

Public-data File 86-70

COAL AND PEAT RESOURCE PROGRAMS FOR ALASKA

Description and Guide, Coal Programs of the
Alaska Division of Geological and Geophysical Surveys
Coal and Peat Investigations Section

By

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Alaska Division of
Geological and Geophysical Surveys

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THIS REPORT HAS NOT BEEN REVIEWED FOR
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Fairbanks, Alaska 99709

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Coal/Peat Resource Program
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COAL AND PEAT RESOURCE PROGRAMS FOR ALASKA¹
Description and Guide, Coal Programs of the
Alaska Division of Geological and Geophysical Surveys
Coal and Peat Investigations Section
G.R. Eakins, Section Chief

¹Compiled by R.D. Merritt, G.R. Eakins, and S.E. Rawlinson, DGGs Coal and Peat Investigations Section (January, 1986).

CONTENTS

| | Page |
|--|------|
| Introduction | |
| DGGS coal and peat staff | |
| Facts about Alaska coal | |
| Benefits from coal development | |
| Current coal resource activity in Alaska | |
| Coal investigations by DGGS | |
| DGGS long range objectives | |
| DGGS coal research capabilities | |
| Recent coal investigations by DGGS | |
| Current DGGS coal projects | |
| Future DGGS coal projects | |
| Organizations cooperating in Alaska coal studies | |
| Facts about Alaska peat resources | |
| Benefits from peat development | |
| Peat investigations by DGGS | |
| Current DGGS peat projects | |
| Future DGGS peat projects | |
| Organizations cooperating in Alaska peat studies | |
| Products of DGGS coal programs | |
| Products of DGGS peat programs | |
| Data needs survey | |

FIGURES

- Figure 1. Current coal resource activity in Alaska.....
- 2. Recent DGGs coal investigations.....
- 3. Future DGGs coal investigations.....
- 4. Current DGGs peat investigations.....

INTRODUCTION

This circular summarizes information on Alaska's coal and peat resources, current coal and peat developments and research, and the potential importance of these commodities to the state. In the last section input is sought from you or your organization concerning what type of coal or peat data or projects would be most helpful. The Division of Geological and Geophysical Survey (DGG5) staff will appreciate receiving your requests and comments on the program.

DGGS COAL AND PEAT STAFF

- .Gilbert R. Eakins, Chief, Coal and Peat Investigations Section
- .Stuart E. Rawlinson, Chief, Geologic Mapping Section
- .Milton A. Wiltse, Chief Geochemist
- .Roy D. Merritt, Coal Geologist, Project Manager, Coal Field Investigations
- .James G. Clough, Geologist
- .Larry L. Lueck, Geologist
- .Kathleen M. Goff, Geological Assistant
- .Jeff T. Kline, Geologist

FACTS ABOUT ALASKA COAL

- .Alaska's hypothetical coal resources of over 5.5 trillion short tons are equivalent in energy to between 7 and 20 trillion barrels of oil, which equates to 700 to 2,000 Prudhoe Bays (original recoverable reserves about 10 billion barrels).
- .It is estimated that Alaska contains coal resources equal to the contiguous United States. While there are 4,500 operating coal mines in the lower 48, there is presently only one producing coal mine in Alaska.
- .There are about 20 known significant coal fields in Alaska.
- .The approximate land area of Alaska thought to be underlain by coal-bearing geologic formations is about 50,330 mi² or 8.5 percent of the state.

- .The potential for discovery of new large coal deposits is great.
- .Probably 75 percent of the easily accessible lands suitable for coal mining in Alaska are held by the state.
- .About 55 percent of Alaska's coal is bituminous, 40 percent is subbituminous, 5 percent is lignite, and less than 1 percent is semianthracite and anthracite.
- .Alaskan deposits are among the most extensive low-sulfur coal known, and because of very low emissions of sulfurous gases during combustion, Alaskan coals are environmentally among the cleanest and safest burning in the world.
- .Alaska coal production in 1984 was about 850,000 short tons valued at nearly \$24 million. Production in 1985 was 1.4 million short tons, which set a new all-time coal production record for Alaska.
- .Coal is undoubtedly the most important resource commodity in Alaska's energy future, and could provide a source of revenue and employment long after the state's petroleum resources are depleted.

BENEFITS FROM COAL DEVELOPMENT:

- .Diversification and expansion of industries within the state.
- .Increased employment of Alaskans in a stable industry.
- .Increased infrastructure, including coal harbors and ship-loading facilities than can be used for multi-resource development.
- .Increase of the tax base and state revenue.
- .The export of coal to foreign nations can decrease the U.S. trade deficit.

- .A stable long-range energy supply for some remote villages.
- .Cultivation of trade between Alaska and Pacific-rim nations seeking to diversify their sources of energy supply.
- .Development of mine-mouth power plants at appropriate locations leading ultimately to lower electricity costs.
- .Development of new technologies for coal liquefaction and gasification.
- .Development of mining and reclamation technologies that can be applied in Alaska's climates.

