

**West Susitna Access Reconnaissance Study
West Susitna Access to Resource Development**

Transportation Analysis Report

2 RESOURCES INVENTORY

Part 1 of 2

Prepared for:



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Division of Program Development

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January 2014

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Table of Contents

EXECUTIVE SUMMARY	ix
1 INTRODUCTION.....	1-1
1.1 Study Overview.....	1-1
1.2 Study Setting.....	1-1
1.3 Background Information.....	1-3
1.3.1 Use of Public Lands.....	1-3
1.3.2 Roads to Resources Initiative Overview.....	1-4
1.4 General Study Methodology	1-6
1.5 Report Contents	1-6
2 RESOURCE INVENTORY	2-1
2.1 Data Collection and Interviews.....	2-1
2.2 Mineral Resources	2-5
2.2.1 Hardrock Mineral Exploration Activities	2-8
2.2.2 Placer Gold Mining Activities	2-12
2.2.3 Coal Exploration and Development Activities.....	2-13
2.3 Oil and Gas Resources	2-19
2.3.1 Current Exploration and Production Activities Snapshot	2-19
2.3.2 Other Oil and Gas Resources Potential.....	2-24
2.4 Forestry/Timber Resources.....	2-26
2.5 Agricultural Resources.....	2-33
2.6 Alternative Energy Resources.....	2-36
2.6.1 Geothermal Resources: Mount Spurr Geothermal Leases	2-36
2.6.2 Hydropower Resources: Chakachamna Hydroelectric Project	2-36
2.6.3 Woody Biomass Resources: Susitna Valley High School Project and the MSB ..	2-37
2.7 Recreational Resources	2-40
3 INFRASTRUCTURE INVENTORY.....	3-1
3.1 Transportation Infrastructure.....	3-3
3.1.1 Roadways.....	3-3
3.1.2 Aviation Access	3-4
3.1.3 Railroads.....	3-6
3.1.4 Port Facilities	3-7
3.1.5 Other Proposed Transportation Infrastructure.....	3-8
3.2 Energy Infrastructure.....	3-8
3.2.1 Pipelines.....	3-8
3.2.2 Fuel Storage Facilities	3-8
3.2.3 Power Generation Facilities and Electrical Distribution.....	3-9
3.2.4 Other Proposed Energy Infrastructure Sources or Needs.....	3-9
4 ALTERNATIVES DEVELOPMENT.....	4-1
4.1 Corridor Development Methodology	4-1
4.2 Previously Identified Alignments in the Study Area	4-2
4.2.1 McGrath-Upper Cook Inlet Corridor, DNR-DGGS 1992	4-4
4.2.2 Chuitna River to Goose Bay Corridor, Department of Highways 1972.....	4-4
4.2.3 Talkeetna-McGrath-Ruby Proposed Road Route, Bureau of Public Roads 1959 ..	4-5

4.3	Susitna River Crossing Location	4-6
4.3.1	Introduction	4-6
4.3.2	Crossing Location Options and Analysis	4-7
4.4	Environmental Constraints	4-12
4.4.1	Constraints Analysis	4-12
4.4.2	Constraints	4-13
4.5	Preliminary Corridors	4-28
4.5.1	Step 1: Preliminary Corridor Segments	4-28
4.5.2	Step 2: Preliminary Corridor Segment Screening - Dismissed Segments	4-30
4.5.3	Step 3: Proposed Access Routes	4-34
5	ENGINEERING OF RESOURCE ACCESS ROUTES.....	5-1
5.1	Preliminary Design Criteria	5-1
5.1.1	Functional Classification	5-2
5.1.2	Other Design Considerations based on Interview-Identified Needs	5-3
5.2	Additional Engineering Considerations	5-5
5.2.1	Seismicity	5-5
5.2.2	Hydrologic Considerations	5-8
5.2.3	Geological and Geotechnical Considerations	5-8
5.3	Proposed Access Routes	5-11
5.3.1	North Petersville Access Route.....	5-13
5.3.2	North Skwentna Access Route	5-15
5.3.3	Middle Susitna-Skwentna River Access Route.....	5-17
5.3.4	Beluga Access Route.....	5-19
5.3.5	Deshka Variant Access Route	5-21
5.4	Preliminary Cost Estimates	5-23
5.4.1	Assumptions for Cost Estimate Development.....	5-25
6	EVALUATION OF PROPOSED ACCESS ROUTES	6-1
6.1	Resource Accessibility.....	6-1
6.2	Land Status	6-6
6.3	Wetlands	6-6
6.4	Terrain Types and Road Grades	6-7
6.5	Seismicity	6-8
6.6	Hydrologic Considerations	6-9
6.7	Geological and Geotechnical Considerations	6-9
7	SUMMARY AND NEXT STEPS.....	7-1
7.1	Identified Data Gaps and Next Steps.....	7-3

Appendices

Appendix A	Preliminary Design Criteria Report
Appendix B	Proposed Access Routes Map Index
Appendix C	Geotechnical Reconnaissance Report
Appendix D	Preliminary Cost Estimate Details
Appendix E	Annotated Bibliography
Appendix F	Economic Considerations

Tables

Table ES-1. Proposed Access Routes Summary	xi
Table 2-1. Entities Contacted and/or Participated in the Resources Interviews	2-3
Table 2-2. Major Hardrock Mineral Exploration Activities in the Study Area.....	2-8
Table 2-3. Kiska’s Whistler Deposit Resource Estimates, 2011	2-9
Table 2-4. Estimated Coal Resources Potential in or near the Study Area	2-14
Table 2-5. Oil and Gas Units/Fields in the Study Area, as of November 2013.....	2-19
Table 2-6. Forest Resources in the Study Area per DNR Planning Regions.....	2-28
Table 2-7. Agricultural Resources in the Study Area per DNR Planning Regions	2-33
Table 2-8. MSB-Owned Forest Management Units in the Study Area with Measurable Woody Biomass Yields.....	2-38
Table 3-1. FAA-Identified Airstrips and Helicopter Landing Locations in the Study Area.....	3-4
Table 4-1. Potential Susitna River Crossing Locations	4-7
Table 4-2. General Land Ownership Status within the Study Area	4-15
Table 4-3. Refined Corridor Alignments.....	4-32
Table 5-1. West Susitna Access Design Criteria Summary	5-2
Table 5-2. Proposed Access Routes Engineering Considerations Summary	5-12
Table 5-3. Preliminary Cost Estimates (in millions)	5-24
Table 5-4. Preliminary ROW Acquisition Cost Estimates.....	5-27
Table 6-1. Summary of Amount of Resources Made Accessible within a 10-mile Buffer of Proposed Routes (“Route Strengths”)	6-2
Table 6-2. Land Status within a 200-foot-wide ROW of Proposed Access Routes	6-6
Table 6-3. Wetlands Potentially Impacted within a 200-foot-wide ROW of Proposed Access Routes	6-6
Table 6-4. Terrain Types.....	6-7
Table 6-5. Terrain Type by Proposed Access Route	6-7
Table 6-6. Hydrologic Considerations by Proposed Access Route.....	6-9
Table 6-7. Geologic and Geotechnical Considerations by Proposed Access Route.....	6-10
Table 7-1. Proposed Access Routes Strengths and Weaknesses Comparison.....	7-2

Figures

Figure 1-1. Study Area in State Context.....	1-1
Figure 1-2. Study Area.....	1-2
Figure 2-1. Mineral Resources: Hardrock and Gold Placer Mining.....	2-6
Figure 2-2. Mineral Resources: Coal.....	2-7
Figure 2-3. Previously Identified Transportation Routes Relative to the Proposed Canyon Creek Coal Lease Area and Kiska’s Whistler Project.....	2-16
Figure 2-4. Oil and Gas Resources.....	2-20
Figure 2-5. Timber and Agricultural Resources.....	2-29
Figure 2-6. Fish Creek Management Area with Proposed DNR 2014 Ice Road.....	2-30
Figure 2-7. Alternative Energy Resources.....	2-39
Figure 2-8. Recreational Resources by DNR Planning Regions.....	2-41
Figure 2-9. Existing Easements of R.S. 2477 Rights-of-Way.....	2-45
Figure 3-1. Existing Infrastructure.....	3-2
Figure 4-1. Previously Identified Alignments.....	4-3
Figure 4-2. Lower Susitna River Vicinity.....	4-6
Figure 4-3. Susitna River: Talkeetna (RM 95) to Kashwitna River (RM 62).....	4-8
Figure 4-4. Susitna River: Kashwitna River (RM 62) to Deshka River (RM 40).....	4-9
Figure 4-5. Susitna River: Rolly Creek (RM 39) to Yentna River (RM 27).....	4-10
Figure 4-6. Susitna River: Susitna Landing (RM 26) to Cook Inlet (RM 0).....	4-11
Figure 4-7. Composite Constraints Development Process.....	4-12
Figure 4-8. Anadromous Streams.....	4-17
Figure 4-9. Wetlands.....	4-18
Figure 4-10. Parks and Refuges.....	4-19
Figure 4-11. Land Status.....	4-20
Figure 4-12. Constraints: Slope.....	4-21
Figure 4-13. Constraints: Slope + Waterbodies and Streams.....	4-22
Figure 4-14. Constraints: Slope, Waterbodies, and Streams + Wetlands.....	4-23
Figure 4-15. Constraints: Slope, Waterbodies, and Streams + Parks and Refuges.....	4-24
Figure 4-16. Constraints: Slope, Waterbodies, and Streams + Land Status.....	4-25
Figure 4-17. Composite Constraints.....	4-26
Figure 4-18. Composite Constraints and Previously Identified Alignments.....	4-27
Figure 4-19. Access Route Development Process.....	4-28

