (Battelle, 1979).

- Tyonek Village Council (Native Village of Tyonek, Inc.)

The village tribal council is the federally chartered local government of Tyonek. Its influence over development on Native lands, however, extends beyond the village itself.

With passage of ANCSA, the Moquawkie Indian Reservation was extinguished. Tyonek Native Corporation now has surface rights and Cook Inlet Region, Inc. has subsurface rights within the former reservation. Generally, the council represents residents of the village when they feel that policies of TNC and CIRI don't necessarily represent the interests of the people of Tyonek. In particular, the village council believes it still can control access to lands within the former reservation which TNC and CIRI might

want to see developed for profit. Regardless of legal authority, TNC has deferred to the village council on local land management questions, particularly in the immediate vicinity of the village. Additional discussions of community governance, life-style and attitudes on industrial development are provided later in this section under TYONEK VILLAGE.

Transportation and Power Infrastructure

Some existing roads in the area would be improved to serve a portion of the project, with some extensions required to the mine and dock locations. The existing airstrip at Granite Point probably would not be used except during very early stages of project start-up. The existing KLM chip mill dock at the North Foreland is too distant to conveniently receive heavy cargo, and probably would not be available for general use.

° Existing Roads and Easements

A network of gravel-surface logging roads crisscrosses the area between the Capps Glacier and the coast. Of the approximately 100 miles of primary and secondary roads, the main logging roads extend about 16 miles northwest of Congahbuna Lake, to within eight miles of the Capps Field (Figure 10.2).

These roads were built to serve KLM timber harvest agreements. No public right-of-way is allowed on these roads. Agreements exist between KLM and the state for use of logging roads on state land west of TNC land. The timber harvest agreements on TNC land expire in 1983, when timber harvests are expected to terminate altogether (DCED - Transportation, 1978).

A 27½-mile, 300-foot wide unspecified location transportation corridor easement between the Capps Field and the eastern edge of Trading Bay has been granted by the State Department of Natural

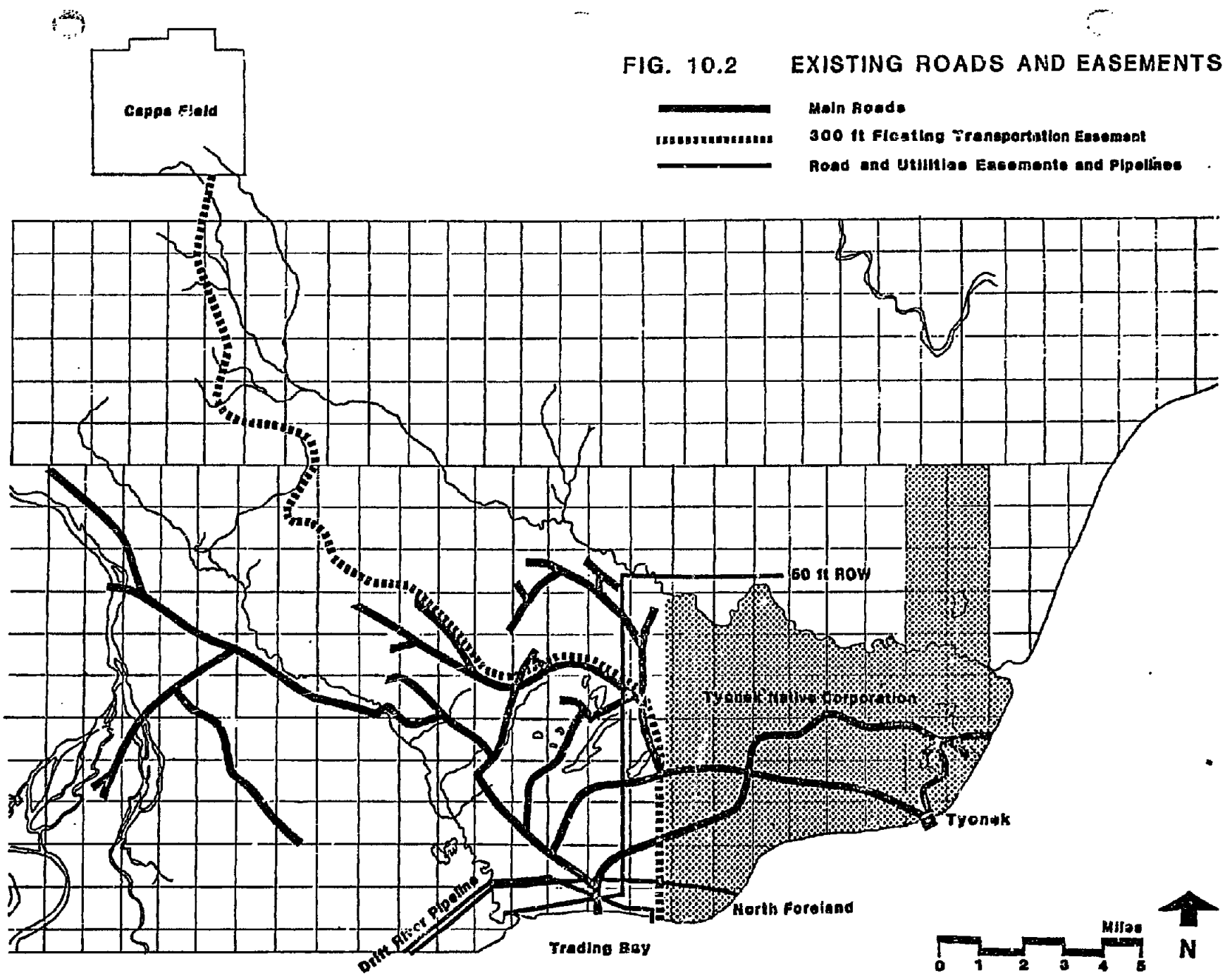


FIG. 10.2 EXISTING ROADS AND EASEMENTS
Main Roads
300 ft Floating Transportation Easement
Road and Utilities Easements and Pipelines
Cappa Field
60 ft ROW
Tyonek Native Corporation
Tyonek
North Foreland
Trading Bay
Drift River Pipeline
Miles
0 1 2 3 4 5
N

Resources, on land obtained by CIRI. Portions of the existing logging roads may fall within this easement.

Other road rights-of-way include section line easements on all state land or land transferred to others by the state. Although section line easements do not necessarily allow for access due to topographic constraints, they do allow for public right-of-way access across the land. These easements allow for a 100-foot right-of-way between sections.

At the request of TNC, no section line easements or other easements for transmission lines, rail lines, or roads exist on TNC land. Thus any new road, rail or power line proposed between the project area and the Beluga area or east to developed portions of the Matanuska-Susitna Borough which passed through TNC land would probably be very difficult to obtain, given the present position of the corporation. Plans for the CIRI/Placer Amex project do not anticipate a need for any such easements. A 65-mile road connection between the coal district and Wasilla, and an equally long rail connection between the district and the Alaska Railroad near Houston, have been discussed, although neither is anticipated for this project.

A 200-foot development setback and a 100-foot recreation easement are in effect along the Chuitna River and other streams (outside of TNC land). These easements were established by the state DNR, Division of Lands.

With respect to obtaining access across CIRI or state land in the project area, no difficulties are anticipated. The DNR reviews right-of-way applications on state land.

- Airports

There are no airports with a capacity to handle landings of heavy cargo planes in the immediate project vicinity. Airstrips which

could be used in early stages of project development include the beach strip at Granite Point and two 900-foot strips at Capps Field. The Granite Point airstrip is about 3,500 feet in length, with a gravel surface.

The closest airport with a good surface and landing lights is the 3,500-foot Tyonek Airport. Like other privately owned airstrips in the vicinity, the Tyonek Airport is restricted to planes with prior landing privileges. The village tribal council in Tyonek wishes to control visits by planes to the village in the same way the village corporation, TNC, wishes to restrict road access across its lands.

- Docks

The only dock near the proposed project with the potential for use during early stages of project development is owned by Kodiak Lumber Mills and is located 7 miles northeast of Granite Point at the North Foreland. This dock is 1,466 feet long, with 685 feet of berthing space at a mean low water depth of 36 feet. The largest ship to dock at North Foreland was 601 feet long and 45,000 metric tons (Battelle, 1979). Use of the dock would require permission, not only from Kodiak Lumber Mills, but also from Tyonek Native Corporation for use of the existing road across TNC land to the project area.

The dock that is proposed to receive and ship the methanol is located approximately 40 miles southwest of the proposed project area on the west side of Cook Inlet near Drift River. This facility, the Cook Inlet Pipeline Drift River Terminal, includes a single-berth fixed-platform offshore loading facility that will accommodate up to 70,000 DWT tankers. This facility will accommodate a maximum 810-foot LOA vessel. This facility is further described in Volume II of this report in the section on pipe transportation and ship loading.

- Power

  The closest power source to the proposed plant and town sites is about 16 miles northeast at Beluga. This gas-fired plant owned by Chugach Electric Association supplies power to the Village of Tyonek, the KLM chip mill and others, via a transmission line near the coast.

Kenai Peninsula Borough Services

The entire project area lies within the Kenai Peninsula Borough, but is isolated from the other borough settlements by Cook Inlet.

Under state law, boroughs exercise powers within their jurisdictional boundaries, both inside and outside of home rule and general law cities. Borough powers extending to the project area include education, planning, platting and land use regulation, and air and water pollution control. Borough service areas can be established for unincorporated areas to provide public safety, solid waste or other services.

The only existing school serving the area is the Bob Bartlett School in Tyonek (discussed later in this section under Community Facilities and Infrastructure). The borough builds schools, establishes curriculum (with local input) and hires teachers. Although the school operating budget is a local responsibility, 50% of operating costs were paid by the state last year. It is not known if state funding will continue. Under a bill likely to pass the 1981 Legislature, all local school construction debt (rather than the current 80%) would be paid by the state. The borough would continue to bond for school construction and would be reimbursed by the state. The proposed legislation forbids 100% reimbursement for such special facilities as swimming pools, hockey rinks and teacher housing.

Planning and zoning and subdivision powers are provided on an areawide basis. The borough establishes a planning commission which prepares a comprehensive plan and/or plans for incorporated cities. Theoretically, the borough could prepare the comprehensive plan for a new town at Beluga if the town became an incorporated first- or second-class city. In practice, this is unlikely because the Kenai Peninsula Borough intends to transfer planning and zoning powers to cities, while retaining control of platting, subdivision approval and transportation facilities.

The borough may collect property, sales and use taxes levied within its boundaries. Taxes levied by an incorporated city shall be collected by the borough and returned entirely to the city. The Kenai Peninsula Borough is proposing a July 1981 - July 1982 budget with a 2.5 mill rate. If increased state funding of schools is not forthcoming, the borough mayor estimates that a 1 mill increase could be required (Atkinson, 1981). At the same time, municipal assistance grants of $1.4 million authorized by the state for next year would allow the borough to end personal property tax (on boats, cars, airplanes, etc.) and reduce real property tax.

Other West Cook Inlet Coal Development

Another coal development project in the Beluga area is coal export from leases held in the Chuitna Field by the Bass-Hunt-Wilson (BHW) venture. The BHW leases are shown in Figure 10.1. Development plans prepared in April 1980 (Bechtel, 1980) suggest production of 7.7 million short tons of coal per year, shipped via a deepwater port at Granite Point to Far East and West Coast destinations. Associated facilities include a town site within the lease area for 1,300 personnel and a conveyor or rail system to carry the coal to a tidewater stockpile.

A 7,700-foot wharf would be built to channel depth for 100,000 DWT carriers. Alternatives to the Granite Point location include a new

8,000-foot wharf near the village of Ladd, about 12 miles southeast across TNC land, or use of the existing 3,500-foot wharf owned by Kodiak Lumber Mills, Inc.

A six-year time frame from engineering to commencement of mining operations was envisaged in the April 1980 feasibility report, although its schedule for development may be adjusted in light of an agreement establishing a joint venture to develop the BHW lease. In an agreement approved by the state DNR in August 1981, the Diamond Shamrock Corporation joined with BHW leaseholders for the purpose of developing engineering, marketing and mining plans for the coal field. The venture is to be managed through Diamond Alaska Coal Company, a wholly owned subsidiary of Diamond Shamrock.

The BHW operations are largely independent of those planned by CIRI/Placer Amex. Town site, dock and transportation concepts currently are completely separate. As these projects reach advanced planning stages, it is expected that the owners will explore ways these infrastructure facilities can be shared to reduce capital costs.

TYONEK VILLAGE

Background

Tyonek is the only settlement on the west coast of Cook Inlet. It is a long-standing community of about 270 Tanaina (Athapaskan) Indians. The village and 27,000 acres surrounding it were withdrawn as an Indian reservation in 1915. However, the residents of the village voluntarily surrendered the reservation status of their land to participate in the land selection benefits of the Alaska Native Claims Settlement Act of 1971.

Like other Indian villages, Tyonek was a traditional community oriented to seasonal subsistence pursuits. When opportunities for commercial trapping and fishing developed in the twentieth century, villagers participated in them to the extent the local resource base would permit. Thus, the fortunes of the village were tied to the cyclic fluctuations of fish and game. Poverty and the threat of starvation were ever-present. In the winter of 1955, an emergency airlift of food was necessary to save the villagers from famine. Housing and living conditions generally were substandard, like those of numerous other remote Native villages in Alaska.

The life-style of Tyonek was radically altered in 1964 when the village received $12.9 million in bonus bids for the competitive sale of oil and gas leases on its land. The money was used to upgrade village housing and community facilities, and to invest in Anchorage real estate and other commercial ventures.

Tyonek's sudden prosperity did much to improve the living conditions of village residents, but it caused new stresses within the community and did nothing to solve familiar problems of culture change faced by Tyonek residents. The oil revenue replaced the remaining physical vestiges of traditional village life, but provided no new spiritual or cultural substance.