CURRENT COAL RESOURCE ACTIVITY IN ALASKA (fig. 1):

| <u>Coal field</u> | <u>Current activity</u> |
|--------------------------------|---|
| Beluga | Extensive exploration drilling, premine feasibility and environmental baseline studies (Beluga Coal Company and Diamond Alaska Coal Company). |
| Bering River | Exploration drilling, port and transportation feasibility studies (Bering Development Corporation). |
| Cape Beaufort (Northern) | Pre-development drilling (Howard Grey & Associates for the North Slope Borough). |
| Chicago Creek | Reconnaissance drilling, resource evaluation, and feasibility studies (Alaska DGGs). |

- Chignik-Herenden BayGeologic field work, continuing resource appraisal (Alaska DGGS).
- Jarvis CreekDrilling for reserve definition, premine planning and engineering design studies (Delta Coal Company).
- MatanuskaDrilling and mine feasibility studies (Valley Coal Company); continuing feasibility study of reopening Evan Jones underground mine (Evan Jones Coal Company).
- NenanaProducing nearly 1.4 million short tons in 1985, about half for export to South Korea (Usibelli Coal Mine, Inc.).
- YentnaDrilling, continuing reserve evaluation, and preliminary mine design (Mobil Resources).

COAL INVESTIGATIONS BY DGGS

Coal programs of the Alaska Division of Geological and Geophysical Surveys (DGGS) attempt to balance the need for general information on all the coal fields of Alaska with demands for site-specific information on certain coal deposits. The results of basin analyses are compiled into regional atlases of major coal fields. Site-specific studies evaluate coal resources near Alaska villages and bush communities that could use the coal as a local fuel source. Important aspects of the programs are:

.DGGGS has been conducting coal investigations for the past 5 years and plans to further expand the state's coal program.

.DGGGS is the principal agency conducting field investigations, research, and exploration relating to Alaska's coals.

.DGGGS has developed a coal resource library and serves as a repository for information dealing with Alaska's coal.

.DGGGS determines the coal resources and development potential of Alaska's lands. Resource assessments include analyses to determine coal-combustion properties, ash-fusion characteristics, and trace-element contents which are of primary interest to potential customers.

.DGGGS cooperates with industry, Native organizations, and other state and federal agencies and serves in a technical advisory capacity in matters pertaining to Alaska's coals.

.DGGGS provides information used to determine state land designations (AAC 85.010) used for issuing coal leases and coal prospecting permits.

DGGGS long range objectives:

.Promote the spread of knowledge about Alaska's vast coal resources and the role these resources will have in our future.

.Support data collection and research to increase growth in Alaskan coal and coal-related industries.

.Anticipate and investigate potential problems associated with the mining and use of Alaska's coals.

- .Accurately determine the coal reserves and the potential for coal development.
- .Explore the feasibility of using coal in remote villages of Alaska to offset rising energy costs.
- .Compile atlases showing the distribution, structure, stratigraphy and resource estimates of Alaska coal.

DGGS coal research can provide data on:

- .Coal distribution and potential minability in Alaska.
- .Alternative uses for Alaska coal and coking potential.
- .Geological conditions affecting surface mining and reclamation.
- .Depositional modeling to aid coal exploration and mine planning.
- .Chemical, mineralogical, and physical characterization of Alaskan coals.
- .Coal petrology and its applications to coal utilization.
- .Pyrite, sulfur, and trace-element content of Alaskan coals and their influences on air and water quality.
- .Stratigraphic studies of coal-bearing formations.
- .Coal metamorphism and resulting rank-upgrading.
- .Historical development and current coal mining activity in Alaska.

RECENT COAL INVESTIGATIONS BY DGGS (See fig. 2)

- .Northwest Alaska* (Cape Beaufort area)
 - .Unalakleet*
 - .Koyuk*
 - .St. Lawrence Island*
 - .Point Hope (Lisburne) field
 - .Kobuk field
 - .Tramway Bar
 - .Sinuk River* and other sites on Seward Peninsula
 - .Nenana coal basin
 - .Farewell-White Mountain area, southwest Alaska
 - .Susitna lowland (Beluga and Yentna fields)
 - .Matanuska Valley
 - .Unga Island
- *Sites that have included exploration drilling operations

CURRENT DGGS COAL PROJECTS (See fig. 2)

- .Chicago Creek, Seward Peninsula: exploration drilling and preliminary mine feasibility.
- .Chignik and Herendeen Bay coal fields: field resource investigation and compilation of coal atlas.

FUTURE DGGs COAL PROJECTS (See fig. 3)

- .Nulato field (project initiated)
- .Kenai field (1986)
- .Western Nenana trend fields
- .Bering River coal field
- .North Slope coal fields

ORGANIZATIONS COOPERATING IN ALASKA COAL STUDIES:

- .U.S. Geological Survey: geologic mapping of coal-bearing formations and compiling data on Alaska's coal resources.
- .U.S. Bureau of Mines: geologic mapping and mineral resource assessments.
- .U.S. Bureau of Land Management: mineral resource assessments, land status, permitting.
- .U.S. Corps of Engineers: confer on coastal developments; harbors.
- .University of Alaska Mineral Industry Research Laboratory: performs coal analyses for DGGs and research on the character, use and development of coal in Alaska.
- .University of Alaska Department of Geology and Geophysics: provides student interns to work with DGGs; holds seminars on coal; confers with DGGs staff on coal programs.
- .Alaska Power Authority: interchange of fundings for coal resource and feasibility studies on coal use in remote areas of the state.