Figure 4-19. Preliminary Corridor Segments 4-29

Figure 4-21. Preliminary Corridor Segments Considered but Dismissed..... 4-31

Figure 4-22. Refined Corridor Alignments 4-33

Figure 4-23. Proposed Access Routes 4-34

Figure 5-1. West Susitna Access Typical Cross Section for a Rural Resource Recovery Road..... 5-3

Figure 5-2. Proposed Access Routes and Fault Locations 5-7

Figure 5-3. North Petersville Proposed Access Route 5-14

Figure 5-4. North Skwentna Proposed Access Route 5-16

Figure 5-5. Middle Susitna-Skwentna River Proposed Access Route 5-18

Figure 5-6. Beluga Proposed Access Route 5-20

Figure 5-7. Deshka Variant Access Route..... 5-22

Figure 5-8. Reconnaissance-Level Total Cost Estimate Comparison..... 5-23

Figure 6-1. Mining Resources within a 10-mile Buffer of Proposed Routes 6-3

Figure 6-2. Oil and Gas Resources within a 10-mile Buffer of Proposed Routes 6-4

Figure 6-3. Forestry/Timber and Agricultural Resources within a 10-mile Buffer of Proposed Routes 6-5

Figure 6-4. Typical Road Cross Section by Terrain Type 6-8

Acronyms

AAC	Alaska Administrative Code
AASHTO	American Association of State Highway and Transportation Officials
ADF&G	Alaska Department of Fish and Game
ADL	Alaska Division of Land
AEA	Alaska Energy Authority
AIDEA	Alaska Industrial Development and Export Authority
AMHT	Alaska Mental Health Trust
ANCSA	Alaska Native Claims Settlement Act
ARDF	Alaska Resource Data File
ARTEC	Alaska Railbelt Transmission and Electric Company
AS	Alaska Statute
ASCMCRA	Alaska Surface Coal Mining Control and Reclamation Act
ATV	all-terrain vehicle
bbbl	barrels
BIF	best interest finding
BLM	U.S. Bureau of Land Management
bpd	barrels per day
CEA	Chugach Electric Association
CBM	Coalbed Methane
CIE	Cook Inlet Energy, LLC
CIRI	Cook Inlet Region, Inc.
CWA	Clean Water Act
DEM	digital elevation model
DGGS	Division of Geologic and Geophysical Surveys
DNR	Alaska Department of Natural Resources
DOF	Division of Forestry
DOG	Division of Oil and Gas
DOT&PF	Alaska Department of Transportation and Public Facilities
DPOR	Department of Parks and Outdoor Recreation
EIS	environmental impact statement
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FMU	Forest Management Unit
GIS	Geographic Information System
GMU	Game Management Unit
KPB	Kenai Peninsula Borough

KPEDD	Kenai Peninsula Economic Development District
LNG	liquid natural gas
mcf	million cubic feet
MEA	Matanuska Electric Association
Mgal	million gallons
ML&P	Municipal Light and Power
MLW	Mining, Land and Water
MOA	Municipality of Anchorage
MSB	Matanuska-Susitna Borough
MW	megawatt
NHCC	National Highway Construction Cost Index
NPR-A	National Petroleum Reserve – Alaska
NWI	National Wetlands Inventory
OPMP	Office of Project Management and Permitting
PGDHS	A Policy on Geometric Design of Highways and Streets
PGE	platinum group elements
ROD	Record of Decision
RM	river mile
SRR	State Recreation River
SRS	State Recreational Site
syngas	synthetic gas
UCG	underground coal gasification
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

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2 RESOURCE INVENTORY

This section documents the potential natural resource development opportunities, exploration projects, and other resource areas that could benefit from surface access on the west side of the Susitna River. One of the reasons for conducting a resource inventory is to help identify the termini; in other words, if a surface access road is warranted, where would the road begin and end.

2.1 Data Collection and Interviews

Resource information was obtained based on a literature search of available, existing information and industry/area knowledge. Subsequent interviews verified and yielded additional information and data. Projects already occurring in the Study Area are in various stages, between proposed, exploratory, or even further along in project development. It is important to note that leases (number and acreage) are not fixed and are constantly changing.

The resource categories inventoried in this study are:

- Mineral Resources
- Oil and Gas Resources: Exploration and Production Activities
- Forestry/Timber and Agricultural Resources
- Alternative Energy Resources
- Recreation Resources

In addition to data collection through literature research, the study team conducted interviews or attempted outreach with the industry representatives and other stakeholders listed below. Some of the interviews were extensive and provided detailed information, while other entities contacted provided only general information. The following contacts were made:

- Alaska Department of Fish and Game (ADF&G), Marla Carter and staff
- Alaska DNR, Division of Agriculture, Resource specialist Erik Johnson
- Alaska DNR, Division of Forestry (DOF), Palmer Area Forester Rick Jandreau
- Alaska DNR-DGGS, Geologist Robert Gillis, Engineering Geology Section Chief De Anne Stevens, and Mineral Resources Section Geological Scientist and Acting Chief Melanie Werdon
- Alaska DNR, Division of Mining, Land and Water (MLW), Division of Land Planning Unit Manager Ray Burger and Division of Land Natural Resource Specialist Liz Sherwood
- Alaska DNR, DOG, staff
- Alaska DNR, Division of Parks and Outdoor Recreation (DPOR), Matanuska-Susitna (Mat-Su)/Copper Basin area Park Superintendent Wayne Biessel and Susitna Ranger District Chief Ranger John Wilber
- Alaska Energy Authority, Susitna-Watana Hydroelectric Project Engineering Manager Bryan Carey
- Alaska Mental Health Trust (AMHT) Land, Energy & Minerals Senior Manager Rick Fredericksen
- Alaska Oil and Gas Commission, Statistical Technician Jenni Hunt
- Apache Alaska Corporation, Lisa Parker
- Aurora Gas, LLC, George Pollock

- Beluga Coal Company/Barrick Gold Corporation, Senior Advisor Cy Wilsey
- Cook Inlet Energy, LLC, President JR Wilcox
- Cook Inlet Region, Inc. (CIRI), Lands Manager Dara Glass and staff
- Kenai Peninsula Borough (KPB), Land Management Division, Land Agent Dan Conetta
- Kenai Peninsula Economic Development District (KPEDD), Programs Manager Carrie Coeuy
- Kiksa Metals Corporation, CEO Jason Weber
- Linc Energy, Inc., General Manager Corri Feige and Special Projects Manager Marty Rutherford
- Matanuska-Susitna Borough (MSB), Transportation and Environmental Manager Brad Sworts
- Millrock Resources, Inc., CEO Greg Beisher
- On-Line Exploration, President and Vice-President Jim and Devin Adler, respectively
- PacRim Coal, LP, Project Manager Dan Graham

The study team attempted to reach out to other organizations, although some declined to be interviewed; these include Alaska Energy Corporation; Donlin Gold, LLC; Hilcorp Alaska, LLC; and ConocoPhillips Alaska, Inc. The study team also attempted to reach out to the following entities, although no contacts were made or information requests were not returned: Ormat Technologies, Inc., and tourism-related groups including the Anchorage Chamber of Commerce and Mat-Su Convention and Visitors Bureau.

The lengthier interviews consisted of asking approximately 30 questions. Table 2-1 summarizes interviewees' responses to the question regarding the usefulness of an access road from the Parks Highway to their prospective sites or lands interests. Other information is integrated directly into each resource subsection of the report.