Thus, the "identity crisis" of the Tyonek villagers, caught in a conflict between the values and life-styles of traditional Indian and modern white societies, was exacerbated by the oil lease windfall.

The history of Tyonek's investment activities is long and often unhappy. Exploratory drilling failed to discover oil in commercial quantities, so a steady stream of royalty income has not supplemented the one-time bonus bid lease payments. Financial setbacks and reversals have plagued the Tyoneks, so that early investments do not now provide a continuous source of direct support or indirect subsidy to village residents.

Both Braund and Behnke (1980) and Battelle (1979) report that the Tyonek village residents are suspicious of outsiders and prefer to have non-Natives avoid the village. The presence of non-Natives in the vicinity of the village is discouraged, especially if it involves the attendance of non-Native children at the Tyonek school, which occurred during the height of the chip mill operation.

Community Facilities and Infrastructure

Tyonek's facilities adequately serve the needs of its approximately 270 residents. Compared with many Native villages in Alaska, Tyonek has good housing, water and sewer systems and educational and health facilities. A substantial portion of the $12.9 million lease sale revenue was used to improve village living conditions (Battelle, 1979).

- Housing and Utilities

  Lease revenue was used to provide a new house for each family in Tyonek. Fifty-nine prefabricated, one- to five-bedroom units were barged from Seattle. Today there are about 60 frame dwellings and six mobile homes. All homes are owned by the Native Village of Tyonek, Inc. Many of the ranch-style prefabricated units have not stood up well to Alaska conditions and are in need of new insulation and rehabilitation. Twenty-seven HUD-financed houses were planned for construction in 1979, but additional housing for those wanting their own homes is still needed.

  Village homes are heated by electricity, which is provided free by Chugach Electric Association under an agreement which will expire when the village has used a total of 50 million kilovolt hours (about 1982-1984). Then homes will be converted to oil-fired furnaces to use fuel purchased from Kodiak Lumber Mills (Battelle, 1979). Because of past power failures and fuel shortages, some residents wish for a return to wood heat.

The Kodiak Lumber Mills camp, located about two miles from the village, has six 20-person bunkhouses, five 3-bedroom modular homes, about 12 trailers and six duplexes -- capable of accommodating a total of about 200 people.

Oil lease money also provided funding for new gravel roads in Tyonek and a village water system. Roads are laid out in an orderly fashion to accommodate additional housing development. A lake water source was developed in 1976 after a high iron content was found in well water. The new system has apparent problems with chlorination, and a low lake level in winter. The Public Health Service is investigating alternative water sources.

Wastewater disposal is by septic tanks and cesspools. Some of the steel septic tanks installed in 1965 are rusting. Soils are gravel base and are adequate for subsurface disposal.

The village has a community building which houses a store, shop facility, guest house, medical center, and the village offices. The town also has a gas station.

- Education

The village school is the one facility which some village residents feel they have the least control over. They fear that children of coal field and plant workers might attend their school in large enough numbers to make Native children a minority in the school.

The Bob Bartlett School, serving grades K-12, is financed and managed by the Kenai Peninsula Borough School District. Enrollment is about 100 students, and capacity is about 240 students. The school has four regular classrooms, a home economics unit, and a portable classroom. There are 10 full-time teachers, who move in to teach temporarily. Two local residents provide supplementary education in cultural affairs, funded by the federal

Johnson-O'Malley program. The amount of funding is keyed to the number (not proportion) of Native students in the school. The Native Village of Tyonek oversees the program.

The borough school board would determine whether students from families employed by this proposed project would attend the Tyonek school. When the KLM chip mill was in full operation, about 20 students were bussed to the village to attend the school. In deciding how best to meet the educational needs of all students, the board would consider the wishes of Tyonek residents in light of districtwide program requirements and funding.

- Public Safety

The Alaska State Troopers provide public services outside of incorporated cities. A constable serves Tyonek, the chip mill, and the oil and gas facilities at Trading Bay. He is based at the Beluga power station. Tyonek has no plans to incorporate as a second-class city.

The addition of a full-time officer is not expected until population increases justify it in another 10 or 20 years. Additional staff can be added on a short-term basis to meet seasonal needs. Industry can also be expected to provide its own internal security.

There is no publicly provided fire protection in the area. It is not known what firefighting equipment is available at Tyonek. Industry would, however, provide its own firefighting equipment and capability.

Health care is available at a small clinic in the community building at Tyonek. The facility is staffed by a resident Licensed Practical Nurse who provides medical and dental care. The U.S. Public Health Service also provides a community health aide (and alternate). Emergency medical care is received at the Alaska Native Medical Center in Anchorage.

Emergency services and hospital care from the health aide are available to non-Natives on an emergency basis only. Emergency evacuations are handled by the state troopers using private charter planes. The U.S. Air Force also handles some emergency evacuations. The Kenai Peninsula Borough provides service to the area from a 32-bed hospital in Soldotna.

Employment

Employment in Tyonek is scarce. With the exception of a few permanent jobs associated with the operation of the school, work in the village is part-time and seasonal. In recent years, a significant amount of work has been derived from government activities and programs. Thus, Tranter (1972) observed: "Tyonek, even with its good fortune of the 1960s, does not significantly differ from the prevailing employment patterns found in Alaska's Native village society found elsewhere in the state."

A survey of employment in Tyonek in the spring of 1979 revealed that 54 people had a full-time or part-time job. Seventy percent of them worked in government-related programs, including state and federal education and health programs and the federal Comprehensive Employment and Training Act (CETA) program. In addition, eight people worked at the KLM chip mill, four worked with a petroleum exploration crew drilling for natural gas on village lands, and four worked in Anchorage on the construction of modular houses that would be brought to the village (Braund & Behnke, 1980). Little of this employment represents permanent full-time jobs. Most is temporary, and the government-related work is dependent upon annual program appropriations.

Thirty-three limited entry fishing permits are held by Tyonek residents (three salmon drift gill net permits and 30 salmon set gill net permits). The Cook Inlet salmon season is open for two days per week for a six-week period from July to mid-August. Salmon stocks

in Cook Inlet have been rebuilding slowly after long years of decline, and the fishery is increasingly lucrative to purse seiners and drift gill net fishermen. However, because Tyonek villagers are predominantly set-net fishermen, and because the runs in the vicinity of the village are not especially strong, commercial fishing is still a marginal enterprise for many residents who participate in it.

The record of village employment in the nearby chip mill is informative for what it suggests about the prospects of villagers benefiting from employment opportunities created by development in the Beluga coal fields. This record is summarized by Braund and Behnke (1980):

> When Tyonek Timber Company, a subsidiary of Kodiak Lumber Mills, constructed a chip mill near the village, many residents hoped the plant would provide permanent jobs for villagers after production began in 1975. The chip mill is located on former reservation land once owned by the village but now owned by the village corporation (Tyonek Native Corporation). From time to time, Tyonek Timber Company employs villagers, but the majority of the workers are transients housed near the facility. Apparently, Tyonek Timber Company did not intend to hire a high percentage of non-Native transients, but many problems developed between the mill and the villagers.
>
> From the industry point of view, the main difficulty was keeping employees who would report to work each day. Flexible work hours were arranged, but apparently absenteeism and drinking problems plagued production, and with a $30 million investment which was losing money each year, Tyonek Timber Company needed a crew of dependable loggers and mill operators. The villagers, who required specialized training for the jobs, often became disillusioned with the training program. Also, they felt that work schedules were constraining and interfered with more traditional and acceptable activities such as hunting and fishing. The growing presence of outsiders near their village was viewed with suspicion and concern. Some villagers complained that they were harrassed by non-Natives at the plant. Others felt the pay was too low when compared to union jobs. A shortage of gas in the village made it difficult to get to and from the timber mill. Possibly one villager summed up the problem when he said, "Natives aren't loggers." The net result is that in a village where unemployment is of primary concern

industry builds a lumber mill within a few miles, and for various reasons, unemployment remains a problem.

Thus, it apparently cannot be assumed that the creation of local employment opportunity will necessarily result in substantial village employment. Many of the same factors that affected village employment in the chip mill could also affect employment in a nearby coal mining and industrial plant operations.

Community Attitudes Toward Development

Attitudes of Tyonek residents toward major new commercial development in the vicinity of their village are discussed in Braund and Behnke (1980) and Battelle (1979). In general, there seems to be little enthusiasm for local development that will result in an increase of the non-Native population of the area. New employment opportunity has general appeal among the villagers, of course, but even this attraction of development is tempered by the realization that full-time employment entails sacrifice of the slower-paced traditional life-style of commercial fishing, seasonal subsistence pursuits, and occasional wage employment.

There is nothing unusual about ambivalence on the part of a small rural town toward the prospect of dramatic change by a major resource development project; but in most cases, the promise of economic prosperity is stronger than the urge to protect traditional life-styles. In the case of Tyonek, however, the villagers may perceive that the disadvantages of development seem to outweigh the hope of benefits. Available data suggest that a majority of village residents would oppose creation of a major new town on the west side of Cook Inlet. A community profile and community attitudes survey are being prepared by a consultant to the Alaska Department of Community and Regional Affairs.

CONSTRUCTION AND OPERATIONS REQUIREMENTS

Background

The Beluga Methanol Project is comprised of the following basic components: a coal mining operation; a rail and road linkage to a coal-to-methanol plant; a pipeline for the methanol to an existing transshipment point; a separate cargo dock; an airport; construction camp; and permanent new town. Assumptions about project manpower requirements and the ultimate projected population of the town were derived by CIRI/Placer Amex in consultation with CIRI/Holmes and Narver, Inc. Separate estimates are provided for construction and operations/maintenance manpower requirements for the mining operation, construction camp, methanol plant, airport, and permanent town.

These figures should be taken as general estimates sufficient for preliminary facility planning and cost estimating. Because of its remote location, the project would require a high degree of self-sufficiency. Since few public facilities or services would be required or impacted, there was only limited consultation with governmental agencies regarding facility requirements. Nevertheless, experience with other remote community and support facilities in Alaska suggests that the proposed project realistically meets known requirements at this time.

Direct Labor Force Requirements

Assuming the start of construction in 1984, a peak construction work force of approximately 3,200 (direct manpower requirements) would occur in the beginning of the second quarter of 1986 and last until the end of the year. Operation of the mines would require approximately 470 people, and the methanol plant approximately 450. In addition, it is estimated by Holmes and Narver that approximately 115 people would be required for the day-to-day operation and main-

tenance (O/M) of the camp, town site, and airport. Therefore, a total of approximately 1,242 regular O/M personnel would be required after start-up of the facility and completion of the town.

Indirect Employment and Total Population

The concept design for the project town site calls for a highly self-sufficient community with schools, recreational facilities, retail goods and services, and other basic urban amenities. Thus, a quantity of indirect, or secondary, employment would be necessary in the community to support the basic work force, as in any other small town in Alaska. This is in addition to the operation and maintenance work force associated with the airport, camp and town site. The amount of this indirect employment is estimated to be approximately 200. This represents an employment multiplier of about 1.2, which is typical for a town of this size in Southcentral Alaska (Kramer, et al., 1979).

Thus, total employment at the project site is estimated at 1,242. The total population of the town would therefore be about 2,600, as an average of approximately one nonworking dependent for each member of the labor force is expected (a labor force participation factor of 2.0).

The town site development concept plan discussed in this report has been scaled to a community size of approximately 2,600 residents with the capacity to increase to more than 4,200 persons (Holmes and Narver, 1981). Table 10.1 summarizes employment and population assumptions for the project.

OVERALL PROJECT DEVELOPMENT

The project is located about 75 miles northwest of Anchorage across Cook Inlet, in an area within the Kenai Peninsula Borough. The project extends upslope from Trading Bay a distance of about 25 miles to the Placer Amex Capps coal field.

Table 10.1

ANTICIPATED CONSTRUCTION AND OPERATION WORK FORCE BELUGA METHANOL PROJECT

Project Phase	Work Activity	Peak Number of Workers
Construction		
(1Q 1983 to 1Q 1986)	Coal Mine	550
	Methanol Plant	450
	Camp and Permanent Townsite	2,000
	Camp and Airport O/M	200
	Total	3,200
Operations		
(Beginning 1Q 1986)	Coal Mine	470
	Methanol Plant	450
	50-Person Camp, Airport, and Townsite O/M	115
	Total	1,035
	Indirect Employment @ 0.2	207
	Total	1,242
	Total Estimated Town Population at Approximately 1 Dependent per Employee	2,600

Source: CIRI/Holmes and Narver, September 1981.

Figure 10.3 shows the general locations of key components of the project. These locations are not precise, however, there is sufficient land within the project area with moderate slope and reasonable foundation conditions to allow for a great deal of latitude in final site planning. Adjustments can be expected based upon further site studies, consultation with government agencies and evaluation of property ownerships.

The Capps mine and methanol plant currently are envisioned on land owned by CIRI; the proposed camp is located on borough land; and the proposed town site, airport and Chuitna West mine are located on state lands. The transportation corridor between the Capps Field and the plant traverses CIRI, state and borough lands within an existing 300-foot wide easement which runs in an unspecified alignment on state land over a distance of 27½ miles from the Capps Field to Trading Bay. The easement was granted by the state DNR.

Descriptions of the proposed construction camp, airport and town site in the following sections are based almost entirely upon the work by CIRI/Holmes and Narver (Conceptual Camp, Airport and Townsite Development Plan, Beluga Methanol Project, September 1981).