- .Alaska Division of Mining: DGGs provides coal resource information to help determine what lands should be leased for coal and type of leases.
- .Alaska Department of Commerce and Economic Development, Office of Mineral Development: with DGGs jointly makes an annual survey of the mineral industry and publishes a formal report on mineral activities.
- .Alaska Native village and regional corporations: have supported stated coal exploration projects and feasibility studies on their land.
- .Borough governments: have cooperated on and supported mineral resource studies.

FACTS ABOUT ALASKA PEAT RESOURCES

- .Recent estimates indicate that approximately 25 million acres of Alaska contain highly organic soil or peat.
- .The total energy estimated as potentially available from unfrozen peat resources in Alaska are about 19 quads (1 quad= 10^{15} Btu), which theoretically could supply Alaska's energy needs for 100 years.
- .At least 125,000 yd³ of horticultural peat valued at nearly \$860,000 were produced in Alaska in 1984.
- .Many Alaska bush villages, including McGrath and Dillingham, continue to evaluate peat as an energy or horticulture resource.
- .Three Anchorage-area companies collectively account for 80 percent of statewide production, which is used for horticultural purposes.
- .Horticultural peat is mined from at least four pits in the Fairbanks area and two pits near Willow.

BENEFITS FROM PEAT DEVELOPMENT

- .Provides a local source of horticultural material for which there is a demand.
- .Develops procedure for producing and utilizing peat for heating purposes which could be cost effective.
- .Provides local employment.

PEAT INVESTIGATIONS BY DGGS

DGGS Program Objectives:

- .To determine the amount and location of fuel-grade and horticultural peat.
- .To provide the public, industry, and government with information on peat resources that will help them to make sound decisions on land use.
- .To provide detailed and reliable geologic maps at 1:63,360 scale or larger showing areas of high fuel-grade peat potential.

DGGS Peat Research Capabilities:

- .Field mapping of peat deposits.
- .Color infra-red aerial photographic interpretation.
- .Drilling and coring operations.
- .Sampling methods and geologic correlation.

- .Resource appraisal.
- .Proximate and ultimate laboratory analyses.
- .Comparison data plots.
- .Petrographic and scanning electron microscopic examinations.

CURRENT DGGS PEAT PROJECTS (fig. 4)

- .Dillingham area---resource investigation of selected peatlands
- .Kenai area
- .Susitna River valley---Roger's Creek and Houston areas
- .McGrath area

FUTURE DGGS PEAT PROJECTS (fig. 4)

- .Susitna River valley
- .Alaska Peat Resource Map

ORGANIZATIONS COOPERATING IN ALASKA PEAT STUDIES

- .Town of McGrath
- .Alaska Power Authority
- .Department of Energy

PRODUCTS OF DGGS COAL PROGRAMS:

Report number and authors

Report title

Public-data File 83-1
(G.R. Eakins and others, 1983)

Northwest coal
transportation study

Public-data File 83-6
(R.G. Schaff and R.D. Merritt, 1983)

Alaska's coal provinces and
resources

Public-data File 85-19
(R.D. Merritt, 1985)

Field trip guidebook:
Lignite Creek and Healy
Creek fields, Nenana basin,
Alaska

Public-data File 85-20
(R.D. Merritt, 1985)

Coal resources, exploration,
and development in Alaska

Public-data File 85-21
(R.D. Merritt, 1985)

Alaska coal summary - 1983

Public-data File 85-22
(R.D. Merritt, 1985)

Alaska coal data base;
explanation guide to
accompany map of Alaska's
coal resources

Public-data File 85-41
(R.D. Merritt, 1985)

Coal atlas of the Nenana
basin, Alaska

Public-data File 85-45
(R.D. Merritt, 1985)

Coal atlas of the Matanuska
Valley, Alaska

Public-data File 85-43
(R.D. Merritt, 1985)

Selected Alaska coal
references by quadrangle

Information Circular 17
(R.G. Schaff and R.D. Merritt, 1983,
rev. 1984)

Coal resources of Alaska

Open-file Report 142
(R.D. Merritt and others, 1982)

Coal investigation of the
Susitna lowland, Alaska

Open-file Report 160
(D.M. Solie and D.B. Dickey, 1982)

Coal occurrences and
analyses, Farewell-White
Mountain area, southwest
Alaska

Report of Investigations 84-24
(R.D. Merritt and M.A. Belowich, 1984)

Coal geology and resources
of the Matanuska Valley
Alaska

Special Report 17
(C.N. Conwell and others, 1982)

Coals of the Anchorage
Quadrangle, Alaska

Special Report 36
(R.D. Merritt and G.R. Eakins, 1984)

Coal resources of Alaska, in
Alaska's resource inventory
1984

(T.K. Bundtzen, G.R. Eakins, and others, 1982-1984 editions)

Special Report
(R.D. Merritt, in prep.)