The study team did not contact individual claim owners. It is possible that individual claims may also be more attractive economically with increased access.

Table 2-1. Entities Contacted and/or Participated in the Resources Interviews

Entity	Brief description of entity and resource interest. <i>Response to question regarding usefulness of an access road from the Parks Highway to prospective site?</i>
<i>HARDROCK MINERALS AND COAL INTERESTS</i>	
Kiska Metals Corporation	Resource interest: Copper, gold, silver. Whistler project and other prospects. 144,000 acres. <i>“Kiska considers an access road very useful and is strongly supportive.”</i>
Millrock Resources, Inc.	Gold and copper exploration. Estelle, Cristo, Distin prospects. 56,000 acres. An access road would be <i>“very useful, but recognize that the State should not build roads to exploration projects but to more advanced projects with identified resources.”</i> A preferred route would be to Tyonek.
On-Line Exploration Services, Inc.	Gold, copper, molybdenum, possibly iron. Prospects: Estelle, Molly, Beaver Creek, Kichatna. 14,225 acres. <i>“...supportive of an all season road as being very helpful to keep exploration costs down”</i> and <i>“considers road access to be invaluable.”</i>
PacRim Coal, LP	Coal for export. Chuitna Coal Project. 20,450 acres. <i>“Considers an access road very useful and is strongly supportive.”</i> Has previously considered rail or road links, but is cost prohibitive if self-financed.
Beluga Coal Company	17,580 acres of coal leases with 8,000 acres of fee-simple leases with CIRI. No current active exploration. An access road would be <i>“quite useful.”</i>
Linc Energy, Inc.	Underground Coal Gasification exploration. Two licenses covering 98,700 acres. An access road would be <i>“100% helpful”</i> and <i>“strongly endorsed.”</i>
Cook Inlet Region, Inc. (CIRI)	Multiple projects and land holdings in the Beluga/ Tyonek area. <i>Prefers development of a deep water port rather than surface road access.</i>
Donlin Gold, LLC	Advanced gold exploration project. Project mostly outside of Study Area. <u>Declined interview request.</u> Stated they did not wish <i>“to be included in the roads for resources program.”</i>
<i>OIL AND GAS INTERESTS</i>	
Apache Alaska Corporation	Conducting 3-D seismic exploration operations and exploratory drilling. <i>“...would be pluses and minuses to a West Susitna access road to the region; the road would make the area more useful and more economically efficient and not restricted by weather (e.g., barging and ice, flying and visibility).”</i>
Aurora Gas, LLC	Approximately 45,000 acres of leases. In operations and development drilling phases. Just completed drilling two new wells. <i>“Access is a priority”</i> and a West Susitna access road <i>“would be very useful.”</i> <i>“We will take any way we can get stuff there as long as it is timely, cost effective, and consistent delivery all season. We do not care about alignments. It is access, which is the priority. We would work around right of ways.”</i>
Cook Inlet Energy, LLC	Currently in exploration phase. Approximately 680,000 gross acres and five potential targets. A West Susitna access road <i>“would allow us to execute exploration programs significantly faster and cheaper. It would lower development costs and operating costs. It would shorten development time and lengthen field life, which would in turn have a positive effect on project economics and the size of our recoverable reserves. In short, it would be a powerful stimulus to oil & gas exploration and production in the area.”</i>
ConocoPhillips Alaska, Inc.	Part owner in the Beluga River natural gas field. <u>Declined interview request.</u> <i>“ConocoPhillips has a neutral position on the importance of accessing the West Susitna region by land. While land access could be useful, it is not considered critical for operation of the BRU or future development.”</i>
Hilcorp Alaska, LLC	Operates a number of units in the Study Area. <u>Declined interview request.</u> <i>“While Hilcorp would consider land access to the West Susitna Region useful, there are currently no projects that would be directly impacted by road access.”</i>

Entity	Brief description of entity and resource interest. <i>Response to question regarding usefulness of an access road from the Parks Highway to prospective site?</i>
<i>OTHER INTERESTS</i>	
Alaska Department of Fish and Game (ADF&G)	<i>“ADF&G generally supports access to fish and wildlife resources, but also realizes that regulatory changes may need to be considered in the future to adjust to changes in public use and harvests.”</i>
Alaska Department of Natural Resources (DNR), Division of Agriculture	Approximately 50,000 acres classified as potential agricultural opportunities, as adopted in the Susitna Matanuska Area Plan adopted in 2011.
DNR-Division of Forestry (DOF)	Proposed Susitna State Forest includes 33 parcels totaling approximately 763,200 acres. Proposed forests managed for a long-term timber supply for local processors.
DNR- Division of Geologic and Geophysical Surveys (DGGS)	Conducting a mapping project in the Beluga/Tyonek area and is collecting baseline geologic data for potential energy systems from surface rock exposures. Published a brief overview report in April 2013 summarizing recent reconnaissance field data collection in the Susitna Basin. <i>“All properties would benefit from road access.”</i>
DNR-Division of Mining, Land and Water (MLW)	Prepared the 2011 Susitna Matanuska Area Plan, which addresses land management policies for major resources in the Susitna Basin.
DNR-Division of Oil and Gas (DOG)	Provided information on producing gas units in the Susitna Basin.
DNR-Division of Parks and Outdoor Recreation (DPOR)	<i>“There would be a great deal of interest for people to go there just to explore as it would provide access to an area that is currently difficult to access.”</i>
Alaska Mental Health Trust Land	AMHT has extensive oil and gas leases and coal leases in the southwest portion of the Study Area. <i>Supportive of surface access, in light of current logistical challenges of accessing area (e.g., lack of barging in the winter).</i>
Matanuska-Susitna Borough	Supports agriculture and forestry/timber opportunities on MSB lands. Has previously identified alignments between existing road network to the Little Susitna River.
Kenai Peninsula Borough	KPB lands are located near Tyonek/Beluga. <i>Is satisfied with existing road network on their lands.</i>
Kenai Peninsula Economic Development District	Recently prepared a Cook Inlet Infrastructure Study. <i>“Surface access to the Tyonek region would be very beneficial.”</i>

2.2 Mineral Resources

Alaska's mining industry includes exploration, mine development, and mineral production. This section discusses hardrock mineral exploration activities, placer gold mining activities, and coal exploration and development activities in the Study Area. Figure 2-1 and Figure 2-2 depict mineral resource activities in the Study Area. In the Study Area, most of the mineral resources are held under mining claims; however there are some leases (generally in the Petersville area).

At the second annual Alaska Strategic and Critical Minerals Summit⁷ held on November 30, 2012, DNR Commissioner Daniel Sullivan presented the following values in terms of what mining brings to the State of Alaska:

- In 2011, the gross mineral production value from Alaska totaled \$3.8 billion, up 16 percent since 2010.
- Mineral ore production had an export value of \$1.8 billion in 2011, nearly 40 percent of Alaska's total exports.
- In 2011, mineral exploration investment in Alaska totaled \$365 million - accounting for about one-third of the total spent on exploration in the U.S.
- \$2.8 billion has been spent on mineral exploration in Alaska since 1981.

What are the State of Alaska's goals for *Subsurface Resources* in the Susitna Matanuska Area?

Opportunities for Mineral Exploration and Development. Provide opportunities through State land management for the exploration and development of mineral resources.

Economic Opportunities. Provide economic opportunities and stability by managing State lands for the efficient and environmentally sound:

- transfer of minerals from uplands to transport vessels;
- disposal of tailings;
- development of State land and submerged land mining sites; and,
- siting of infrastructure to support development of mineral resources.