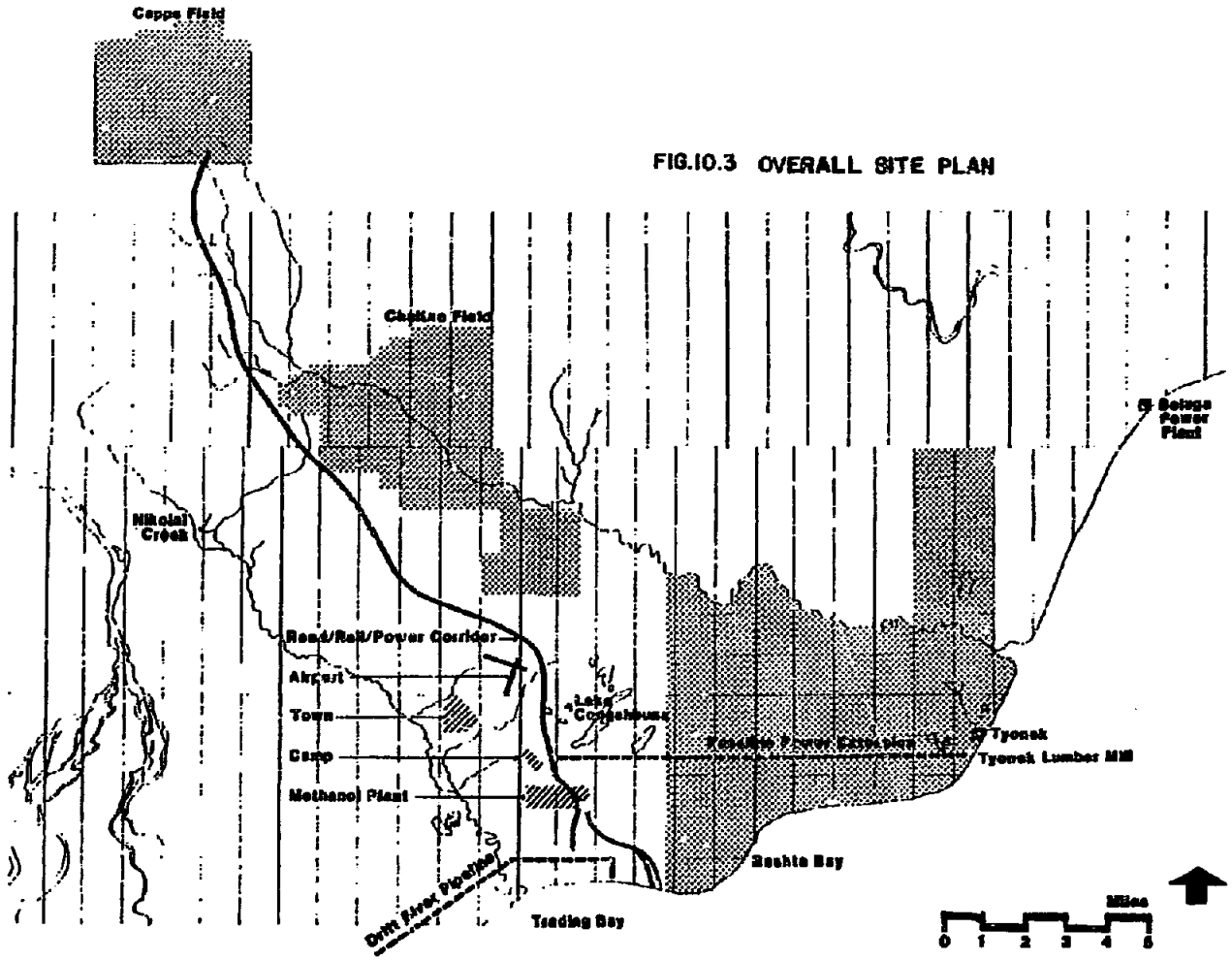
Construction Camp

° Concept

At peak construction, the project would require housing for about 3,200 people. Due to the remoteness of the project, all of these personnel would have to be housed in a newly constructed work camp. The camp would have to be built quickly in increments which could accommodate fluctuations in the work force.

The most appropriate method of camp development for the support of the project is the use of prefabricated and preinstalled building modules which are readily available from contractors and

FIG.10.3 OVERALL SITE PLAN



manufacturers in Alaska and other states. Because these modules require a minimum of field construction, the camp could be expanded or reduced in size at modest cost. The modules would be barged, or air-lifted by Lockheed Hercules aircraft. Trucks, helicopters or CATCO Rolligons could transport the units to their final site destination.

° Camp Facilities

The building modules would be arranged to serve a variety of camp uses. Approximately 62 dormitory-style barracks would be grouped in four quadrants -- each with its own dining, recreation, and laundry facilities. Administrative offices, warehouses, shops, a first-aid station, fuel storage, water and sewage treatment, access road, helipad and similar facilities would be built in the initial phase.

The camp's location in relation to other project facilities is shown in Figure 10.4. Its general location is close enough to the plant (within about a mile) to allow for a short bus ride, but not so close as to be affected by plant construction noise. Power and water are brought in above the camp, with road access, helipad, and sewage facilities located downhill.

Figure 10.5 shows the proposed configuration of camp facilities. Dormitories are arranged along a spine with the support dining, recreation, and laundry facilities at the mid-point. This configuration allows for efficiency of construction and operation, but could be modified based upon terrain features and requirements of camp O/M subcontractors.

° Housing and Support Facilities

Housing and support functions would necessitate dormitory, kitchen/dining, recreation, first-aid, and central laundry facilities.

FIG.10.4 CAMP SITE CONSIDERATIONS

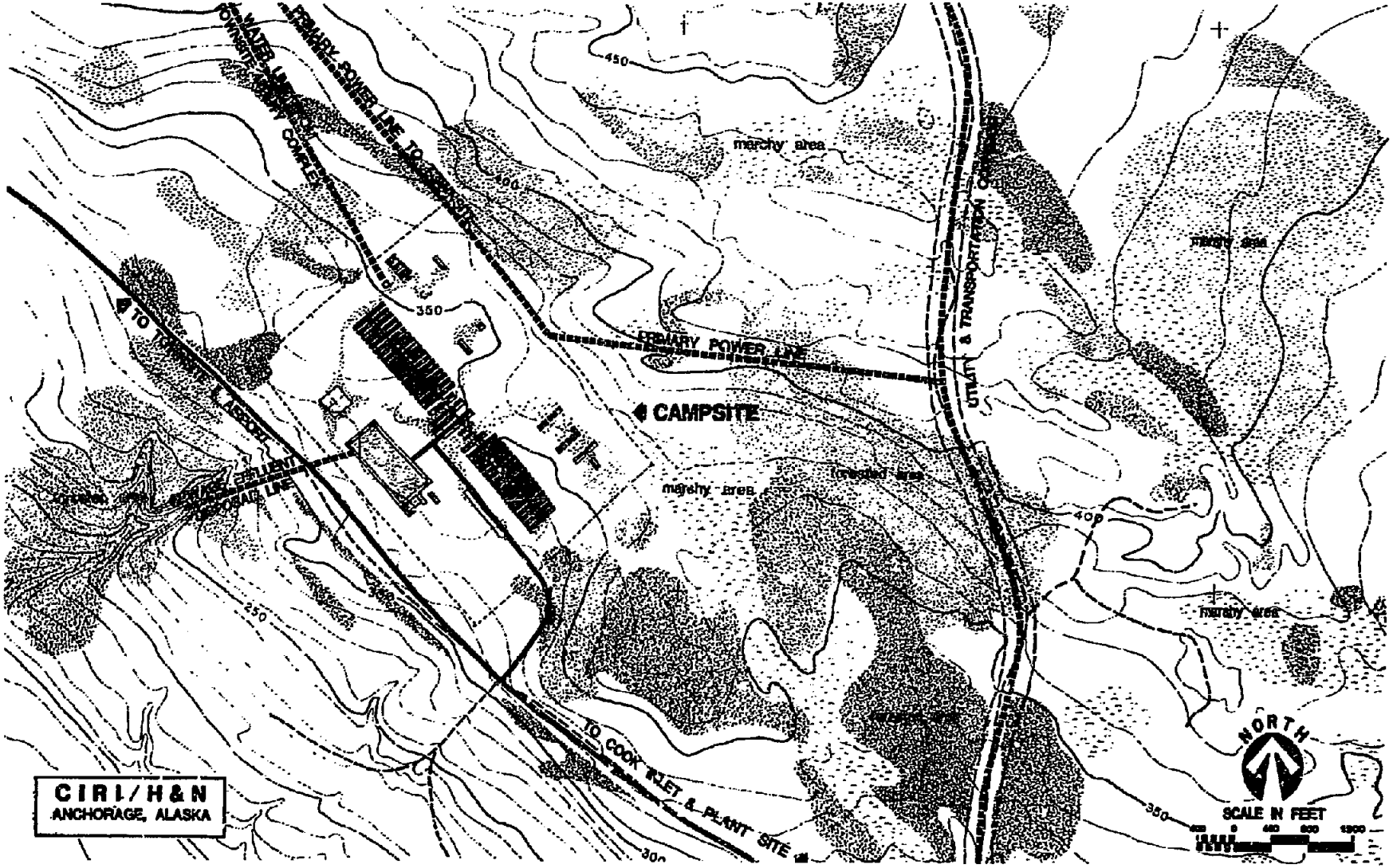
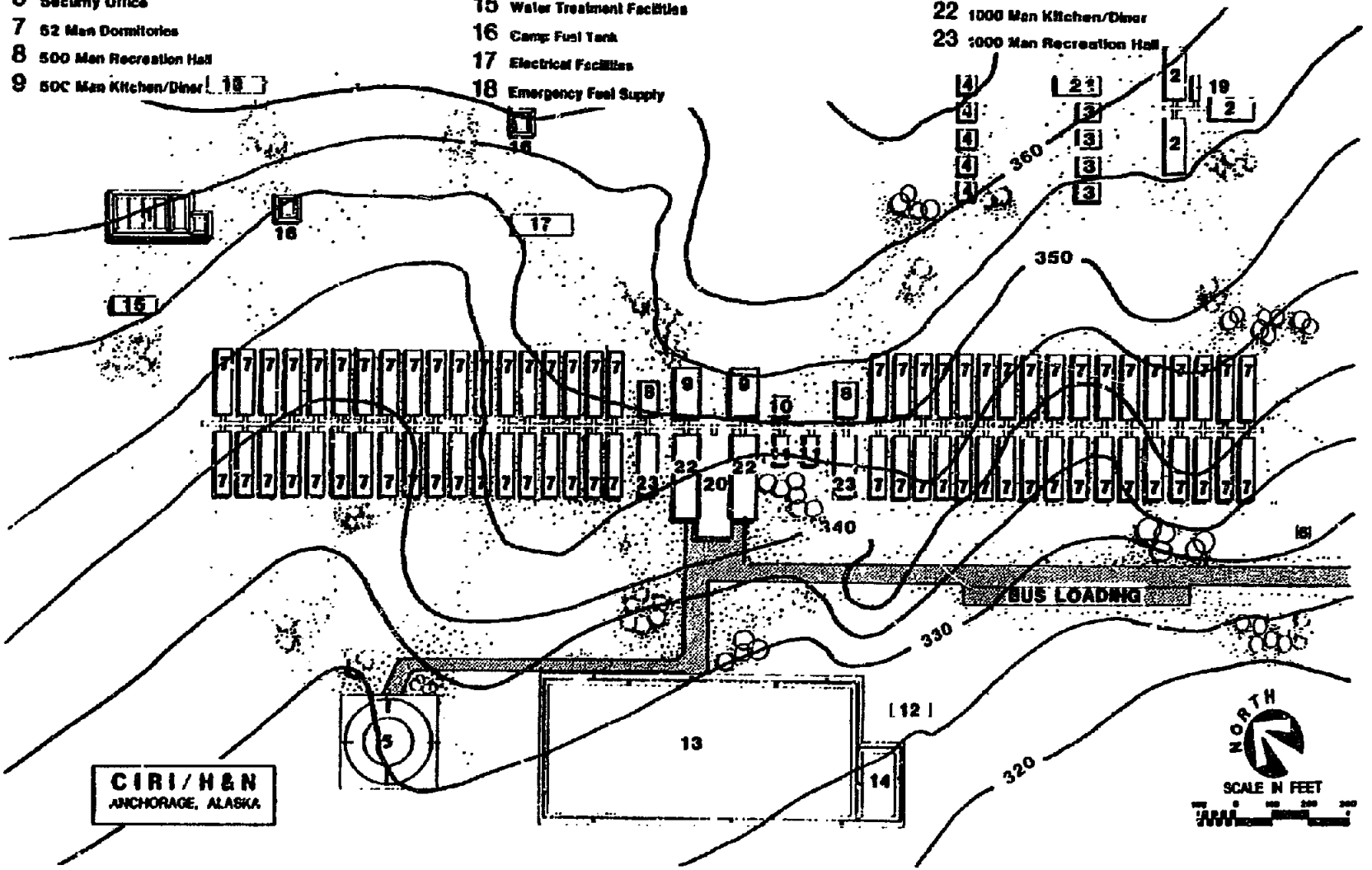


FIG.10.5 CAMP PLAN

1 Bulk Fuel Storage and Dispensing
2 Offices
3 Shops
4 Warehouses
5 Helipad
6 Security Office
7 52 Man Dormitories
8 500 Man Recreation Hall
9 500 Man Kitchen/Diner
10 First Aid Station
11 500 Man Laundry
12 Sewage Treatment Facilities
13 Flow Control Management Reservoir
14 Five Day Holding Pond
15 Water Treatment Facilities
16 Camp Fuel Tank
17 Electrical Facilities
18 Emergency Fuel Supply
19 Field Toilet
20 Enclosed Loading Area
21 Vehicle Equipment Shop
22 1000 Man Kitchen/Diner
23 1000 Man Recreation Hall



Each dormitory module would accommodate 52 persons in two-man rooms. The one-story structures would be about 35 feet wide and 144 feet long. In addition to the 26 rooms, each sleeper module would contain group washroom, shower and toilet facilities, clothes washers and dryers, and other amenities.