Alaska Mines and Geology
(R.D. Merritt, 1982)

Professional Report 82
(R.D. Merritt, in press)

Public-data File 83-3
(J.G. Clough and others, 1982)

Public-data File 83-4
(J.G. Clough and others, 1982)

DGGS in-house Special Report prepared for Governor Bill Sheffield's Pacific-rim Trade Mission (R.D. Merritt, 1984)

Geological Society of America Special Paper (R.D. Merritt, in press)

International Journal of Coal Geology
(R.D. Merritt, 1985)

Sedimentary Geology
(R.D. Merritt and D.L. McGee, in press)

Special Report 31, 33, 38
Coal exploration activity, drilling, development projects, production, in Alaska's mineral industry (annual updates)

Map of Alaska's coal resources

Alaska's fifth coal-lease sale on May 17; a modest new beginning after 11-year hiatus

Coal atlas of the Susitna lowland

Preliminary report on the Hockley Hills-Singauruk River area coal occurrences.

Preliminary report on Kallarichuk River area coal occurrences

Coal resources, in Selected data and information on the mineral, petroleum, coal, and timber resources of the People's Republic of China, Republic of Korea, and Japan.

Paleoenvironmental and tectonic controls in major coal basins of Alaska

Review of coking phenomena in relation to an occurrence of prismatically-fractured natural coke from the Castle Mountain mine, Matanuska coal field, Alaska

Depositional environments and resource potential of Cretaceous coal-bearing strata at Chignik and Herendeen Bay, Alaska Peninsula

| | |
|--|--|
| 1984 Keystone Coal Industry Manual (R.D. Merritt and C.N. Conwell) | Alaska: Coal fields and seams section |
| 1985 Keystone Coal Industry Manual (R.D. Merritt) | Alaska: Coal fields and seams section |
| 1986 Keystone Coal Industry Manual (R.D. Merritt, in press) | Alaska: Coal fields and seams section |
| Stevens Exploration Management Corp. (1983; PDF 83-2) | The Chicago Creek and Norton Sound area coal exploration programs-1982 |
| C.C. Hawley and Associates, Inc. (1983) | Northwest Alaska coal investigation |
| Open-file Report 30 (D.L. McGee, 1972) | Coal reserve study, Chuitna-Beluga-Capps area, Alaska |
| Open-file Report 51 (W.M. Lyle and N.J. Bragg, 1974) | Coal bibliography of Alaska |
| Open-file Report 49 (D.C. Hartman and others, 1972) | Stratigraphy of the Kenai Group, Cook Inlet |
| Open-file Report 41 (D.L. McGee and K.M. O'Connor, 1975) | Mineral resources of Alaska ¹ and the impact of federal land policies on their availability---coal |
| Open-file Report 74 (D.L. McGee and K.M. O'Connor, 1975) | Cook Inlet Basin subsurface coal reserve study |
| Open-file Report 107E | Bedrock geology and coal occurrences, Talkeetna- Kashwitna area, Susitna River Basin |
| Special Report (C.N. Conwell and L.C. Schell, 1977) | Energy resource map of Alaska |
| Special Report 8 (C.N. Conwell and D.M. Triplehorn, 1978) | Herendeen Bay-Chignik coals, southern Alaska Peninsula |
| Short notes on Alaskan Geology - Geologic Report 51 (C.N. Conwell and D.M. Triplehorn, 1976) | High quality coal near Point Hope, northwestern Alaska |
| Alaska Mines and Geology (C.N. Conwell, 1976) | Samples from Realy coal field analyzed |

| | |
|--|---|
| Unpublished internal report (C.N. Conwell, 1977) | Cook Inlet-Susitna coal fields |
| Unpublished internal report (P.L. Dobej and others, 1975) | Capps Glacier-Beluga coal economic resource analysis |
| Unpublished internal report (D.L. McGee and K.S. Emmel, 1979) | Alaska coal resources |
| <u>in</u> Focus on Alaska's coal '75, University of Alaska Mineral Industry Research Laboratory Report 37 (R.G. Schaff, 1976) | The role of the Alaska Division of Geological and Geophysical Surveys |
| <u>in</u> Focus on Alaska's coal '75, University of Alaska Mineral Industry Research Laboratory Report 37 (D.L. McGee, 1976) | Gasification prospects and application in Cook Inlet, Alaska |
| <u>in</u> Focus on Alaska's coal '80, University of Alaska Mineral Industry Research Laboratory Report 50 (G.R. Eakins and C.N. Conwell, 1981) | Coal programs of the Alaska Division of Geological and Geophysical Surveys |
| <u>in</u> Focus on Alaska's coal '80, University of Alaska Mineral Industry Research Laboratory Report 50 (C.N. Conwell and D.M. Triplehorn, 1981) | Coal for Alaska villages |
| Mining Engineering (C.N. Conwell, 1971) | Alaskan coals may prove a big plus in the future export picture |
| Transactions AIME (C.N. Conwell, 1972) | Alaskan coals |
| The Coal Miner (C.N. Conwell, 1977) | Land reclamation is an integral part of the only operational coal mine in Alaska |
| Miller and Freeman Publ. (<u>in</u> Stability in coal mining; C.N. Conwell and Stanley Weston, 1978) | Reclaiming mining lands in Alaska |
| <u>in</u> Surface coal mining in Alaska, by Committee on Alaskan Coal Mining and Reclamation (COACMAR; R.G. Schaff, 1980) | Geologic characteristics of Alaskan coal deposits |

University of Alaska SMI Portal
(R.D. Merritt, 1982)

Framboidal pyrites in
Tertiary continental-fluvial
coals of south-central
Alaska

Resource Development Council's
Proceedings of International
Conference on Coal, Minerals, and
Petroleum
(R.G. Schaff and R.D. Merritt, 1983)

Alaska's coal provinces and
resources

Journal of Commerce and Pacific-rim
Reporter
(R.D. Merritt, 1984)

Coal mine activity listed;
ongoing development

in Alaska's energy resources by Gene
Rutledge

(Reprint of above article)

Noyes Data Corporation
(R.D. Merritt, 1983)

Coal overburden; geological
characterization and premine
planning

Noyes Data Corporation
(R.D. Merritt, 1986)

Coal exploration, mine
planning, and development

Journal submission
(R.D. Merritt, in prep.)