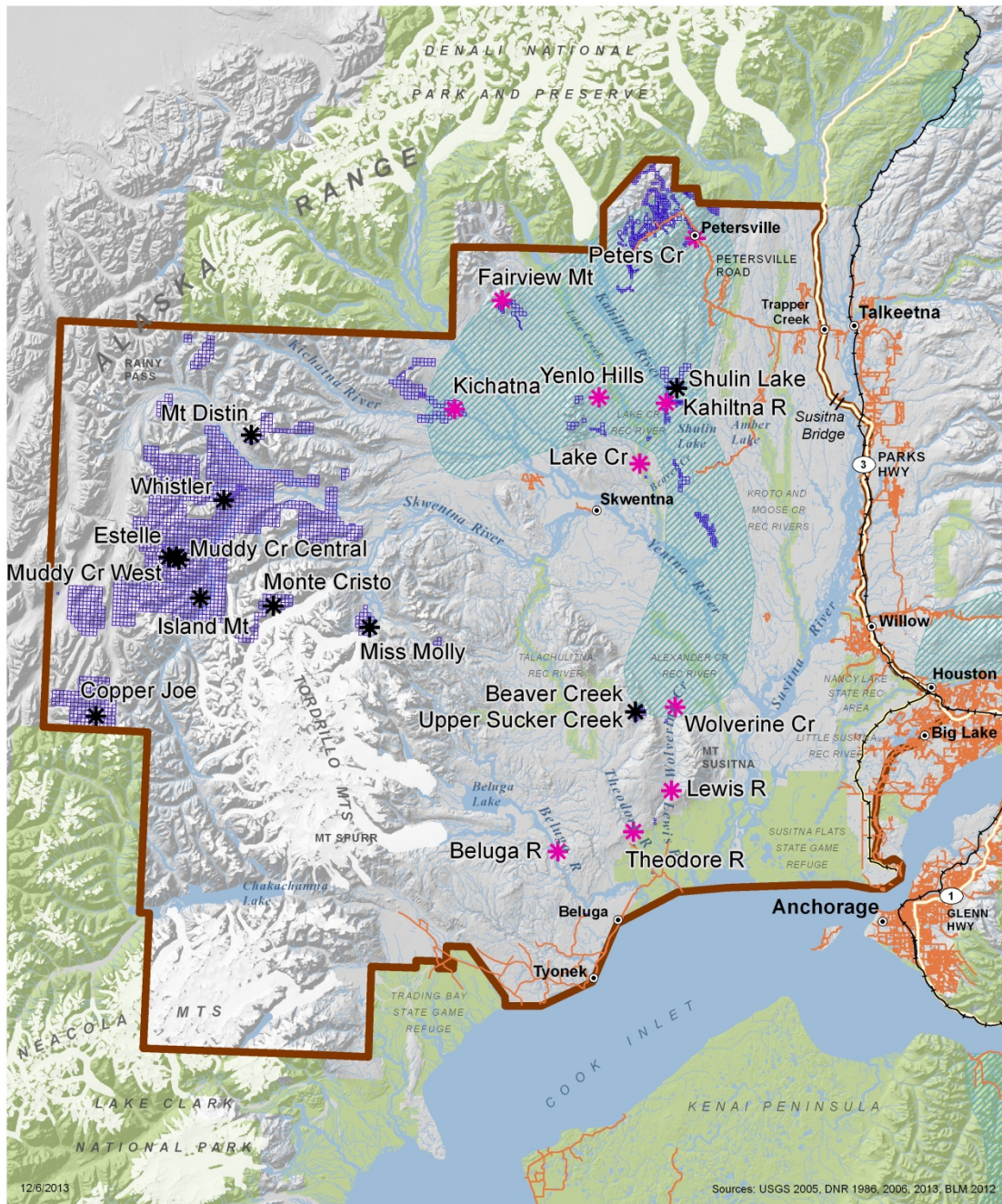
Environmental Quality and Cultural Values. When developing subsurface resources, protect the integrity of the environment and affected cultural features to the extent feasible and prudent.

- excerpted from the *Susitna Matanuska Area Plan for State Lands*

(DNR-DMLW 2011: 2-48)

⁷ Alaska 2nd Annual Strategic and Critical Minerals Summit. November 30, 2012. Presentation slides: http://dnr.alaska.gov/commis/priorities/2012_minerals_summit_slides.html.

Figure 2-1. Mineral Resources: Hardrock and Gold Placer Mining



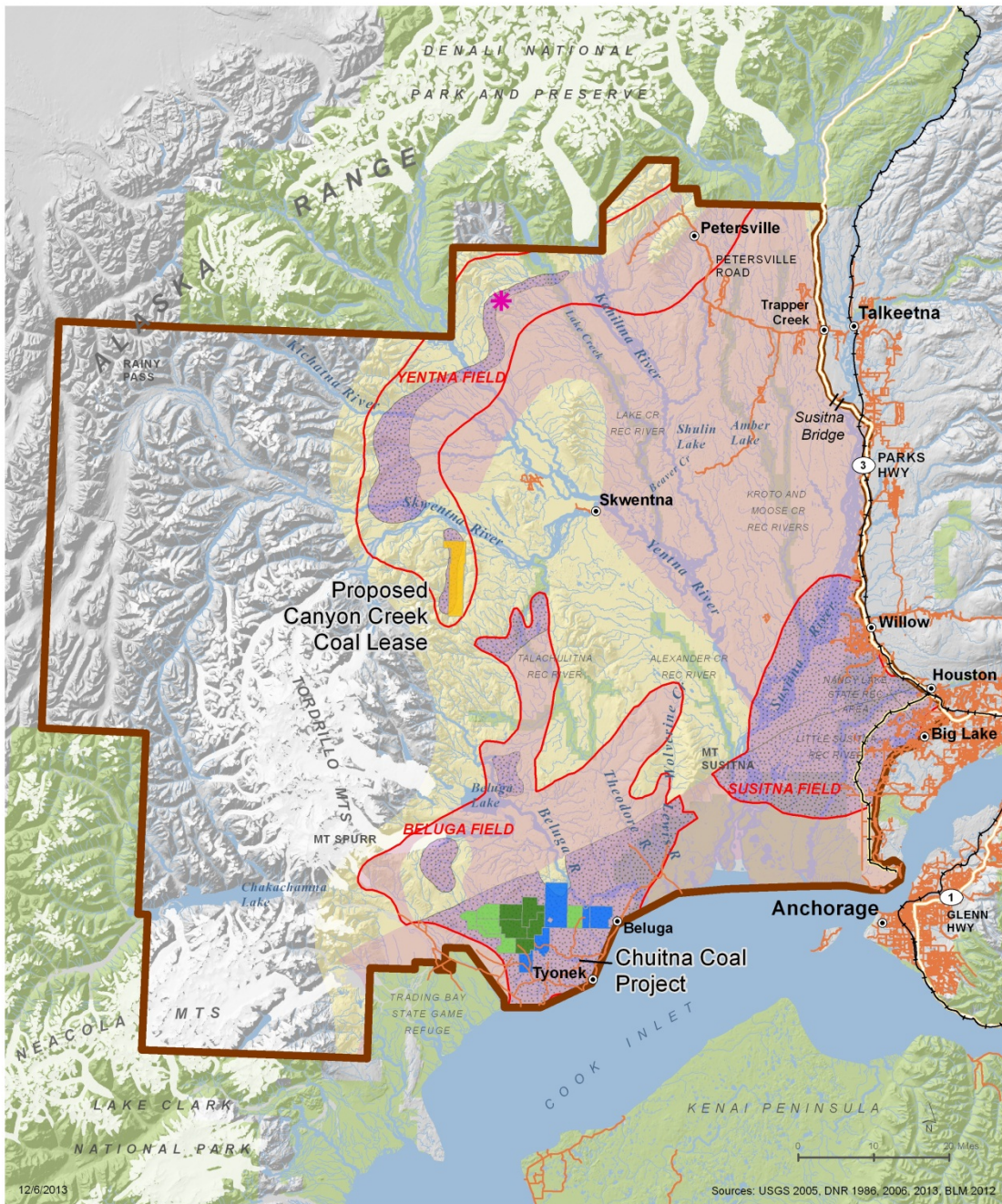
Mineral Resources: Hardrock and Gold Placer Mining

West Susitna Access to Resource Development

- State Mining Lease/Claim
- * Gold Placer Claim
- Study Area
- Placer District
- * Active Mine or Prospect
- Park or Refuge



Figure 2-2. Mineral Resources: Coal



Mineral Resources: Coal

West Susitna Access to Resource Development

Mining Permits/Leases	Linc Energy (Alaska), Inc	Ranks of Coal	Coal Field Boundary	Study Area
Beluga Coal Company	Pacrim Coal, LP	Subbituminous Coal Beds of Minable Thickness - Min. 30 in.	Susitna Coal Basin	Park or Refuge
DNR DMLW Mining Statewide		Subbituminous Coal - Resource Potential Less Certain		

2.2.1 *Hardrock Mineral Exploration Activities*

There are more than 3,000 active mining claims in the Study Area. The highest concentration of claim activity is in the northern portion of the Tordrillo Mountains in the Alaska Range near Rainy Pass area. Commodities include copper, gold, silver, molybdenum, iron, platinum group elements (PGE), and possibly diamonds. The larger hardrock mineral exploration activities are shown in Table 2-2.