Four standard prefabricated and preinstalled kitchen/diner modules would be built. Assuming incremental development of four quadrants of dormitory modules, two 1,000-person kitchen/ dining halls, and two 500-person halls would be required.

The recreation hall is a vital component in any remote camp because of its influence on the morale of the construction and O/M work force. Assuming at least two work shifts, two 1,000-person recreation halls would be adequate to provide a full variety of recreational pursuits. A commissary and post office would be located in one of the halls.

A centrally located first-aid station would allow medical personnel to assess and stabilize medical emergencies before air evacuation to Anchorage; coordinate on-site injury assessment and treatment methods with Anchorage medical specialists; and provide selected out-patient services.

- Utilities

Camp utility systems would consist of water supply, treatment and distribution; sewage collection, treatment and effluent disposal; power supply and distribution; solid waste collection, reduction and disposal; and fuel storage. Potable water would be needed for domestic use and fire protection. The probable source would be groundwater obtained from wells.

Water would be stored in a ground-level or elevated tank. The storage requirement for potable water would be based upon the

sum of fire demand and one-half daily domestic demand, or 344,000 gallons. Fire flow criteria established by the National Board of Fire Underwriters suggests that approximately 1,800 gallons per minute for two hours be provided, or a total storage of 216,000 gallons. Domestic demand is based upon a daily consumption of 80 gallons for approximately 3,200 persons, or about 256,000 gallons per day (gpd). Well pumps and booster pumps could be sized to provide approximately 445 gallons per minute (gpm) to serve a peak daily load equal to 2.5 times average flow requirements.

Sewage flows which would be generated by the camp are estimated at 60 gallons per person per day or a total of about 192,000 gpd. Treatment would consist of four 50,000-gallon package plants (e.g. extended aeration) preinstalled and prefabricated. These modules could be relocated to the town site as camp population declined. Tertiary treated effluent would flow via Arctic pipe down a drainage channel, then would be absorbed into substrata and eventually discharged into Nikolai Creek.

Power requirements probably would be met initially by on-site diesel generators and/or by the existing Chugach Electric Association power plant at Beluga, approximately 20 miles from the project site. Another possible source would be natural gas obtained from nearby Cook Inlet offshore wells.

Ultimately, a power plant would be included as part of the Beluga methanol project. The plant would serve overall needs of the methanol plant and other facilities, while the above-described power sources could provide emergency power.

Solid waste initially would be hauled to a landfill. For longer-range needs, a solid waste management facility should be constructed at the town site to serve later construction and operation phases of the project. Wastes would then be reduced, incinerated and deposited in the landfill.

Diesel oil and other oil-based products would be stored in a special, lined POL (petroleum, oil and lubricants) berm. The facility would be located away from the camp and town sites to reduce risks associated with possible fire or explosion.

Airport

° Concept

A general transport airport is proposed to serve the construction and operation phases of the project. The airport would be sized to serve the Lockheed Hercules aircraft, in common usage in the state for heavy cargo as well as for carrying personnel and passengers and for medical evacuations.

The airport would be located northeast of the plant on land owned by the state. Given the large areas of poorly drained soils and swamp in the project area, a choice of good airport sites is limited. The recommended site best meets requirements for level terrain, adequate soils drainage and orientation to prevailing winds (Figure 10.6). Final design could require adjustments based upon closer evaluation of these requirements.

° Facilities

The airport is designed to provide adequate runway area, air control, lighting, storage and ancilliary facilities necessary to accommodate Lockheed Hercules aircraft during prevailing northerly and crosswind conditions. Figure 10.7 shows the preliminary design for the airport. It is believed that development of only a north-south runway is necessary for the construction phase of the project.

Runway length required for the Hercules is about one mile, while width should be about 300 feet. FAA criteria for a general trans-

FIG. 10.6 AIRPORT SITING CONSIDERATION

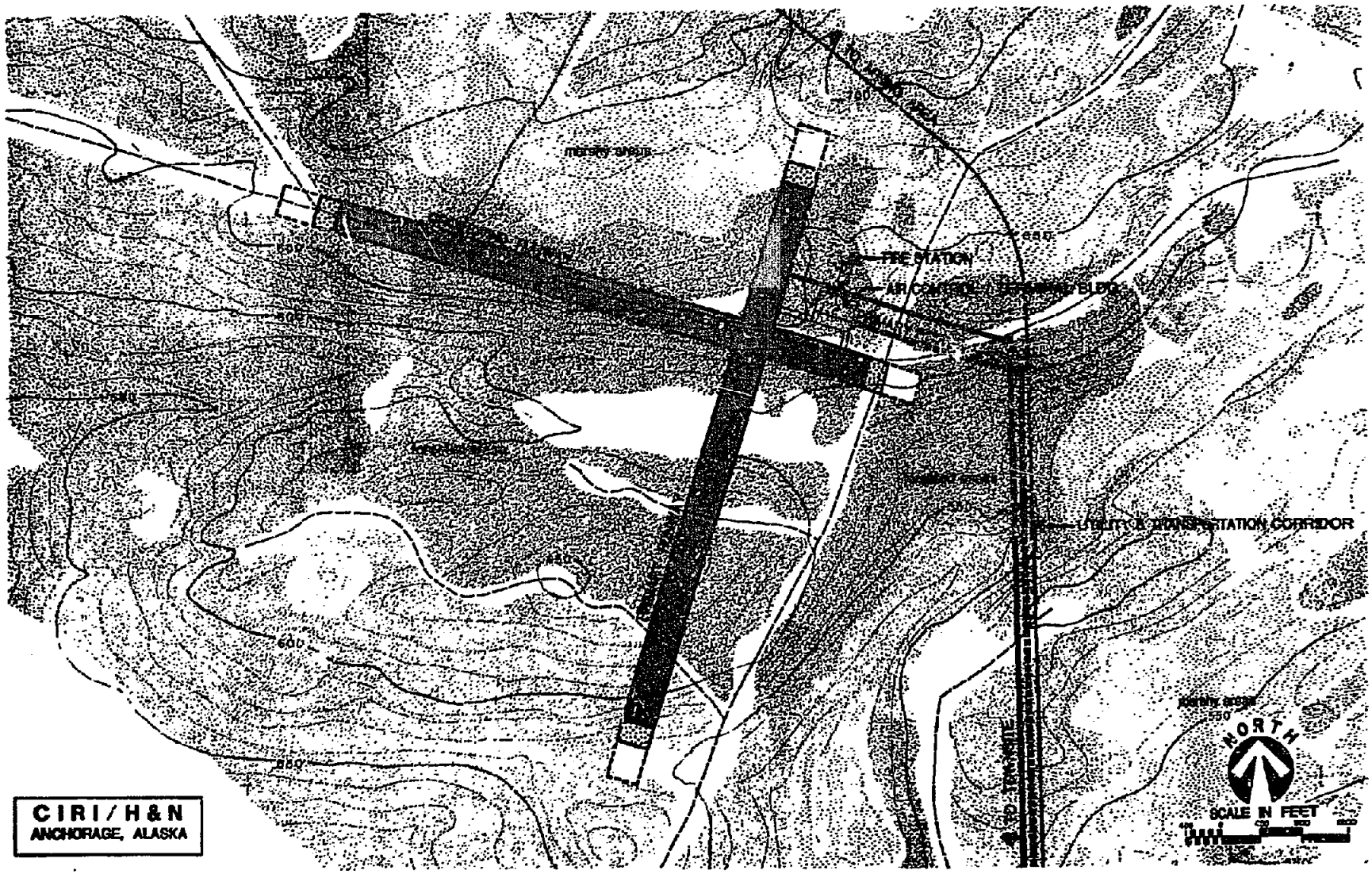
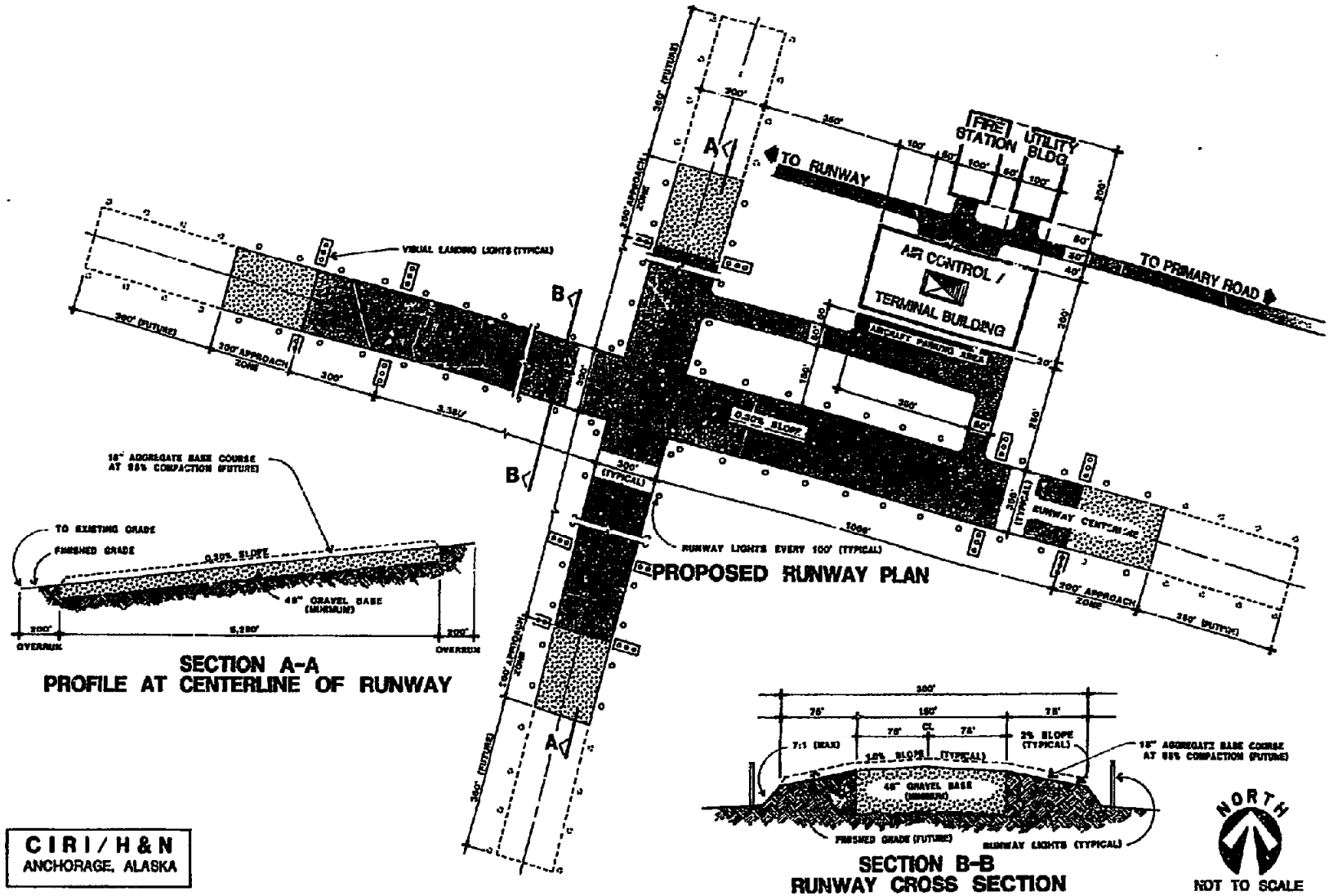


FIG.10.7 AIRPORT PLAN



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port, nonprecision runway require a safety area at each end of 300 feet. An additional 200 feet is proposed at each end for adequate protection from potential obstructions. It is recommended that FAA clear zone slopes of 50:1 be established (instead of the normal 40:1 slope necessary for nonprecision runways) because of the likelihood that the runway would eventually serve Boeing 737 aircraft. If commercial jet service were instituted, the runway probably would have to be lengthened to 6,000 feet and widened to about 500 feet.

Other airport facilities would include a two-story air control/terminal building adjoining enclosed warehouse storage area. A fire station would be located adjacent to the air terminal, and would also provide fire suppression equipment for the nearby campsite. Fire suppression would utilize dry chemicals with backup from a fire truck pumper loaded with water. Water, sewage, power and solid waste requirements are expected to be small. Since domestic water requirements would be small, treated water would be trucked on a weekly basis from the camp or town to an insulated water storage tank near the terminal. Sewage effluent would be treated in a 500-gallon package treatment plant with effluent discharged into a small subsurface soil absorption system. Power would be provided by the same source which is selected to serve the construction camp. Initially, two 20 kv diesel generators would be used. Solid waste would be stored in a dumpster to be transported to the solid waste management facility at the proposed new town.

Permanent New Town

- Concept

A relatively self-sufficient new community would be developed for the people who would be employed at the mine, methanol plant, and related facilities, and for their families. The town's estimated population would be about 2,600.

CIRI/Placer Amex would manage the development process, providing certain initial infrastructure to facilitate efficient development eventually having a full range of community services. Initial community development would provide the basic core of public infrastructure and housing. Private developers would provide additional housing, commercial and other facilities on a free-market basis within the broad guidelines of the overall town site plan. Schools would be built and operated by the Kenai Peninsula Borough.

The community might become an incorporated city, levying taxes and bonding for certain facilities (options discussed previously in this section under Kenai Peninsula Borough Services).

One option to the development of a permanent town site would be continued use of the construction camp beyond the construction phase. Rotating crews (without families) working seven days on/seven days off could be transported to Anchorage or Kenai. In any event, some of the camp's facilities could be adapted for use in the town site. Some camp housing could be designed for relocation and reconstruction as permanent housing. Water, sewer and power would be coordinated between the camp and town sites. Camp recreation halls might be relocated to the town site.

The preliminary land use plan for the proposed new town is shown in Figure 10.8. It was chosen from an analysis of alternative sites which considered such criteria as slope, drainage, land ownership, and proximity to the camp, plant and other facilities. The town site would be oriented along a high, well-drained bluff overlooking Nikolai Creek, about three miles from the plant.