Chronicle of Alaska
coal-mining history

Journal submission
(R.D. Merritt, in prep.)

Coal resources of the
Miocene-aged Unga
Conglomerate Member, Bear
Lake Formation, Unga Island,
Alaska

PRODUCTS OF DGGS PEAT PROGRAM

Report number and authors

Report title

Open-file Report 150
(R.W. Huck and S.E. Rawlinson, 1982)

Peat-resource inventory of
south-central Alaska, a data
report

Open-file Report 150A
(S.E. Rawlinson and others, 1982)

Peat-resource map,
south-central Talkeetna B-1
Quadrangle

Open-file Report 150B
(S.E. Rawlinson and others, 1982)

Peat-resource map,
southwestern Talkeetna B-1
Quadrangle

Open-file Report 150C
(S.E. Rawlinson and others, 1982)

Peat-resource map,
north-central Talkeetna A-1
Quadrangle

| | |
|---|---|
| Open-file Report 150D (S.E. Rawlinson and others, 1982) | Peat-resource map, northwestern Talkeetna A-1 Quadrangle |
| Open-file Report 150E (S.E. Rawlinson and others, 1982) | Peat-resource map, southeastern Talkeetna A-1 and southwestern Talkeetna Mountains A-6 Quadrangles |
| Open-file Report 150F (S.E. Rawlinson and others, 1982) | Peat-resource map, south-central Talkeetna A-1 Quadrangle |
| Open-file Report 150G (S.E. Rawlinson and others, 1982) | Peat-resource map, southwestern Talkeetna A-1 Quadrangle |
| Open-file Report 150H (S.E. Rawlinson and others, 1982) | Peat-resource map, western Anchorage B-8 Quadrangle |
| Open-file Report 150I (S.E. Rawlinson and others, 1982) | Peat-resource map, Tyonek D-1 Quadrangle |
| Open-file Report 150J (S.E. Rawlinson and others, 1982) | Peat-resource map, Anchorage C-8 Quadrangle |
| Open-file Report 150K (S.E. Rawlinson and others, 1982) | Peat-resource map, Tyonek C-1 Quadrangle |
| Open-file Report 150L (S.E. Rawlinson and others, 1982) | Peat-resource map, Anchorage B-8 Quadrangle |
| Open-file Report 150M (S.E. Rawlinson and others, 1982) | Peat-resource map, Tyonek B-1 Quadrangle |
| Open-file Report 151 (S.E. Rawlinson and others, 1982) | Peat-resource map, southwestern Dillingham A-7 Quadrangle |
| Open-file Report 152 (S.E. Rawlinson and S.B. Hardy) | Peat-resource map of Alaska |
| Alaska Mineral Resources, 1981-82 (T.K. Bundtzen and others, 1982) | Peat resource estimate |
| Special Report 31, Alaska' mineral industry, 1982 (G.R. Eakins and others, 1983) | Peat production |
| Special Report 33, Alaska's mineral industry, 1983 (T.K. Bundtzen and others, 1984) | Peat production |

Special Report 38, Alaska's mineral
industry, 1984
(G.R. Eakin and others, 1985)

Peat production

Special Report 36, Alaska's resource
inventory, 1984
(by S.E. Rawlinson, in W.W. Barnwell
and K.S. Pearson)

Peat resources of Alaska

DATA NEEDS SURVEY

Please note below by priority the needs of your organization or yourself
for information on Alaska coal or peat resources or both (see suggestions on
next page); please detach and return to the address listed below. Feel free
to use additional sheets as needed.

Information needs:

- 1.
- 2.
- 3.
- 4.
- 5.

Suggested topics to consider:

1. Areas to be classified, leased, disposed of, exchanged, relinquished, or developed and where coal or peat resources may be present.
2. Types of maps needed, appropriate scales of geologic and resource maps, ranking system of tracts.
3. Potential access and transportation routes to coal or peat deposits.
4. Coal, overburden, or peat qualities that may significantly effect the environment.
5. General information on any particular coal or peat deposit in Alaska.