Table 2-2. Major Hardrock Mineral Exploration Activities in the Study Area

Company	Project/Prospect Name	Resources/Commodities	Size (acres)
Kiska Metals Corporation*	Whistler mainly, also Island Mountain and Muddy Creek	Copper, gold, silver	144,000
Millrock Resources, Inc.*	Estelle, Cristo, Distin	Copper, gold	119,150
Intercept Alaska, Inc.	A single claim block (JL claims)	Copper, gold	17,760
Kennecott Exploration Company	Copper Joe	Copper, gold, molybdenum	16,000
On-Line Exploration Services, Inc.*	Estelle, Molly, Beaver Creek, Kichatna	Copper, gold, molybdenum, possibly iron	14,225
Alaska Earth Sciences (AES)	Four claim blocks (55 claims)	Primarily copper and gold; silver	8,750
Shulin Lake Mining Company	Moderate-sized claim block (57 claims)	Gold, PGE, possibly diamonds	4,860

Source: DNR-DGGS Alaska Mineral Resources Map:
www.dggs.alaska.gov/webpubs/dggs/mp/oversized/mp149_sh001.pdf

* Companies that were interviewed.

The study team conducted interviews with three mineral resource exploration companies that have some of the larger and more active prospects in the Study Area. These are Kiska Metals Corporation, Millrock Resources, Inc., and On-Line Exploration Services, Inc. Interviews have been summarized in this section, particularly with respect to existing activities, identified transportation needs, and site facility/infrastructure needs. Information about other major hardrock mineral exploration activities and claim holders is included in this section as well. Even though the proposed Donlin Gold Mine is located outside of the Study Area, a component of that proposed project extends into the Study Area and is therefore included in this discussion.

Kiska Metals Corporation

Kiska is currently in the exploration stage and their resource interest is copper, gold, and silver. Kiska holds a large number of claims in the Rainy Pass area, having acquired 921 claims from 2003 to 2011, which covers an area of 144,000 acres. Kiska's largest prospect is Whistler, which covers most of the 144,000 acres. Other prospects include Island Mountain and Muddy Creek. Kiska said in a best-case-scenario, they are at least five years from production. Kiska has not formally applied for any mine permits. For the Whistler prospect, economic modeling estimates production at a rate of 11 million tons per year for 13 years, with the possibility of expanded operations based on sufficient and suitable material to mine and process on adjacent properties. While the conceptual mine life is estimated to be 13 years, Kiska said they would like to develop sufficient reserves for a 17- to 20-year mine life.

Table 2-3 contains a summary of the resource estimates for Kiska’s Whistler deposit, as directly reported in technical documentation prepared in compliance with National Instrument (NI) 43-101.⁸

Table 2-3. Kiska’s Whistler Deposit Resource Estimates, 2011

Resource Category	Tonnes and Grade					Total Contained Metal			
	Tonnes (Mt)	Gold (g/t)	Silver (g/t)	Copper (%)	Gold Eq ² (g/t)	Gold (Moz)	Silver (Moz)	Copper (Mlbs)	Gold Eq ³ (Moz)
Open Pit Resource									
Indicated ¹	79.2	0.51	1.97	0.17	0.88	1.28	5.03	302	2.25
Inferred ¹	145.8	0.40	1.75	0.15	0.73	1.85	8.21	467	3.35

Source: Moose Mountain Technical Services. March 17, 2011. Kiska Metals Corporation Whistler Resource Estimate, Table 19-10 Pit Delineated Resource at Base Case Prices and Costs.

g/t = grams per tonne; M = million; oz = ounces; lbs = pounds.

¹ Reported within a conceptual pit shell (45 degree pit slope angle) and based on a cut-off grade of \$7.5/t adjusted for metallurgical recovery and offsite costs.

² Gold equivalent grade calculation was based on 75 percent recovery for gold and silver; 85 percent recovery for copper; USD \$990 per ounce gold, USD \$15.40 per ounce silver and USD \$2.91 per pound of copper.

³ Totals may vary due to rounding.

During an interview on March 19, 2013, Kiska said it would consider an access road very useful and is strongly supportive of it. Kiska emphasized that a road would be of major assistance for activity, citing that its main advantage would be to lower capital expenses for financing. Kiska said current constraints to development are access and capital markets. Kiska said they will need an all-season road for construction material, mining fleet and fuel delivery, and concentrate removal. Four concentrate-removal round trips and three light-service vehicle trips per day are expected.

Current on-site facilities include a 50-person camp facility, fuel storage and a 3,500-foot-long airstrip. An access road, if present today, would reduce the existing costs of transporting in fuel, material and people. In addition, concentrates must be removed from the site to smelting facilities off-site. At this time, Kiska said they are uncertain whether crews would access the site via an access road or as a fly-in operation. Kiska has initially modeled power needs for a 45-megawatt (MW) power line from Tyonek, but access to other power options remains a consideration, including access to any nearby gas pipelines that might be developed.

Millrock Resources, Inc.

Millrock is currently in the exploration stage and their resource interest is primarily gold and copper. Millrock has a number of prospects located in the Yentna Mining District region near the Rainy Pass area, most notably Estelle, Distin, and Cristo (Figure 2-1). The Estelle prospect is for gold, and Cristo is for possibly gold and base metals. Millrock has 763 claims in the Study Area covering 119,150 acres.⁹ Teck-Cominco is a partner on the Estelle prospect area, though Millrock owns 100 percent of all their other prospects. Millrock has not applied for any mine leases and no resource estimates have been made public.

⁸ NI 43-101 is used within Canada for reporting the “Standards of Disclosure for Minerals Projects.”

⁹ The Alaska Resource Data Files (ARDF) contains information regarding mining, prospects, and mineral occurrences in Alaska. Available at: <http://ardf.wr.usgs.gov/> (accessed March 2013).

Millrock considers the lack of access roads and power in the immediate area as constraints or limiting factors on their development activity. At this exploration stage, all construction, fuel, and mining equipment needs are supplied by air or ice roads. Millrock indicated that while a West Susitna access road would be “very useful, the State should not build roads to exploration projects but to more advanced projects with identified resources.” Millrock stated a road access to their prospect would lower the costs of exploration. Millrock said their preferred road route would be to Tyonek and not necessarily to the existing road system (e.g., Parks Highway), though they would strongly be in favor of a road connection regardless of the route.

Millrock has camp facilities at the nearby Whistler project airstrip. If exploration is successful, a range of facilities and buildings would be required, including a camp for onsite worker housing. If exploration is successful power would also be needed and access to any nearby gas pipelines would also be beneficial.

On-Line Exploration Services, Inc.

On-Line has several prospects in the Study Area that are currently in the exploration stage with unknown production start dates. The lode-prospects are gold and copper at Estelle (approximately 875 acres); molybdenum at Molly (4,372 acres); copper and gold with possibly iron at Beaver Creek (1,578 acres); and placer-gold only at K N Resources Kichatna (7,400 acres). Estelle and Molly are 100 percent owned by On-Line; exploration on the other two prospects is managed by On-Line. None of these lode prospects have had any previous mining, with one exception. A record of minor placer production has occurred at the Kichatna placer prospect.

At this exploration stage all exploration equipment, fuel, and camp supplies are transported by air or ice roads, but On-Line was supportive of an all-season road and said it would help keep exploration costs down. On-Line said the constraints or limiting factors on activity include access to roads, power, financing, and support resources such as helicopters during peak season for exploration. On-Line considers road access to be invaluable. A surface road would lower the costs of exploration through reduced costs of fuel equipment and personnel.

On-Line currently has an airstrip located at the Molly and Kichatna prospect locations, and has proposed a runway length expansion from 3,500 feet to 5,000 feet. Other infrastructure needs include power and gas or electric. On-Line also identified the need for access to fiber optic lines for communications.

Kennecott Exploration Company

Kennecott Exploration Company holds the Cooper Joe claim block, which is located about 20 km southwest of the Whistler block. The Copper Joe claim block covers 16,000 acres and the resource interests are copper, gold, and molybdenum. Kiska reports that they have entered into a non-binding letter of intent with Kennecott to acquire a 100 percent interest in the Copper Joe Property.

Intercept Alaska, Inc.

Intercept Alaska, Inc. has a single claim block covering 17,760 acres west of Kiska’s Whistler prospect. No drilling has been reported at the claim block. Resource interest is for gold and copper.