- Housing, Education and Commercial Facilities

A variety of housing types including single-family homes and multi-family units would be provided by private builders. Some

Residential:

SF 16 to 24 single family units in six acre neighborhoods.
average density: 3.3 units/acre

MF 50 townhouse and apartment units in five acre neighborhoods.
average density: 10.0 units/acre

FSF Potential six acre expansion area for single family neighborhood development.

Educational:

EDUCATIONAL COMPLEX High school and K-8 facility on sixty acres.

FUTURE EDUCATIONAL EXPANSION Potential twenty acre expansion area for additional K-8 facility

Utilities:

UTILITY COMPLEX Water treatment, solid waste management, and power substation facilities on approx. 3.7 acres.

STP Sewage treatment plant on approximately 4.6 acres.

FSTP Potential sewage treatment plant relocation with single family neighborhood expansion on approximately 4.6 acres.

MC Motor vehicle maintenance and storage complex on 3.7 acres.

Improved road

Potential improved road for single family expansion area.

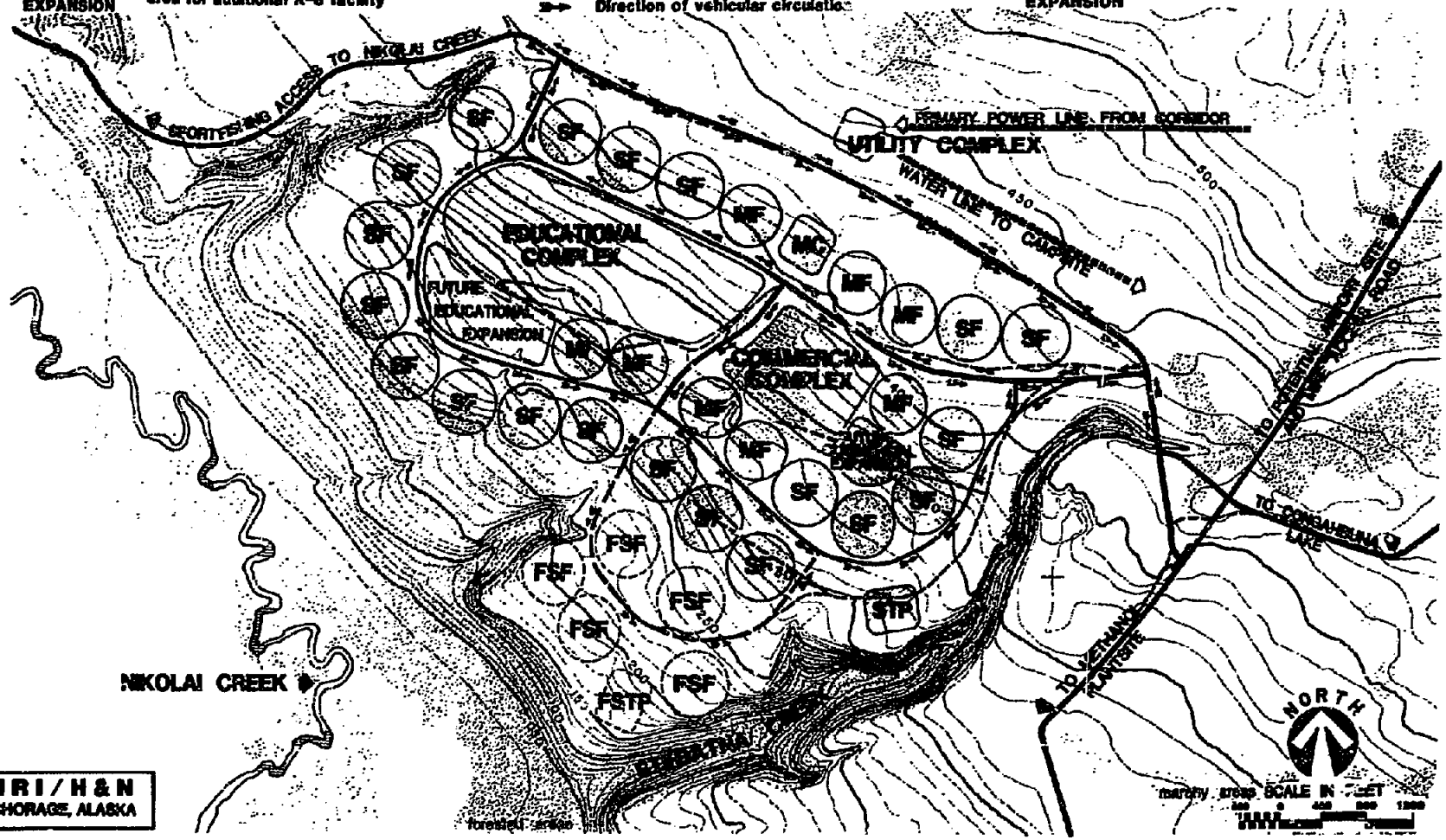
Direction of vehicular circulation

FIG. 10.8 TOWN LAND USE PLAN

Commercial:

COMMERCIAL COMPLEX Combined shopping and entertainment, community services, offices, governmental administration, and residential apartment units on 30.0 acres.

FUTURE COMMERCIAL EXPANSION Potential ten acre commercial expansion area



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mobile homes could be installed, but cost estimates have assumed all wood-frame housing. Using an average household size of about 2.5, approximately 1,020 units would be required. The tentative mix of units is about 400 single-family units, 125 townhouses, and 495 rental apartments (a reduction in the number of rental units is possible, depending upon employment agreements established by CIRI/Placer Amex). Development densities would be about 3.3 units per acre for single-family and 10 units per acre for townshouses/apartments, with higher densities for about 200 apartment units in the town center. Total residential land requirements and land costs have not been estimated.

Schools in the new community would function as both education and community recreation centers. Assuming a range of 25 to 35% school-age children, schools would have to be built for 650 to 910 students. Perhaps all of these students could be accommodated in one K-12 school. However, the Kenai Peninsula Borough has estimated the need for a K-8 school for 500 students and a high school for 800 students, so these conservative estimates have been used for cost estimating purposes. The borough estimated that a 20-acre site would be required for the K-8 school and a 40-acre site for the high school. It is anticipated the borough would build and operate the schools.

Commercial space would be needed for retail grocery and department stores, a medical clinic, bank, offices, restaurants, movie theater, and future government offices. A hotel and church site(s) may also be necessary. It is suggested that most of these services be conveniently grouped within a single energy-efficient structure -- perhaps along the lines of an enclosed shopping center mall.

- Transportation

Travel within the project area would be generally restricted to home-to-plant or mine trips, shopping trips, and less frequent

trips within the community or to nearby fishing or recreation areas. Trips onto nearby Native lands would be greatly discouraged by Tyonek Native Corporation.

These trip-making characteristics provide the opportunity for the use of buses as the primary means of transportation in the area -- during both the construction and operations phases. Since roads are not developed outside of the area, and new roads would be developed primarily for truck use, the initial use of private automobiles should be discouraged. Buses could circulate throughout the project area on narrow roadways, while saving land and development costs usually required for wider roads and parking areas. Emergency vehicles, delivery trucks, and snow removal equipment would also use the roads.

Circulation throughout the town would be by 20- and 45-passenger buses, and a separate network of bicycle/cross-country ski trails. Approximately 20 45-passenger buses and six 20-passenger buses or 9-passenger vans would be used during the construction phase. All of these vehicles would be used during the operations phase for home-to-work trips, home-to-school trips, and trips to recreational areas such as Congahbuna Lake and Nikolai Creek. The smaller vehicles would be used within the town site on a 24-foot-wide one-way loop road, served by 12-foot-wide residential access streets. A 4-acre bus storage and maintenance facility is planned near the town center. At some point further into the development, private automobiles may be permitted.

- Utilities

The same types of utility services provided for the camp would be needed for the town. Possibilities exist to integrate some of the facilities (water supply, sewage treatment, solid waste disposal). Domestic and fire flow water requirements are estimated at 354,000

gpd (one-half daily domestic demand of 120 gallons per person plus 1,650 gpm for two hours of fire flow). Storage and treatment would be the same as described for the construction camp. Distribution would be by approximately 8-inch main and smaller diameter feeder lines.

Sewage flows generated by the town are estimated at 208,000 gpd (80 gallons per person). The four 50,000-gallon package treatment plants used at the construction site, plus a new 10,000-gallon package plant would be installed on an incremental basis. The plants would be sited downslope from the town with treated effluent discharged into Nikolai Creek.

Minimum power requirements for the town would be about 25 kv. It is assumed that initial power requirements could be met using the source which served the construction camp until the permanent power plant were built.

Solid waste equal to about 24,000 pounds per day of burnable material and 1,440 pounds per day of noncombustible material would be hauled to a solid waste management facility. After reduction, remaining solid waste would be disposed in the sanitary landfill.

11.0 ACOUSTIC ENVIRONMENT

INTRODUCTION

Sound is radiant mechanical energy transmitted by longitudinal pressure waves in a material medium. Sound can be transmitted through gases, liquids or solids. The number of times a sound wave reaches its maximum and minimum pressures in a unit of time is referred to as its frequency, and frequency is expressed in Hertz (Hz), which refers to the number of cycles per second. Sounds with frequencies from about 16 to 20,000 Hz are in the range of human hearing.

Sound level or loudness usually is described using a dimensionless unit of pressure, the decibel (dB), and environmental noise generally is expressed using the A-weighted sound level in units of dB called dB(A). The A-weighting is an adjustment based on human hearing sensitivity at various frequencies. It is customary to call any undesirable sound "noise." Figure 11.1 illustrates various levels of noise in terms of A-weighted sound levels.

The result of combining two sound levels is not additive. Generally when two sounds are combined the resulting sound level is not more than 3 dB greater than the louder component. In terms of human hearing, a sound level difference of 1 to 2 dB is barely perceptible; 3 to 5 dB is clearly perceptible; and 7 to 10 dB is an effective doubling or halving of loudness.

Ambient background noise levels of 55 dB or less generally are acceptable. Residential areas near large cities generally have a background level of about 60 dB. Increases of up to 5 dB over ambient levels are generally considered to have a slight impact; increases of 5 to 10 dB would have a significant impact; and increases of 10 dB or more would have serious impacts.

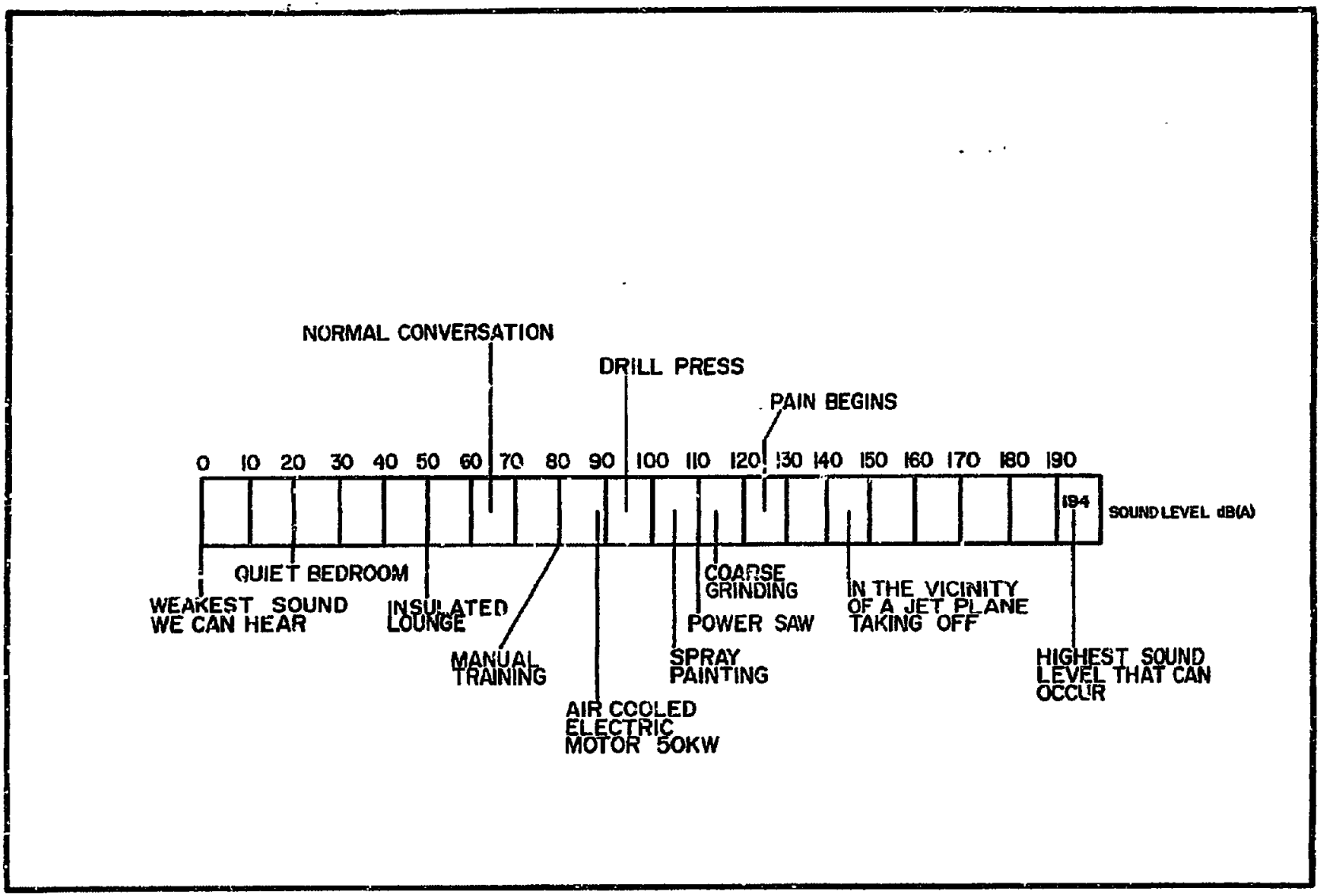

FIGURE II.1 LEVELS OF NOISE IN TERMS OF A-WEIGHTED SOUND LEVELS, dB(A)

GENERAL OVERVIEW

The Chuitna Center Ridge and Capps mine areas which would provide coal feedstock for this project are located in an uninhabited wilderness area between the elevations of 1,500 and 2,100 feet. There are essentially no man-induced noise sources in these areas other than occasional overflights by light aircraft. The ambient noise levels in these areas would probably vary between 20 and 35 dB(A).