Mail to:

Mr. G.R. Eakins, Chief Coal and Peat Investigations Section
Alaska Division of Geological and Geophysical Surveys
794 University Avenue, Basement
Fairbanks, Alaska 99709

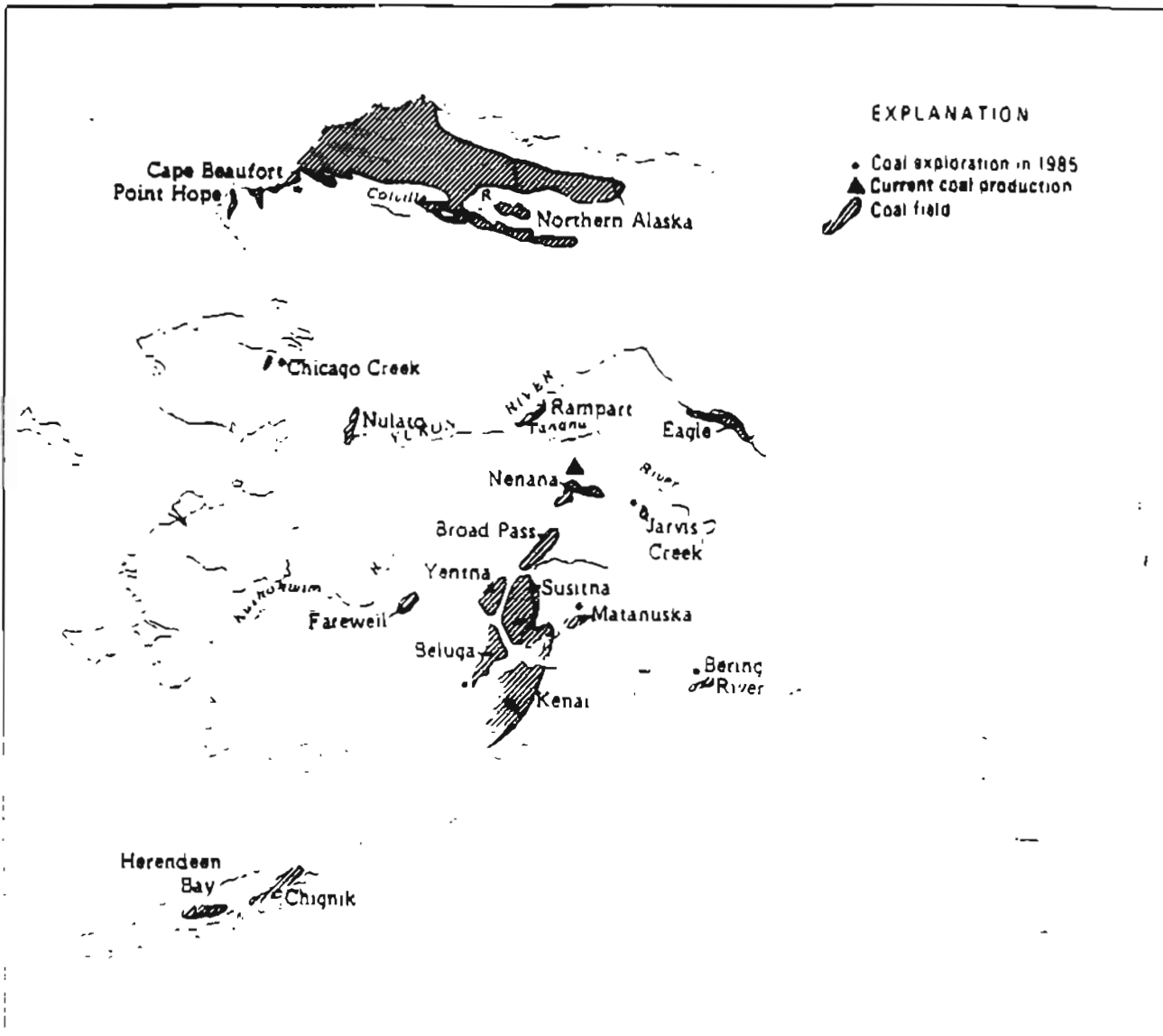


Figure 1. Major coal fields of Alaska and sites of current coal exploration and production.