Alaska Earth Sciences

Alaska Earth Sciences has four claim blocks (consisting of 55 claims) in the Study Area totaling 8,750 acres. The blocks are located 10 to 20 km northwest of the Whistler block, with one claim

block located east of the Molly claim block. Resource interest is for copper, gold, and silver. Alaska Earth Sciences also provides logistical support for a number of other projects in the Study Area, including CIRI's underground coal gasification (UCG)¹⁰ project at the Beluga Coal Field, the Mt. Spurr geothermal project, and Linc Energy's drilling program in the Beluga Coal Field.

Shulin Lake Mining Company

A moderate-sized claim block (57 claims over an area of 4,860 acres) exists in the Shulin Lake area. The area is reported as having significant concentrations of heavy mineral sands containing some gold and PGE values¹¹. Some of the claims appear to be held for placer minerals, but Shulin Lake Mining Company has marketed the property as having diamond potential^{12, 13}, and at least 22 drill holes were completed on the property. No follow up work has been reported after 2005.

Teryl Resources Corporation

Teryl Resources is a junior precious metals exploration company listed on the TSX Venture Exchange with properties in the Fairbanks area. Teryl maintains a small claim block peripheral to Kiska's claims located approximately 14 miles east of the Whistler prospect. Teryl's claims cover an area of 3,680 acres and partially surround a smaller claim block held by Mark Farrar.

Individual claim holders

Three individuals are listed as claim holders around the Whistler area. Mark Farrar has 14 claims (1,872 acres). The earliest claims were staked in 2004 with additions in 2009 and 2010 before being encircled by Teryl in late 2010. Three more claims were added in 2011 adjacent to two claims held by David Fikill.

Donlin Gold, LLC

The proposed footprint of the actual Donlin gold mine is located outside the Study Area to the west of the Alaska Range. However, components of the Donlin project may pass through the Study Area in the future if the project is constructed as proposed. Donlin Gold, LLC is proposing a number of project elements including an open pit that is 2.2 miles long by 1 mile wide by 1,850 feet deep, a camp, an approximate 300-mile buried natural gas pipeline that would run through the Study Area, and other infrastructure (e.g., airstrip, access road, new barge landing, power plant, conveyor systems, mill, labs, and wastewater treatment plant). The proposed natural gas pipeline would be constructed from Cook Inlet, at the west end of the Beluga Gas Field, to the mine site, which is located approximately 10 miles north of the village of Crooked Creek on the Kuskokwim River west of the Alaska Range. Gold mining operations at the mining site would consist of energy-intensive processes, and past discussions have occurred as to how the 120-140 MW of power would be obtained at the site. Previous ideas to meet the energy needs have included barging the diesel upstream to the mine site, building a coal plant, and purchasing gas from the Cook Inlet area (which is the primary option currently under consideration). The permitting and environmental phase of

¹⁰ UCG is an in-situ gasification process that converts coal into gas without the use of traditional surface or underground mining methods. A mixed gas feedstock is produced through the controlled combustion of underground coal seams.

¹¹ ARDF, TL048

¹² ARDF, TL078

¹³ DNR-DMLW Coal Program. October 8, 2013. Comments provided during a review of a draft of this report indicate the diamond claims have not been confirmed and may be speculative.

this project began in January 2013. Donlin Gold, LLC declined a request for an interview for this study.

2.2.2 Placer Gold Mining Activities

Placer gold was found in the Susitna basin in the early 1900s.¹⁴ Alaska does not distinguish between lode and placer claims, so some speculation is necessary as to the activities conducted on mining claims. The inferred State placer claims in the Study Area cover an area of 45,133 acres and are held by 113 DNR-identified claim holders. The four largest claim holders by acreage are K N Resources, LLC (7,400 acres), Jim D Espinola (7,234 acres), Daniel R. Freitas, (2,862 acres), and Diamond Gold Corporation (2,123 acres). This section includes a general description of the placer gold prospects and claims in the Study Area.

Petersville/ Peters Creek

There are 94 individual claim holders to 499 claims and leaseholds over an area of approximately 20,957 acres and 13 State mining leases over an area of 3,976 acres who likely are involved in placer mining in the Petersville area. A number of claims overlap or are “overstaked,” which increases the apparent acreage. In addition, there are 4 federal claims predating statehood, whose claimants have elected to maintain their claims. The Petersville area is already served by public road access from the Parks Highways and by temporary ice roads during the winter for planned seasonal delivery of larger quantities of material.

Kichatna River

Since 2009 a large claim block has developed in the Kichatna River drainage, located approximately 25 miles west northwest of Skwentna between the Yentna and Skwentna River drainages. Two groups (K N Resources, LLC and Jim D Espinola) have almost equally claimed a total of 14,634 acres. The only known prospect within or close to the claim blocks is an historic placer prospect with undetermined production¹⁵. Assessment work claimed by one of the groups references prospecting, brush clearing, and line cutting in preparation for geophysical surveys, but no drilling. It is thought that these claims are being held for their placer potential.

Kahiltna River

Daniel Freitas holds 72 claims along the Kahiltna River downstream from Shulin Lake, covering an area of 2,862 acres, all of which appear to be placer claims. The claims comprise two blocks separated by approximately 13 miles. Between these two claim blocks is a third, 21-claim block covering 1,600 acres, also targeting heavy mineral deposits along the Kahiltna River centered on the confluence of the Kahiltna River and Beaver Creek. A trend of four small claim blocks extends from the confluence of Beaver Creek northeasterly towards Amber Lake. Small-scale production is reported from placer mines in the vicinity of Daniel Freitas’ southern claim block¹⁶.

¹⁴ Bureau of Public Roads. August 1959. *A Description of Proposed Road Routes in Alaska: Talkeetna-McGrath-Ruby*. Compiled and written by Rose Komatsubara and William DeArmond, under the direction of Elmer Biggs, Acting Planning and Research Engineer. p.15.

¹⁵ ARDF, TL49

¹⁶ ARDF, TL27, 28, and 29

Lake Creek

Four different parties hold eight claims along and adjacent to Lake Creek. There is no evidence for more than minor assessment work on these claims.

Yenlo Hills

Two parties hold 23 claims covering an area of 2,340 acres. Half the claims were added in the past two years. One of the claimants, Diamond Gold Corporation, reports bedrock-hosted Au-bearing veins on their Yenlo claims exposed by trenching¹⁷.

Fairview Mountain

There are 3 placer gold prospects in the Fairview Mountain area, which lies 6 miles southwest of Lake Chelatna. The most northerly is Pass Creek, which has recorded production of gold and PGE back to the turn of the last century (ARDF, TL24). There are three groups that hold 16 claims covering 401 acres. The 2 other prospects in the Fairview Mountain area are Mills and Twin Creeks, both southerly flowing drainages and with historic placer production¹⁸. Four individuals hold 2,066 acres as State mining claims.

Wolverine Creek

Wolverine Creek is the northerly flowing drainage between Mt. Susitna and Little Mt. Susitna, and is part of the planned route for the Donlin Creek gas pipeline. Two active claims currently remain on Wolverine Creek, a recorded placer prospect location, but in earlier affidavits referenced, up to 11 claims exist till 1990¹⁹. There is no recorded production.

Lewis Creek, Beluga and Theodore Rivers

Placer gold was reported as actively mined prior to 1918. As recently as the 1980s a significant number of placer claims were held along the Lewis, Beluga, and Theodore River drainages. At present only five remaining claims exist, and annual affidavits indicate no active production is occurring.

2.2.3 Coal Exploration and Development Activities

Alaska possesses a significant amount of the world's remaining coal resources. The majority of Alaska's coal is located on the North Slope, followed by the Cook Inlet region and other areas.²⁰ The only active coal mine in Alaska, the Usibelli Coal Mine, is located outside the Study Area; it has been active for more than 40 years.

A study prepared by the USGS in 2004 divided the estimated coal resources in Alaska into three major provinces: Northern Alaska-Slope, Central Alaska-Nenana, and Southern Alaska-Cook Inlet²¹ (which includes the Study Area). Of the two latter provinces, the report found that only a small fraction of the identified coal resources has been produced (over 40 million short tons or 36 million

¹⁷ ARDF, TL75

¹⁸ ARDF, TL59 and TL26

¹⁹ ARDF, TY006

²⁰ DNR-DGGS. 2012. *Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska*. Edited by Robert Swenson et al.

²¹ USGS. 2004. *Alaska Coal Geology, Resources, and Coalbed Methane Potential*.

metric tons) of the more than 13.5 billion short tons (12.25 billion metric tons) that are estimated to occur in these two provinces.