The methanol plant site is located near the shore of Cook Inlet in a generally uninhabited area, although it is the location of ongoing timber harvest and oil industry activities. There are regular timber hauling activities with slow-moving heavy trucks producing noise in the 60 to 70 dB range at a distance of 400 feet. Although general vehicular traffic is sparce by rural standards, pickup and automobile traffic is generated by Granite Point fishing activities, the onshore oil receiving facility, and general recreational and hunting excursions. Overhead small aircraft traffic also is frequent. The present noise inducing activities near the plant site still produce an insignificant level of background noise. It is assumed the base ambient sound levels for the general methanol project site are between 30 and 40 dB(A).

NOISE SENSITIVE LAND USES

There are no noise sensitive land uses within the project area other than the expected responses to higher levels of induced noise by the resident wildlife and bird populations.

ENVIRONMENTAL IMPACT

12.0 GEOLOGY AND SOILS

CONSTRUCTION EFFECTS

Construction effects from this project on geology and soils would be the result of numerous activities ranging from the surveying of the land surface to the construction and operation of sedimentation ponds (Table 12.1). The primary concern during construction would be the control of erosion (primarily by surface water) to prevent the degradation of surface waters and the potential impact on the fishes utilizing these surface waters. Also of concern would be the general impact of such construction activities on generally unstable soils with particular concern for areas that could possibly fail due to high water contents and inherent slope instability. The former can be controlled by careful planning and operator training with close supervision; the latter can be controlled by detailed soil analysis and sound engineering design.

LONG-TERM EFFECTS

Long-term effects from construction and operation of this project in terms of geology and soils would relate primarily to:

- Competency as Structural Foundation
- Erosion Potential
- Clays for Impermeable Sealers
- Aggregate Sources
- Seismic (Faulting)
- Geophysical Hazards
- Soil Suitability for Wastewater Disposal
- Slope Stability
- Permafrost

Table 12.1

PRELIMINARY LIST OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH DEVELOPMENT IN THE BELUGA REGION

1. Survey land surface
2. Operate drill rigs
3. Remove surface features
4. Store topsoil materials
5. Dewater (by pumping)
6. Blast
7. Remove overburden
8. Dispose of overburden
9. Extract material
10. Replace topsoil and revegetate
11. Divert surface waters
12. Operate machinery and equipment
13. Clear and grade
14. Excavate
15. Backfill and grade
16. Construct stream crossings
17. Construct dikes and dams
18. Install culverts
19. Assemble structures
20. Pave surfaces
21. Build bridges
22. Cut and fill
23. Haul material
24. Prepare surfaces and roadbeds
25. Store material
26. Crush material
27. Load material
28. Operate railroads
29. Operate access roads
30. Operate haul roads
31. Store fuel and chemicals
32. Operate maintenance yards and parking lots
33. Operate electric transmission
34. Operate water supply
35. Operate sewage treatment plant
36. Operate septic tanks
37. Operate runoff controls
38. Operate waste rock dumps
39. Operate sediment ponds
40. Construct docks

Nearly all of these effects (or concerns) relate to the operation of the mines supporting the methanol plant. Stability of the material in the waste dumps would be of some concern due to the overall weak and water-sensitive nature of the material. The extensive distribution and depth of glacial tills will determine the overall slope of pit walls. Slide areas adjacent to the northeast side of the Capps pit area would most likely be susceptible to additional water. The finer-grain mud stones have very poor trafficability. The transportation corridor past the Chuitna west pit area may encounter siltstone and claystone slopes susceptible to instability without design precautions (e.g., flatting the slope). Drainage from open slopes would require interception to avoid progressive erosion. The transportation corridor crossing extensive areas of tundra may require excavation of the organic layer. The extent of granular borrow material available in the pit areas to support long-term operations has not yet been determined. Final plant location determinations may require the extensive removal of deep organic layers.

MAJOR REGULATORY REQUIREMENTS

Regulations relative to impacts on geology and soils would be primarily through the permanent regulatory program of the Office of Surface Mining Reclamation and Enforcement. It is anticipated that the State of Alaska will enact regulations similar to those of OSMRE.

ENVIRONMENTAL ACCEPTABILITY OF PROPOSED ACTION

While some degree of uncertainty remains as to the nature and permeability of the overburden in the pit areas and along the transportation corridor, there is nothing to suggest that the project as proposed would cause any unacceptable environmental impacts during either construction or the operation phases. Modification of the landscape within the mining areas would be unavoidable but should be

environmentally acceptable assuming a proper mine design and careful monitoring to insure that proper construction and operation techniques are being applied.

13.0 HYDROLOGY

CONSTRUCTION EFFECTS

Groundwater

° Construction Water Source

The only likely use of groundwater during the construction phase of the project would be as a potable water supply and possibly for concrete mix water. The test water well drilled in May 1981 near the proposed plant site indicated a presence of a deep groundwater source that could provide up to 100 gpm on a regular basis. The water is of reasonably good quality with possibly only chlorination required for treatment. It is assumed that the potable water supply would be used primarily to operate the construction camp. It is likely the groundwater supply would feed a storage reserve near the camp facility to meet peak water demands.

° Effects on Water Table

It is probable that if groundwater were used it would be drawn from a deep source similar to that in the above-mentioned test well. Virtually nothing is known about groundwater movement in this area, but the abundance of surface sources suggests a system of aquifer feed-water that would preclude any detrimental effects on the water table based on the anticipated potable water requirements for this project.

° Appropriation of Water Rights

Alaska Statutes Title 46 Water, Air, and Environmental Conservation reserves the waters of Alaska for the people of the state for common use. Waters may be appropriated with permit authority for beneficial uses which comply with standards for the protection

of public health and safety, protection of previous permitted appropriations, and preservation of anadromous fish streams and public recreational opportunities. Any entity desiring to appropriate waters of the state must obtain a water appropriation permit from the director of the Division of Forest, Land and Water Management, Department of Natural Resources prior to developing the water source. This permit authorizes the holder to conduct the necessary work for appropriating water and to commence his appropriation; however, it does not secure rights to the water. When the permit holder has commenced use of the water, he must again notify the director, who will issue a "Certificate of Appropriation" upon demonstration that the means for taking the water have been developed and the permit holder has complied with all permit conditions. The certificate secures the holder's rights to the water. It is not anticipated that any difficulties would be encountered in CIRI/Placer Amex obtaining a "Certificate of Appropriation" for groundwater use.

Surface Water

° Siltation During Construction

Construction of the coal handling and plant facilities would occur over a period of several years. During this period and prior to initiation of processing activities, the only significant wastewaters generated on-site would be runoff waters. Because of construction work such as site grading, road building and other civil-associated activities, that precipitation runoff during this period would contain quantities of silt.

As an initial site activity, the facility's design proposes construction of two large earthen ponds to collect and detain runoff from the construction site. These would enable any silt contained in the runoff waters to settle prior to release of the runoff to natural channels. Runoff flows would be intercepted by the em-

bankment forming the foundation of the southerly site access road, and would be directed through a channel under the roadway to the settling pond sites.

Because of physical conditions at the currently proposed processing site, two runoff control systems are anticipated. One would serve the coal handling area, approximately 100 acres, and the other would serve the methanol production area, approximately 220 acres. Each system's design is based on the Universal Soil Loss Equation. Each settling pond is sized to accommodate a 24-hour rainfall on the area served, with a frequency of return of once in 10 years, in addition to a sizable volume of settled silt. An alum feeding capability proportioned to the influent flow would enhance agglomeration and settling of turbidity-causing fines anticipated in the raw runoff. This system of runoff control should maintain sediment discharges at an acceptable level.

- Accidental Petroleum and Hazardous Substance Spills

As with any construction project, there likely would be small accidental spills of gasoline and diesel fuels, hydraulic fluids or other petroleum by-products. Minor accidental spills of materials such as solvents also would be expected, and these likely would qualify as hazardous substances. If such spills occurred in minor amounts on the plant site, they would be sufficiently removed from the nearest lakes, anadromous fish streams, and coastal waters to prevent impact. Such minor spills most likely would occur in the plant workpad area, a location which would also preclude direct contamination of adjacent wetlands.

The most detrimental place for a spill to occur would be near a stream crossing on the road system or near dock construction and material handling activities in the intertidal area. Such spills would be beyond the category of small accidental material handling spills discussed above. A spill there likely would involve a more

serious accident, and would have a very low chance of occurrence. To protect against adverse impacts from such an accident, a cooperative and coordinated plan of response to oil and hazardous substances pollution emergencies would be forthcoming from an interagency group headed by the Alaska Department of Environmental Conservation, in accordance with state policies. This would represent an extreme sequence of events not unlike those possible during any large industrial construction project. Any accidental spills from routine construction activities are not anticipated to cause adverse environmental effects.

° As a Water Source for Construction

Surface water would be used during construction primarily for concrete batching, earthwork compaction and dust control. This water would be required in relatively low quantities and likely sources would be adjacent streams or ponds such as Congahbuna Creek, Congahbuna Lake or one of the other adjacent small ponds. Groundwater might also supply some of the concrete mix water. Due to the intermittent nature of the water requirement and the relatively small quantites that would be withdrawn, any effects on these water courses would be very temporary.

LONG-TERM EFFECTS

Groundwater

° Plant Water Source

The methanol plant and coal handling and processing facilities have a variety of water requirements, however, the largest requirement is make-up water for the plant cooling system. The highest water requirement cooling alternative reviewed in this project necessitated an excess of 300,000 gpm of once-through

cooling water. This design scenario was favorable to capital cost but was discarded because of insufficient local water sources to meet this extraordinarily high demand. The present cooling concept is a recirculating system requiring about 15,000 gpm to replace the evaporation and other losses. The two exploratory water wells drilled as part of this study confirmed that deep groundwater sources would not be sufficient to meet the water requirements at the plant. Approximately 100 gpm on a regular basis may be available from a well in the plant site but this would be insufficient to meet much more than routine potable water needs. The only apparent alternative at this time is the installation of an extensive infiltration gallery system in the lower reaches of Nikolai Creek. This is discussed further later in this Section under Effects to Surface Waters. It is expected that there would be some well water used for domestic purposes whether at the plant or construction camp. Because there are no significant uses of groundwater in the Granite Point area at this time, there would not be any significant impact from the use of these wells for a potable water source. Based on the available information, a single well could provide between 100,000 and 150,000 gpd. It may also be possible to have two or three wells in close proximity near the plant without significant overlapping of the cones of depression of the drawdown curve of each well.

- Effects on Water Table and Marshes

It seems evident that any deep groundwater withdrawal for this project would come from the upland area of the Nikolai escarpment. This area is two to four miles from the Trading Bay State Game Refuge, so groundwater withdrawal should have no impact on the marshes in the refuge. Virtually no use is being made of the groundwater resources in this region. Consequently groundwater withdrawal of domestic quanities for this facility and its supporting construction activities should have only minor effects on the water table. Between uses or if withdrawal is later discontinued,

the static water level should rapidly be restored to its present level.

° Appropriation of Water Rights

A permit to withdraw groundwater would have to be obtained from the state Department of Natural Resources. The details of this procedure are further explained earlier in this section under Appropriation of Water Rights. It is not anticipated that any difficulties would be encountered in CIRI/Placer Amex obtaining a Certificate of Appropriation for groundwater use.

Surface Water

° Wastewater Discharges and Treatment

Wastewater discharges would result from water treatment facilities, processing and non-processing operations, blowdowns from boilers and cooling towers, repair shop associated with the servicing of locomotive engines, runoffs from coal storage and processing areas, and from infrequent cleaning of steam boilers. All of these wastewater streams are treatable using conventional technology and could be discharged to Cook Inlet in compliance with state Water Quality Standards.

Wastewater discharges from the proposed gasification/methanol plant complex would occur continuously and/or intermittently from several sources, which are summarized and discussed in the remainder of this section. It appears that each of these discharges is treatable using conventional technology and that discharge permits could be obtained. It is beyond the level of available data and scope of this study to analyze the environmental effects of each component of the discharge stream in detail.

The continuous discharges include:

- Water Treatment Blowdowns
- Char Filtrate
- Methanol Bottoms
- Pump Seal Waters
- Railroad Service Shop Wastewaters
- Sanitary Wastewaters
- Boiler Blowdown
- Cooling Tower Blowdown

The intermittent discharges include:

- Coal Storage Area Run-off
- Boiler Cleaning Wastewaters
- Process Area Runoff
- "Clean" Area Runoff

All treated effluents would be stored in a final treated effluent pond, and discharged through an effluent diffuser to Cook Inlet during ebb tide only. A portion of the treated effluent would be utilized for the conditioning of dry ash to minimize dust problems during load-out from ash silos. Stored treated effluent also would serve to meet the plant fire water demand.

The wastewaters generated in the proposed methanol plant according to the above listed categories, including estimated flows and characterization are described in this section. This information is the basis for the conceptual development of wastewater treatment facilities, and for estimating the characteristics of treated effluent proposed to be discharged to Cook Inlet.