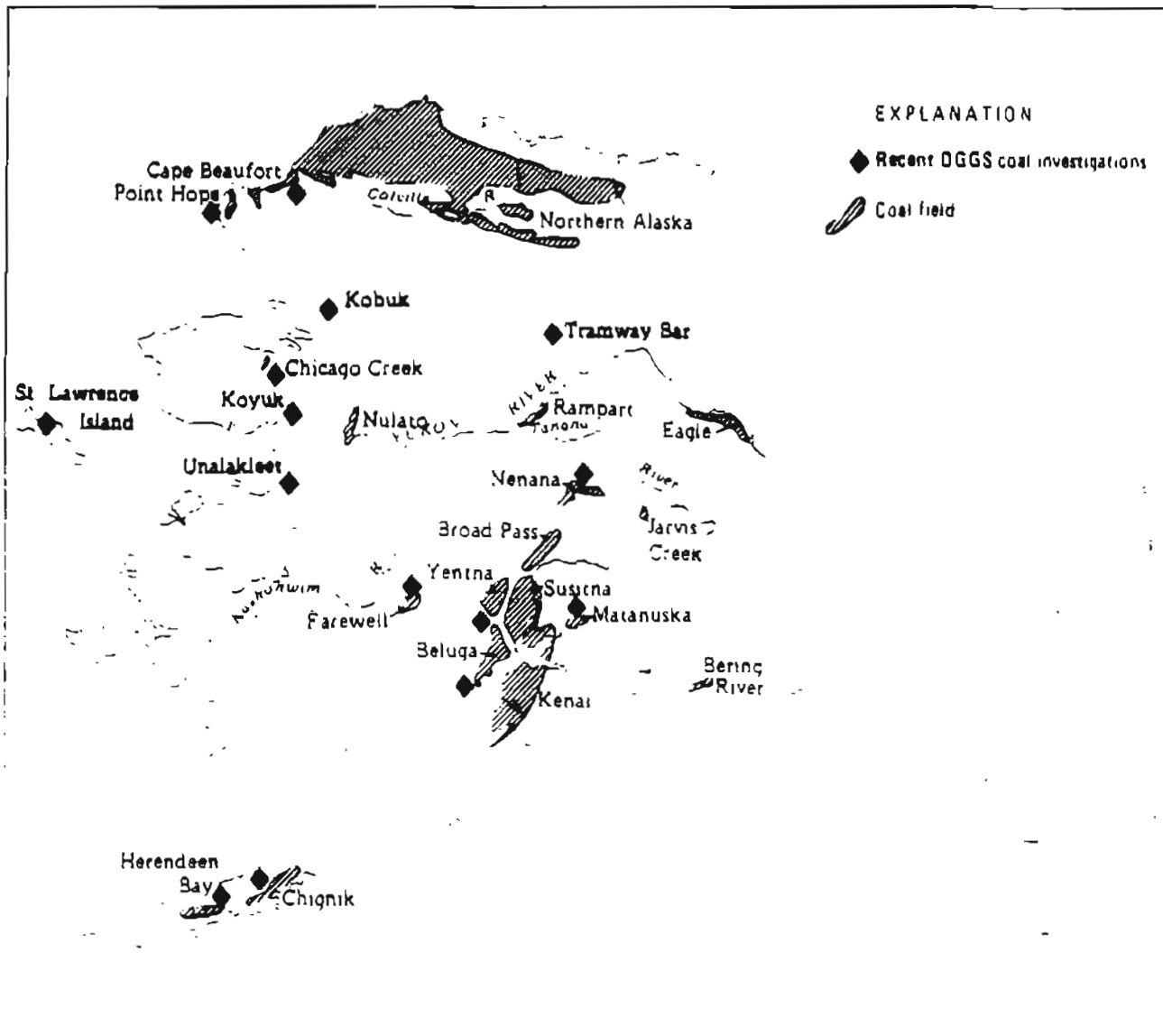


Figure 2. Major coal fields in Alaska and sites of recent DGGs coal investigations.