DNR-DGGS has requested the recognition that while this study considers the recent exploration and development activities, there is the potential for coal development beyond the currently active prospects. Table 2-4 highlights the estimated coal resources potential in or near the Study Area. See also Figure 2-2.

Table 2-4. Estimated Coal Resources Potential in or near the Study Area

Coal Province and Field	Coal Rank	Identified Resources (Short tons)	Hypothetical Potential Sale Value (\$)	Hypothetical Resources (Short tons)	Hypothetical Potential Sale Value (\$)
Cook Inlet-Susitna Province					
Beluga Field	Subbituminous	10 billion	\$153.4 billion	30 billion	\$460.2 billion
Yentna Field	Subbituminous	1 billion	\$15.3 billion	2.5 billion	\$38.3 billion
Susitna Field	Subbituminous	110 million	\$1.7 billion	2.3 billion	\$35.3 billion

Source: DNR-DGGS. October 8, 2013. Comment provided by Jim Clough during a review of a draft of this report. Potential sale revenue was calculated by multiplying the resource quantity by the average sales price of coal nationwide in 2012 (an average state sales price was not available). This was recorded as being \$66.04/short ton (Bituminous), \$15.34/ short ton (Subbituminous), and \$80.21/short ton (Anthracite). For those fields that are thought to have multiple coal ranks, an average was used (per U.S. Energy Information Administration (EIA) 2012 Annual Coal Report; available at: <http://www.eia.gov/coal/annual/>).

There are a variety of types of proposed coal development projects in the Study Area, which are at varying stages of project development. Due to past and present mining activity, the geology of this region is moderately well understood.²² Active leases for surface coal reserves exist in the Study Area. The State is considering the decision to hold a coal lease sale in the area of Canyon Creek, which is depicted on Figure 2-3. The Cook Inlet region is also being evaluated for underground coal gasification (UCG) potential. UCG eliminates the need to mine and transport the coal to a power plant, as well as the costs associated with reclaiming the surface-mined coal areas.²³

Coal projects or areas of interest in the Study Area include:

- Alaska Energy Corporation’s proposed Canyon Creek Coal lease
- PacRim Coal, LP’s Chuitna Coal mine project in the Beluga coal field – in advanced permitting stage
- Beluga Coal Company– active leases for surface coal reserves in the Beluga coal field
- Linc Energy Alaska, Inc., Cook Inlet Region, Inc. (CIRI)/Stone Horn Ridge, LLC – UCG testing in the Beluga coal field
- Coal-to-liquid plant considerations

Portions of the Study Area hold potential for development of coalbed methane (CBM). In what has more recently become a viable energy resource in the Lower 48, CBM is hindered by many unique challenges and has not yet proven to be economically viable. See Section 2.3.2 on CBM resources within the Study Area.

²² DNR-DGGS. 2012. *Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska*. Edited by Robert Swenson et al.

²³ Ibid.

For coal resources, the study team conducted interviews with following companies: PacRim Coal, LP; Beluga Coal Company, and Linc Energy, Inc. The study team also discussed the study with Cook Inlet Region Incorporated (CIRI), Knikatu, Inc., Tyonek Native Corporation, and Chickaloon-Moose Creek Native Association at a meeting held on April 11, 2013. Interviews have been summarized in this section, particularly with respect to existing activities, identified transportation needs, and site facility/infrastructure.

Alaska Energy Corporation (Proposed Canyon Creek Coal Leases)

In 2012 the State of Alaska entered a regulatory best interest finding (BIF)²⁴ in favor of holding a competitive coal lease in the Canyon Creek area. DMLW issued the BIF based on Alaska Energy Corporation's interest in exploring coal resources in the Canyon Creek area. The proposed lease area covers approximately 13,175 acres and is located 30 km southwest of Skwentna, within the center of the Study Area. DNR estimated the total of the Measured, Indicated, and Inferred Resources within the proposed Canyon Creek coal lease area as approximately 257.9 million short tons of sub-bituminous coal. In July 2013, DNR issued a "Final Finding and Decision" to offer the coal lease.²⁵

The proposed Canyon Creek Coal leases are located about 40 miles north of the proposed Chuitna Coal Project, and about 15 miles east of the Whistler prospect. The DNR-DMLW's *2012 Preliminary Decision Competitive Coal Lease Sale in the Canyon Creek Area, Alaska*²⁶ includes a chapter (Chapter 7) devoted to potential routes for the transport of coal. Figure 2-3 depicts the location of the Canyon Creek proposed lease area and potential transportation routes relative to Kiska's Whistler project as depicted in that report.

²⁴ DNR-DMLW. 2012. *Preliminary Decision: Competitive Coal Lease Sale in the Canyon Creek Area, Alaska*. <http://dnr.alaska.gov/mlw/mining/CanyonCreekPBIF.pdf> (accessed March 2013).

²⁵ DNR-DMLW. 2013. *Final Finding and Decision*. http://dnr.alaska.gov/mlw/mining/coal/canyon_creek/Notice_of_Final_Decision_for_Canyon_Creek_Coal_Lease_Sale.pdf (accessed July 2013).

²⁶ DNR-DMLW. 2012. *Preliminary Decision: Competitive Coal Lease Sale in the Canyon Creek Area, Alaska*. <http://dnr.alaska.gov/mlw/mining/CanyonCreekPBIF.pdf>

Figure 2-3. Previously Identified Transportation Routes Relative to the Proposed Canyon Creek Coal Lease Area and Kiska's Whistler Project

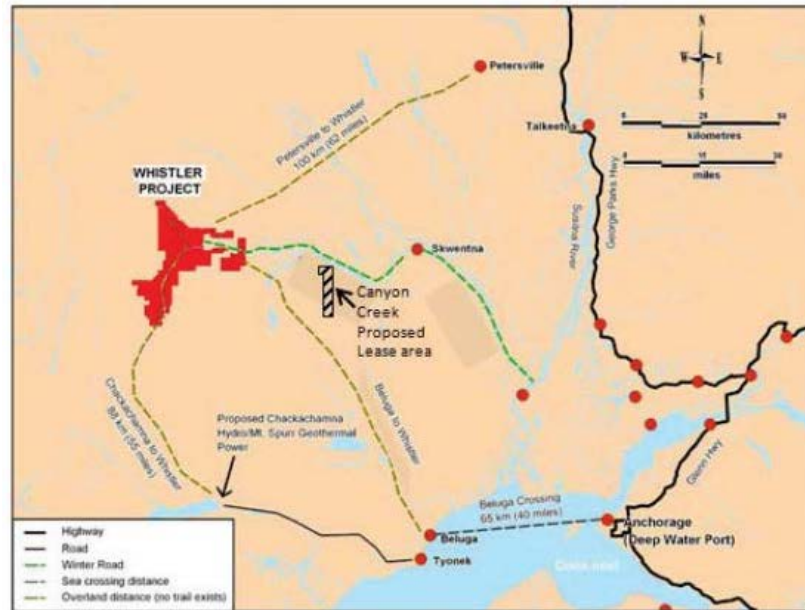


Figure 6.2- Location of the Whistler Project Area and potential transportation routes relative to the Canyon Creek Proposed Lease area (Kiska Metals 2012).

Source: DNR-DMLW. 2012. Preliminary Decision: Competitive Coal Lease Sale in the Canyon Creek Area, Alaska.

A limited amount of drilling has occurred in the past, though additional drilling would be required to prove the coal reserves.²⁷

PacRim Coal, LP (Chuitna Coal Project)

PacRim holds a coal lease to 20,450 acres located 12 miles northwest of Tyonek on the north side of Cook Inlet. Within their coal lease, PacRim has identified 300 million tons of minable resource referred to as the Chuitna Coal Project. This deposit has a long history of development activities: exploration in 1968, leases in 1972, and drilling and permitting in the 1980s. The permitting process was reinitiated in 2005; however, a permit application for the mine has not been submitted for the project as of the end of 2013. At present the project is in the supplemental environmental impact statement (EIS) phase, with permitting plans for an open pit mine with an estimated annual production of 12 million tons.²⁸ Historical proposed start dates for production are as early as late 2014 to 2016. Approximately 5,000 acres would be used for mining operations, with 1,000 acres of support facilities. After an initial 2-year construction phase, the proposed life of the mine is 25 years, followed by reclamation. PacRim anticipates the project will employ up to 500 people during construction, with 250 people onsite and 350 people total during operations.

²⁷ Alaska Coal Association. December 2012. *State of the State's Coal Industry*. Presented to the Resource Development Council. www.akrdc.org/membership/events/breakfast/1213/graham.pdf (accessed March 2013).