Water Treatment Blowdowns (Continuous Discharge): Well water for general plant uses would be softened using the Cold Lime process to remove alkalinity and hardness, then would be neutralized and chlorinated before distribution. Due to the pres-

ence of high concentrations of silica in the well water, make-up water for boiler use would first be softened using the Warm Lime process for partial removal of silica, and then would be demineralized using a combination of cation and anion exchange beds.

Wastewater discharges from the water treatment facilities would result from the combined dewatering of sludges resulting from cold and warm lime softening, and from the regeneration of ion-exhange beds.. Sludge dewatering would result in a discharge of 123 gpm of centrate, and ion exchange regeneration would result in a wastewater discharge of 185 gpm. These wastewater discharges contain only inorganic impurities. Since ion-exchange regenertion wastes are expected to be highly acidic, they would be neutralized. These wastewaters then would be combined with treated process wastewaters for discharge to Cook Inlet.

Char Filtrate (Continuous Discharge): Significant quantities of char are carried with the hot raw gas from the gasifiers. The major portion of the char is removed in cyclones prior to cooling of the raw gas. The gas is cooled by direct contact with water in scrubbers, which removes the remaining char, and also removes any "condensible" impurities. Wastewater resulting from gas scrubbing is clarified and cooled, and then is recycled to the scrubber. The underflow sludge from the clarifiers is dewatered in pressure filters. These pressure filters also dewater sludges from the clarifiers which handle wastewater discharges resulting from scrubbing of coal dryer gas. Char filtrate thus represents combined blowdowns from the dewatering of sludges resulting from gas cooling and from coal dryer gas scrubbing. The estimated flow of char filtrate is 878 gpm, and it would contain impurities condensed from the gas. The estimated concentration of contaminants in the char filtrate is shown in Table 13.1.

Table 13.1

SUMMARY OF ESTIMATED FLOWS AND CHARACTERISTICS
OF PROCESS - RELATED AND SANITARY WASTEWATER DISCHARGES

Parameters	Char Filtrate	Methanol Bottoms	Pump Seal Water	Pretreated Effluent Railroad Shop	Contaminated Process Area Runoff	Pretreated Sanitary Wastewater Discharges	Total Wastewater
Flow, GPM							
AVG	878	190	175	50	-	11	1304
MAX	-	-	-	90	340	-	1674
BOD_5, mg/ℓ	685	5	-	30	50	100	477 (373)[1]
TOC, mg/ℓ	380	3	-	20	30	50	265 (208)
COD, mg/ℓ	1360	10	-	60	100	200	947 (741)
Sus. Solids, mg/ℓ	100	20	-	50	75	100	93 (73)
TDS, mg/ℓ	1500	-	-	200	200	350	1075 (842)
Phenol, mg/ℓ	5	-	-	-	-	-	3.4 (2.7)
Chloride, mg/ℓ	760	-	-	-	-	-	512 (400)
Thiocyanate, mg/ℓ	5	-	-	-	-		3.4 (2.7)
Cyanide, mg/ℓ	46	-	-	-	-	-	31 (24)
Ammonia-N, mg/ℓ	17	-	-	-	-	-	11.5 (9)

[1] Concentrations indicated for maximum flow conditions.

Methanol Bottoms (Continuous Discharge): An estimated discharge of 190 gpm would result from the methanol distillation columns. This discharge is anticipated to contain approximately 5 ppm of methanol and 1 ppm of higher alcohols. The characteristics estimated for this discharge are shown in Table 13.1.

Pump Seal Water (Continuous Discharge): Water used to cool pump seals would be discharged to the process area sewers. An estimated discharge of 175 gpm would result from the use of water for pump seal cooling. Insignificant contaminants are anticipated in these discharges.

Railroad Service Shop Wastewaters (Continuous Discharge): A shop to service and repair locomotive engines would be provided. Wastewater discharges would occur from washing cars prior to repairs, as well as from runoff from the railroad tracks associated with the shop. It is proposed that wastewater discharges from the shop and runoff be pretreated to remove oil and settleable solid materials, and that the effluent be discharged to the process sewers. The average and maximum rates of flow of discharges from the railroad shop area are estimated at 30 and 50 gpm, respectively. The characteristics of pretreated effluent from the railroad shop are shown in Table 13.1.

Sanitary Wastewaters (Continuous Discharge): Sanitary facilities would be scattered throughout the plant area. To avoid problems of conveying relatively small volumes of sanitary wastes to a central location for treatment, it is envisioned that minor sanitary discharges from remote locations would be treated in individual septic tanks. Overflow from the septic tanks would be chlorinated using chlorine tablets, and discharged to the nearest process sewer. Centrally located package treatment plants providing secondary treatment and chlorination would be provided to serve major sanitary discharges.

Treated effluents from these package systems would also be discharged to the process sewer.

An estimated total quantity of 16,000 gpd (11 gpm) would be discharged from the various sanitary treatment facilities. The estimated characteristics of the pretreated sanitary wastewater discharges are:

BOD_5	100 mg/ℓ
TOC	50 mg/ℓ
COD	200 mg/ℓ
Suspended Solids	100 mg/ℓ
Total Dissolved Solids	350 mg/ℓ

The estimated flows and characteristics of process wastewaters, pretreated effluent from the railroad shop, pretreated sanitary wastewaters and controlled discharges of process area runoff are shown in Table 13.1. It is proposed to treat these wastewaters in on-site biological treatment facilities.

Boiler Blowdown (Continuous Discharge): There would be three classes of boilers in the coal gasification/methanol complex: high pressure steam boilers; Winkler waste heat recovery boiler; and Reformer waste heat recovery boiler. The estimated normal rate of flow of blowdown from the high pressure boilers is 135 gpm. The estimated normal rates of flow of blowdowns from the Winkler and Reformer waste heat recovery boilers are 37 and 15 gpm respectively. The principal contaminants are suspended and dissolved solids. The estimated suspended and dissolved solids concentrations are 30 and 350 mg/ℓ, respectively.

Cooling Tower Blowdown (Continuous Discharge): Waste heat is recovered from the condensing turbines and other processing areas using recirculated cooling water. This waste heat is

removed from the cooling water in cooling towers. The estimated flow of water in the recirculating cooling system is approximately 330,000 gpm. The cooling tower is designed to operate at three cycles of concentration. The estimated averages are: evaporation 9,980 gpm; drift 333 gpm, and blowdown 4,660 gpm. The characteristics of cooling tower blowdown are estimated based on using well water as make-up to the cooling towers. The cooling tower blowdown characteristics are:

Suspended Solids	100 mg/ℓ
Dissolved Solids	1,800 mg/ℓ
Iron	2 mg/ℓ

Coal Storage Area Runoff (Intermittent Discharge): During normal operation of the production facilities the only significant wastewaters generated within the approximately 100-acre coal storage and handling area would be from periodic washdown of certain coal handling equipment operating areas, and from precipitation runoff. It is estimated that the washdown wastewaters could amount to approximately 54,000 gpd. Precipitation runoff would, of course, be variable, both in quantity and frequency of occurrence, and is further dependent on the coefficient of runoff, a function of the type of surface on which the precipitation falls. In this case, a 24-hour rainfall with a frequency of return of once in 10 years is expected to result in a total quantity of runoff of approximately 3.9 million gallons from the coal storage and handling area.

All clean-up and precipitation runoff waters occurring in the coal storage and handling area would be collected and stored in the coal handling area stormwater storage pond prior to ultimate disposition. The storage pond is designed to retain precipitation runoff from a 10-year, 24-hour storm, plus 10 days of accumulated clean-up water.

It is anticipated that clean-up and precipitation runoff wastewaters which come into direct contact with the low sulfur coal could become somewhat contaminated with low concentrations of leached acid and miscellaneous heavy metals, although they would be diluted substantially by runoff which has not been in contact with coal. The estimated characteristics of these wastewaters, based on the EPA Development Document for the Steam Electric Point Source Category, are presented in Table 13.2.

These wastewaters would be pumped to pretreatment facilities at a controlled rate (up to 320 gpm) and, combined with boiler cleaning wastewaters, would be treated for the removal of heavy metals and residual suspended solids. At this pumping rate, coal handling area stormwater runoff from a 10-year, 24-hour storm would be treated over a period of 10 days. The treated effluent would be combined with biologically treated process wastewaters prior to discharge to Cook Inlet through the effluent diffuser.

Boiler Cleaning Wastewaters (Intermittent Discharge): Periodic cleaning of boiler tubes and boiler tubes fireside is necessary to maintain efficient heat transfer capability of the boiler. Similarly, the air preheaters require periodic cleaning to remove soot and fly ash accumulations on the air preheater surfaces. The quantities of cleaning wastewaters would depend upon the cleaning frequency and the amount of water used for cleaning, and are estimated for this project from information presented in the EPA Development Document for the Steam Electric Point Source Category.

There are three high-pressure boilers, each capable of generating 900,000 pounds per hour of steam. Each boiler is cable of producing an "equivalent power" of 150 mw (based on 6,000

Table 13.2

SUMMARY OF COAL AREA WASTEWATER CHARACTERISTICS[1]

Parameter	Concentration[2]
pH	3.0
Acidity, as $CaCo_3$	600.0
Sulfate	1,000.0
Dissolved Solids	1,500.0
Suspended Solids	300.0
Iron	180.0
Manganese	5.0
Copper	0.2
Zinc	1.2
Aluminum	40.0
Nickel	0.4

[1] Based on EPA Development Document for the Steam Electric Point Source Category

[2] All Units except pH are expressed in mg/ℓ.

pounds per hour steam per mw). Thus, the estimated volumes of boiler cleaning wastewater discharges are:

	Cleaning Frequency	Water Use Gals/ MW/Cleaning	Total Cleaning Waste Gals/Year
Boiler Tube	1/Year	1,800	810,000
Boiler Fireside	2/Year	800	720,000
Air Preheater	6/Year	700	1,890,000
		TOTAL	3,420,000

The estimated characteristics of boiler cleaning wastewaters are shown in Table 13.3. These wastewaters have high concentrations of various metals, and suspended and dissolved solids. The boiler cleaning wastewaters would be collected in a storage pond sized to handle the total discharge from one boiler cleaning. The cleaning wastewaters would be pumped to the pretreatement facilities at a controlled rate (up to 25 gpm) and, combined with coal handling area storm water runoff, would be treated for the removal of heavy metals and suspended solids. At this pumping rate, the boiler cleaning wastewater would be treated over a period of 15 days. The pretreated effluent would be combined with the biologically treated process wastewaters prior to discharge to Cook Inlet through the effluent diffuser.

Process Area Runoff (Intermittent Discharge): A substantial portion of the overall processing area (non-coal-handling) is occupied by process facilities and operations from which it is possible that minor drips, leaks or spills might occur. Thus, precipitation falling on these operating areas could inadvertently become slightly contaminated with miscellaneous organic constituents. Therefore, precipitation runoff from these operating areas would be collected and stored in a stormwater storage pond, and pumped at a reduced rate (0 to 340 gpm) to the process wastewater biological treatment facilities for treatment with the process wastewaters.

Table 13.3

SUMMARY OF BOILER CLEANING WASTEWATER CHARACTERISTICS[1]

Parameters	Boiler Tube	Boiler Fireside	Air Preheater	Total Cleaning Wastes [2]
Total Solids, mg/ℓ	11,000.0	13,400.00	12,075.0	11,695
Dissolved Solids, mg/ℓ	9,200.0	10,430.00	8,850.0	9,330
Suspended Solids, mg/ℓ	80.0	616.00	1,990.0	615
Chromium, mg/ℓ	4.4	2.50	6.0	4
Copper, mg/ℓ	166.0	1.25	3.4	90
Iron, mg/ℓ	1,077.0	150.00	974.0	820
Nickel, mg/ℓ	76.0	5 00	61.0	55
Zinc, mg/ℓ	36.0	7.50	7.0	22

[1] Based on information from the EPA Development Document for Steam Electric Power Generating Point Source Category

[2] Characteristics of combined cleaning wastewaters are based on estimated flow and characteristics of individual discharges

The stormwater storage pond is designed to retain potentially contaminated runoff associated with a 24-hour storm with a frequency of return of once in 10 years, a volume of approximately 5 million gallons. For purposes of establishing a conservative design basis, it is assumed that contaminated process area runoff has characteristics listed in Table 13.4.

Table 13.4

ESTIMATED CONTAMINATED PROCESS AREA RUNOFF CHARACTERISTICS

Parameter	Concentration, mg/ℓ
BOD	50
TOC	30
COD	100
Suspended Solids	75
Total Dissolved Solids	200

"Clean" Area Runoff (Intermittent Discharge): A significant portion of the total land area nominally classed as the process area (non-coal-handling area) would be essentially unused. Consequently, precipitation runoff from this unused area is expected to be essentially uncontaminated, and it should be possible to allow this runoff to occur without treatment. However, as a measure of insurance against the unforeseen, clean runoff waters would first be directed to a primary stormwater basin, which would serve as a primary separator, before being discharged to existing runoff drainage channels.

Treatment Requirements: Estimated requirements for treatment of anticipated industrial wastewater discharges are generally based on: 1) Effluent guidelines established by the EPA for several process-related major industrial manufacturing cate-

gories; and 2) the receiving water quality standards established by the Alaska Department of Environmental Conservation. Since synthetic fuel manufacturing is a relatively new industry, specific effluent guidelines have not yet been developed by EPA. As a result the approach to wastewater treatment would necessarily be technology based. Since the process wastewaters from the proposed coal gasification/methanol plant contain significant quantities of organic material, it is reasonable that these wastewaters should at least be treated to the secondary treatment level.

The remaining wastewaters anticipated from the proposed plant, such as blowdowns from cooling tower and boilers, coal storage area runoff and boiler cleaning wastes, are similar to those encountered in power generation plants. Therefore, treatment required for these wastewaters would be similar to that practiced by the power generating point source category.