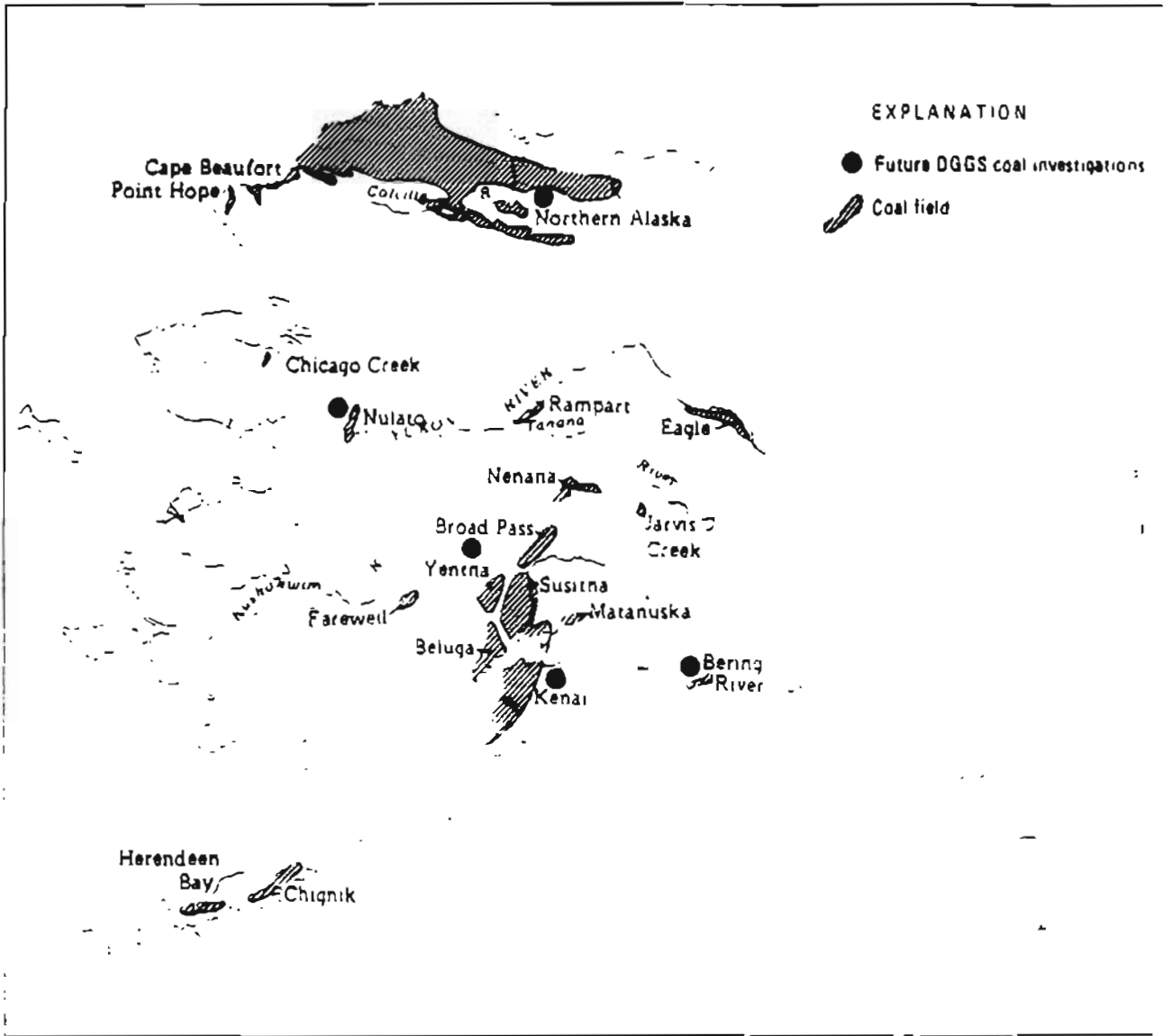
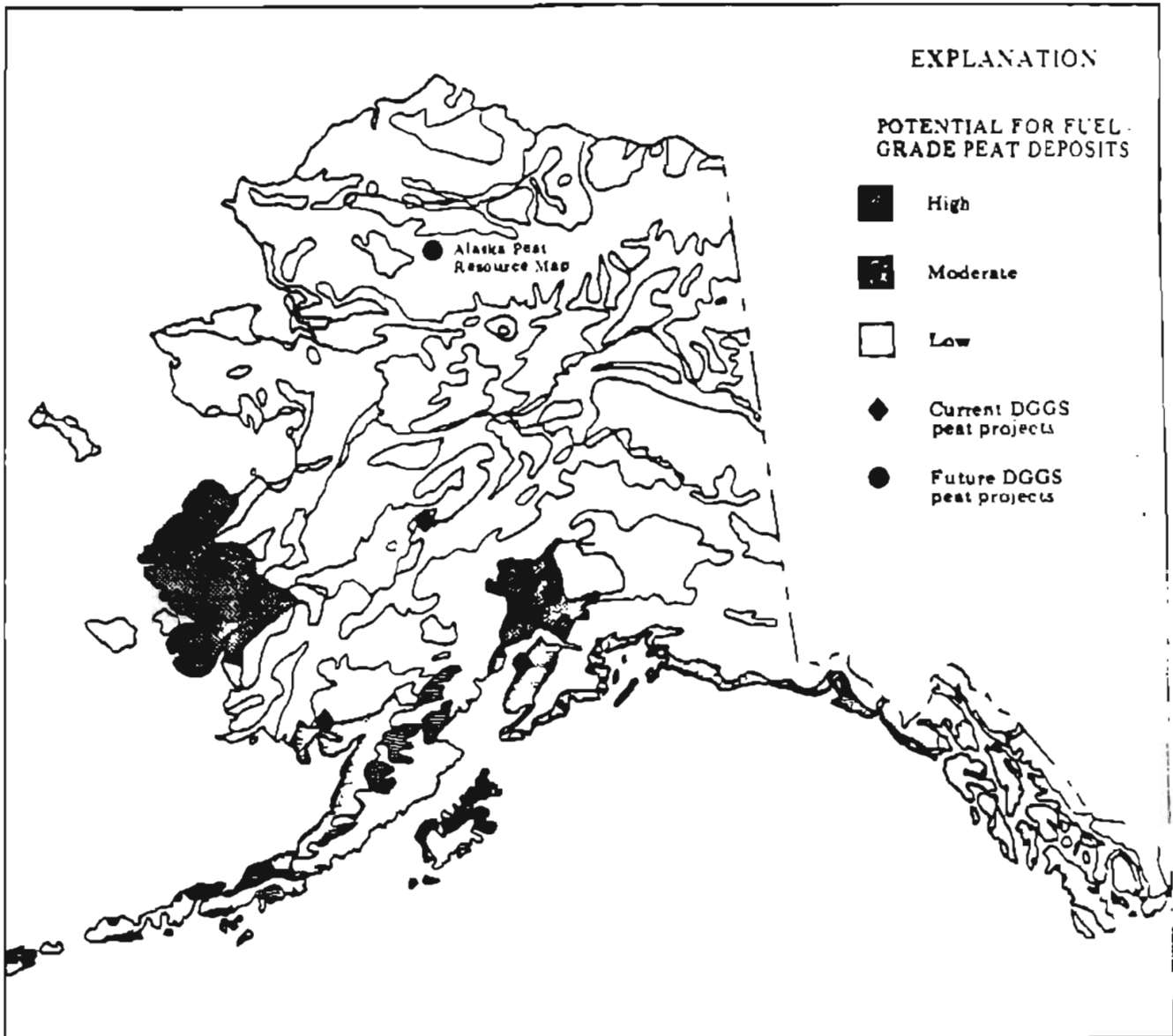


Figure 3. Major coal fields of Alaska and sites where future DGGs coal investigations are planned.



See original for shading of 'Low' potential.

Figure 4. Potential for fuel-grade peat deposits in Alaska and sites of current and future DGGs peat projects.