Specific numerical limits for effluent discharges from the proposed wastewater treatment facilities would be included in the NPDES permit, which must be obtained from the EPA prior to the start-up and operation of the treatment facilities.

Additionally, effluent discharges would have to meet the state water quality standards, which regulate man-made alternations to waters of the state. Cook Inlet, at the point of proposed discharge, is classified as marine waters suitable for the growth and propagation of fish, shellfish, other aquatic life, and wildlife including seabirds, waterfowl and furbearers (18 AAC 70.020). Water quality parameters which are regulated for waters so classified are dissolved gas; pH; turbidity; temperature; dissolved inorganic substances; sediment; toxic and other deleterious organic and inorganic substances; color; petroleum hydrocarbons, oils and grease; radioactivity; total residual chlorine; and residues, floating solids, debris, sludge deposits,

foam and scum (18 AAC 70.020). The criteria to be met are also covered in 18 AAC 70.020.

Since the treated effluents are to be diffused into the waters of Cook Inlet, the requirements of 18 AAC 70.032 also apply. Compliance involves establishment of a mixing zone for which a permit must be obtained from the Alaska Department of Environmental Conservation. The mixing zone should be determined at the same time the NPDES permit and the Section 401 certification under the Clean Water Act are being prepared.

Wastewater discharges from the proposed gasification/methanol plant can be classified into one of the following categories:

- Wastewaters principally containing organic materials
- Wastewaters principally containing inorganics & heavy metals
- Wastewaters containing inorganic materials only

The treatment approach consists of segregating wastewaters according to the contaminants known to be present, and treating them individually prior to combining all effluents for final discharge to Cook Inlet.

Wastewaters containing principally organic materials would be generated in the char filtration area, methanol distillation columns, pump seal cooling waters, railroad shop, contaminated runoff from processing areas, and sanitary wastewaters. Although pump seal cooling water discharges should not require treatment, they are included in this category because they would be discharged to the process sewer. To protect the process wastewater treatment facilities from oil and dirt that may be present in discharges from the railroad shop, these wastewaters would be pretreated before discharge to the process sewer.

The characteristics estimated for wastewater discharges from processing operations (Table 13.1) indicate the need for treatment to reduce the BOD_5. Biological treatment using the activated sludge process would be utilized to provide greater than 90% BOD_5 removal. Biological treatment also would be expected to remove essentially all of the phenol and thiocyanates present in the wastewaters. Based on experiences of biological treatment of coke-oven wastewaters as practiced in the iron and steel industry, significant removal of cyanide (60 to 80%) is expected in the proposed biological treatment facilities. However, a conservative cyanide removal estimate of only 55% is projected for this biological treatment facility.

Wastewaters containing principally inorganic impurities and heavy metals would be those resulting from coal storage area runoff and boiler cleaning operations. These wastewaters would be provided with physical/chemical treatment using lime addition to remove heavy metals and suspended solids. Physical/chemical treatment using lime addition is a proven method which is expected to provide a very high degree of heavy metals removal.

Wastewaters containing predominantly inorganic impurities would be those resulting from water treatment, boiler blowdown and cooling tower blowdown. These discharges would not require treatment other than blending with the treated effluents from biological and physical/chemical treatment facilities.

The above approaches are selected as the basis of treating the various wastewaters generated by the proposed coal gasification/methanol plant. These approaches would be expected to provide a sufficient degree of treatment to ensure that the combined total treated effluent would be suitable for discharge to Cook Inlet.

To further ensure that the total treated effluent adequately mixes with the waters of Cook Inlet, it is proposed to discharge treated wastewaters through a multiple port diffuser located several thousand feet from shore, and thus in an area with a water depth of at least several fathoms even at mean low tide.

Studies have been conducted incident to similar diffuser discharges of municipal effluents from the City of Anchorage into Cook Inlet. Based upon these studies, it is anticipated that multiple port diffuser discharge of effluents from the CIRI/ Placer Amex wastewater treatment facilities would receive an adequate dilution in the waters of Cook Inlet.

The effluent diffuser would be approximately 1,300 feet long, varying in diameter from 30 to 42 inches. The ports would be double nozzles on 25-foot spacings, with a nozzle diameter equal to or less than 4 inches. The diffuser would be served by approximately a 42-inch-diameter effluent sewer connecting it to the effluent storage pond.

- Projected Effluent Characteristics

The estimated characteristics of effluents proposed to be discharged to Cook Inlet are shown in Table 13.5. The characteristics of process wastewaters and inorganics containing wastewaters which would be treated by biological and physical/chemical treatment methods are based on the capabilities and performance expected to result from these treatment methods. Characteristics of other wastewaters (boiler blowdown, cooling tower blowdown, ion-exchange regenerant wastes, and water treatment plant sludge centrate) are estimated based on the system operating characteristics. The total effluent proposed to be discharged is a summation of these individual effluents.

Table 13.5

SUMMARY OF PROJECTED EFFLUENT CHARACTERISTICS

Parameters[1]	Treated Bio Effluent	Boiler Blowdown	Treated Coal Pile Runoff and Boiler Cleaning Wastes	Ion-Exhange Regenerant Wastes	Treatment Plant Sludge Centrate	Cooling Tower Blowdown	Total Plant[3] Effluent
Flow, gpm - AVG	1304	187	298	185	123	3660	5757
MAX	1674	-	321	-	-	4660	7150
BOD_5	40	-	-	-	-	-	9
TOC	25	-	-	-	-	-	6
COD	200	-	-	-	-	-	45 (47)[2]
Suspended Solids	25	30	75	-	500	100	84
TDS	1073 (845)[2]	350	2000 (2550)[2]	7000	1000	1200	1750 (1700)
Phenol	0.001	-	-	-	-	-	Neg
Chloride	512 (400)	-	-	-	-	8	125 (102)
Thiocyanate	0.5	-	-	-	-	-	0.12
Cyanide, mg/ℓ	14 (11)	-	-	-	-	-	3
Ammonia Nitrogen	5	-	-	-	-	-	1
Total Heavy Metals [5]	-	-	0.5 (0.7)	-	-	-	0.03
Iron	-	-	9	-	-	2	1.75 (1.70)
Aluminum	-	-	1	-	-	-	0.06 (0.05)
pH	7-7.5	9+	9+	5-6	9+	7-7.5	7-8

1 All contaminant concentrations are expressed as mg/ℓ except pH
2 Concentration during maximum flow condition
3 Proposed to be discharged to Cook Inlet
4 Estimated to be present as complex cyanide
5 Includes copper, nickel and zinc

- Effects to Surface Water

The preferred receiving water for the treated industrial wastewater discharge would be Cook Inlet. The currents are swift and the exchange rate is high in Cook Inlet, which would facilitate rapid dilution of the discharge. Compliance with water quality standards in Cook Inlet would primarily be a function of the level of treatment employed. In applying the State of Alaska water quality criteria to surface waters, the Department of Environmental Conservation will, in its discretion, prescribe in wastewater disposal permits a volume of dilution for the effluent within the receiving water. Water quality standards may be violated within this mixing zone; however, the standard must be met at every point outside its boundaries. Meeting the water quality criteria at the mixing zone boundary essentially would be a function of the level of treatment employed.

Construction of an outfall line a sufficient distance across the shallow intertidal area of Cook Inlet to waters deep enough to provide adequate dispersion would produce significant impacts, although on a very short-term basis. The general biological nature of the northern half of Cook Inlet is impoverished. It is a transient zone for substantial parts of the north Cook Inlet salmon run migrating particularly to the Chuitna, Beluga and Susitna river systems. The fish spend a very short time in this portion of Cook Inlet, and consequently, no detrimental effects on the salmon runs would be expected. The resident population in the intertidal zone of Cook Inlet near this project consists almost exclusively of the clam, macoma. This is not a productive harvestable shellfish area. Consequently, effects on the intertidal community would probably be inconsequential.

Any surface runoff from the construction of the methanol plant and adjacent facilities would be directed almost exclusively in a southeasterly direction by the topography. There is only one

small, unnamed creek with its headwaters near the point of runoff discharge from plant construction activities. This is a very short stream and it discharges at the mouth of Nikolai Creek. Reasonable containment of runoff from plant construction should avoid heavy sediment discharges near this creek, however, should sedimentation occur, there are no significant fish populations to be affected.

Water for construction activities such as dust control and earthwork compaction may be drawn from Congahbuna Lake or Congahbuna Creek, immediately adjacent to the construction site. The use would be intermittent and the volume relatively low to preclude any noticeable impact on either source. Congahbuna Lake and Creek would be the preferred sources of non-potable water during the construction phase of the project.

The proposed town site located on the Nikolai escarpment bluff would most likely utilize Nikolai Creek as a receiving water for treated effluent from the sanitary sewer treatment facility. With secondary or tertiary treatment, a high quality effluent could be produced that would have a very minimal effect on Nikolai Creek. An alternative would be to pipe the discharge to the plant site and release it to Cook Inlet with the treated industrial wastewater effluent from the methanol plant treatment facility. There would be no significant impacts to Cook Inlet from this alternative.

The more significant area of surface water impact would be from the mining operation and activities in the transportation corridor. In the transportation corridor erosion and sedimentation, particularly during construction, would be the primary source of contamination to about nine different drainages crossing the corridor. Revegetation after construction and proper handling of runoff can minimize the additional sediment loads to an acceptable short-term level. In the mining operation, the runoff of surface waters in the discharge of heavily sediment laden water from the mine pit

would be the single largest water quality control problem in the overall project. In the initial stages of mine operation there would be large volumes of highly organic overburden to be disposed of before there would be large volumes of underlying non-organic material which could be utilized to build containment dikes and retention ponds. The mine plan would provide a control for this runoff which, if left unrestrained, could produce highly sediment laden discharges. Such discharges, particularly in the Chuitna drainage system, would exceed the volume the system could assimilate. Due to the higher quality of water and diversity of fish species present, the Chuitna River system would be the most seriously affected by a highly sediment-laden discharge.

The mine plan would provide for the trapping of most surface drainage waters before they get to the mining operation and would direct them back into the natural drainage systems, relatively untouched and with no increase in sediment load. The surface waters that get into the mining operation and the groundwater contribution within the mining operation would be highly sediment laden waters which would be retained in a series of sediment ponds before being released back into the natural drainage systems. Considerably more information must be known about the potential sediment load of the discharges and the chemistry of the water before reasonable assessments can be made of the impacts from the release of these waters into the river systems. Water from the sediment ponds at the Capps Mine would all end up in Capps Creek and flow into the already sediment-laden Beluga drainage system. The Capps Mine plan specifically excludes any drainage discharge to the Nikolai Creek system. Discharge from the sediment ponds in the Chuitna Center Ridge Mine area most likely would end up in some portion of the Chuitna River drainage system. Other alternatives more remote at this time are a possible discharge to the Nikolai drainage system or the Chakachatna drainage system, both of which would require more distant transportation of the discharge water. The Chuitna Mine area probably

would require a greater dewatering effort than the Capps Mine area and, consequently, there would be a larger discharge from the sediment control system. This is due to the Capps Mine being located at a higher altitude near the recharge area of the surrounding groundwater system, while the Chuitna Mine is at a lower elevation, receives more surface drainage, and is in a more productive area of the groundwater regime.

In summary, effects to the surface waters in Cook Inlet and adjacent to the plant should be negligible. There is a greater potential for perturbations to Nikolai Creek primarily due to its value as a fishery, however, if handled properly the impacts are anticipated to be minimal. The greatest potential for effects to the surface waters would be from the mining activities and construction in the transportation corridor. The following table provides a general overview of the project activities and surface water systems potentially affected by the proposed project.

Table 13.6

POSSIBLE INTERACTION OF PROJECT ACTIVITIES WITH SURFACE WATERS

Environmental Perturbation	Cook Inlet	Chuitna System	Nikolai System	Beluga System
Alter Surface Runoff	P	M	P, T	M
Alter Peak Flows		M	P	M
Alter Sedimentation	P	M	P,T	M
Alter Downstream Flows		M	P	M
Alter Stream Channels		M	M	M
Alter Water Chemistry	P	M	T	M

P = Potential effects from Plant activities
T = Potential effects from Town Site
M = Potential effects from Mines & Transportation Corridor

MAJOR REGULATORY REQUIREMENTS

A permit to appropriate water would be required from the Alaska Department of Natural Resources to withdraw and use groundwater resources. The authority for this requirement is Alaska Statute 46.15.030-185 "Appropriation and Use of Water" and 11 AAC 72 Water Use. Generally, it is not a complicated procedure to obtain this permit, but it could take a period of six to nine months. The permit should be applied for well in advance of the requirement.

If a direct surface source of water or an infiltration gallery near a stream is used, the same water rights permit would be required from the DNR except that if the application concerns use of a surface source of water, DNR asks the departments of Fish and Game and Environmental Conservation to review and comment on the proposed permit issuance. It is possible that under certain circumstances the Department of Fish and Game would require the applicant to also obtain an anadromous fish permit (Alaska Statute 16.05.870 "Protection of Fish and Game"), or that the DF&G would attach stipulations to the issuance of the DNR water rights permit.

ENVIRONMENTAL ACCEPTABILITY OF PROPOSED ACTION

There is no indication that groundwater could not be used for the purposes and in the quantities described above in a totally acceptable manner. It should also be possible to acceptably use water from the surface systems in the vicinity of the plant, but it likely would be necessary to demonstrate to the reviewing agencies that the water used is excess to the minimum amount required to sustain the existing fishery. The use of water from Congahbuna Lake or any of its drainages for intermittent construction requirements should be less controversial than obtaining permit approval to construct an infiltration gallery system near Nikolai Creek. Although there is still a lack of low winter season flow data for Nikolai Creek, indications

are that there is a sufficient reserve of water that could be intercepted before it reaches the creek and that the withdrawal could be permitted and done in an environmentally acceptable manner.