²⁸ DNR-DMLW. Chuitna Coal Project Description. Large Mine Permitting webpage. <http://dnr.alaska.gov/mlw/mining/largemine/chuitna/> (accessed July 2013).

PacRim said they have significant transportation needs. At present, all supplies for construction and operation are planned to be barged in. During operation, in excess of 10 million gallons (Mgal) of fuel will be needed, which is also anticipated to be barged in. PacRim considered rail and road links, but those were determined to be uneconomical if self-financed. An access road would significantly reduce barge traffic and allow crew changes by bus or private vehicles. Air transport can be limited during bad weather, which makes planning difficult. Barges are very expensive as well.

In its present planned configuration, the site is designed to operate as an independent operation without road connectivity. Operations consist of transporting the coal from the mine site by an 8-mile conveyor to Ladd Landing and then a 2-mile conveyor offshore to a ship load out platform.²⁹ Limited mine and transportation facilities currently exist at the site. PacRim uses a camp at the Beluga airstrip and accesses their site via helicopter. Proposed facilities include an onsite camp, deepwater port/loading facility, vehicle workshop area, coal and fuel storage, warehouse, road access from tidewater, conveyor system, crusher, and wash facilities. For power, PacRim plans to build a six-mile tie-in to the Beluga power plant and access the gas pipeline for heating needs.

Beluga Coal Company

The Beluga Coal Company is owned by Barrick Gold Corporation³⁰ and CIRI. The Beluga Coal Company holds a total of 17,580 acres of coal leases either adjacent to or in close proximity to PacRim's leases. Development activity on the Beluga Coal Company holdings is not as advanced as its PacRim's. Most recently, in 2008, they applied for exploration permits on their Beluga coal leases. No published resource estimates are available, but the geologic continuity suggests similar development opportunities exist as on the PacRim leases. There is no active exploration or development. The project is currently on "care and maintenance" status and is anticipated to remain in this status for the foreseeable future.

Beluga Coal has transportation needs for all levels of exploration and currently uses barges into Tyonek to access the project. Barging is the only current viable transportation mode.

Quantities and schedule of production are unknown at this time. Coal would likely be sent directly to ships from near the mine site area and not be transported on the road system for export. Other infrastructure needs include power and camp facilities.

Linc Energy, Inc.

Linc Energy, Inc. is exploring UCG projects near Tyonek and Beluga that consist of an in-situ method of producing a mixed gas feedstock through the controlled combustion of underground coal seams. Linc has two coal exploration licenses³¹ on Alaska Mental Health Trust (AMHT) Authority lands adjacent to and east of PacRim's Chuitna Coal Project. These two licensed areas are called the Kenai and Tyonek, as depicted on Figure 2-4. Presently, these two exploration licenses constitute a total of 98,700 acres under the lease. The Tyonek exploration license will be converted partially or entirely into a three-year coal lease area starting in 2014. Linc has until 2017 to decide its selection in the Kenai bloc, where the terms are for a seven-year lease interval. Exploration is

²⁹ DNR-DMLW Coal Program. October 8, 2013. Comments provided during a review of a draft of this report.

³⁰ Barrick Gold Corp. also owns 50% of the Donlin Creek project.

³¹ Linc Energy, Inc.'s 2011 exploration permit application describes exploration methods/activities and existing environmental conditions. Available at: <http://dnr.alaska.gov/mlw/mining/coal/linc-tyonek/LincEnergy-Tyonek-Area-Exploration-Application-10192011a.pdf> (accessed March 2013).

currently ongoing, with additional coal core drilling planned for the summer of 2013. Linc said they anticipate commencement of production in 2016 to 2017. However, according to the DNR-DMLW, the anticipated 2016 production schedule is unlikely since Linc has not started baseline studies or completed sufficient geotechnical work to meet the Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA) requirements. UCG synthesis gas (syngas) production is anticipated in 2016. Linc said there are sufficient coal resources for more than 70 years of production. All estimates to date are economic modeling constrained and set at 35 years. Access logistics and cost are the limiting factors on activity.

All fuel equipment and supplies currently have to be either flown in or barged. This material could all feasibly be brought to the project by road if one were available. For workforce access, Linc said they would prefer site access by road.

Three products will be produced and are expected to be transported off-site by pipeline. During peak construction, Linc said they could potentially have 1,000 people onsite, but even during operations they would expect 200 people onsite. Linc said they will need electric power for the start-up phases of gas-to-liquids or synthetic natural gas facilities, or syngas-cleanup facilities. An operating liquids facility will generate excess electricity and steam. The site is expected to be in operation for 30 to 50 years.

Cook Inlet Region, Inc. (CIRI)

CIRI is a major landholder in the Beluga/Tyonek area. Stone Horn Ridge, a joint venture of CIRI and Laurus Energy, Inc., is seeking to develop UCG on CIRI-owned land north of Beluga. Stone Horn Ridge is moving to develop a UCG project (to access coal energy without mining) and to initiate commercial operations and production as soon as 2015. However, according to the DNR-DMLW, the anticipated 2015 production schedule is also unlikely due to a lack of baseline studies and sufficient geotechnical work necessary to meet the ACMCRA requirements.

Other Identified Coal-to-Liquid Plans

- A Beluga Coal Gasification Feasibility Study was prepared in 2006 for the National Energy Technology Laboratory, which was to determine the economic feasibility of developing and siting a coal-based integrated gasification combined-cycle plant in the Cook Inlet region of Alaska for the co-production of electric power and marketable by-products.³²
- In late 2010, Tyonek Native Corporation signed an agreement with Accelergy to develop a coal-to-liquids plant on Tyonek land on the west side of Cook Inlet. The facility would produce aviation fuel, gasoline, and diesel.
- The Alaska Natural Resources to Liquids LLC has previously partnered with the AIDEA to promote plans for an 80,000-barrels-per-day (bpd) coal-to-liquid plant near the Beluga Coal fields near the communities of Tyonek and Beluga.

³² Research & Development Solutions, LLC (RDS)/Science Applications International Corp. (SAIC). 2006. *Beluga Coal Gasification Feasibility Study*. Prepared for National Energy Technology Laboratory. Available at: www.netl.doe.gov/technologies/coalpower/gasification/pubs/pdf/Beluga%20Coal%20Gasi%20Feasibility%20Study%2015_06.pdf (accessed March 2013).

2.3 Oil and Gas Resources

2.3.1 Current Exploration and Production Activities Snapshot

Active oil and gas exploration continues to occur in Northern Cook Inlet. According to DNR, recent drilling has proven new reserves in existing fields. Cook Inlet oil production peaked at 230,000 bpd in 1970, dropping to about 10,800 bpd in FY 2012.³³ As of early December 2013, there are 398 leases in Cook Inlet totaling 1.12 million acres, of which about one-third are on-shore and two-thirds are off-shore.³⁴ Figure 2-4 depicts the on-shore oil and gas leases and activities in the Study Area.

There are nine producing oil and gas units and fields in the Study Area (in Northern Cook Inlet and the Susitna Basin), as detailed in Table 2-5.³⁵ Table 2-5 shows the cumulative production since the inception for each of the units found in the Study Area. The Beluga River Unit is a major supplier for local electric utilities and home gas usage in the Anchorage area.

Table 2-5. Oil and Gas Units/Fields in the Study Area, as of November 2013

Unit/ Field	Current Ownership (%)	Inception	Size (acres)	Number of Wells*	Cumulative Production		
					Condensate (barrels [bbl])	Water (bbl)	Gas (millions of cubic feet [MCF])
Ivan River **	Hilcorp: 99.8 uncommitted: 0.2	1990	2,295	6	0	33,872	84,283,767
Stump Lake	Hilcorp: 100	1990	4,880	1	0	505	6,647,923
Beluga River ***	ConocoPhillips: 50 MOA: 33.33 Hilcorp 16.67	1963	8,227	26	0	1,966,167	1,269,300,564
Lewis River	Hilcorp: 100	1984	620	3	0	13,113	14,313,420
Pretty Creek **	Hilcorp: 100	1986	4,600	2	0	17,252	9,540,022
Three Mile Creek	Aurora Gas: 50 Cook Inlet Energy: 50	2005	3,320	2	0	28,719	2,381,336
Lone Creek (CIRI)	Aurora Gas: 100	2003	n/a	3	0	33,467	9,933,627
Moquawkie (CIRI)	Aurora Gas: 100	1967	n/a	5	0	7,582	4,914,788
Nicolai Creek	Aurora Gas: 100	1968	470	6	1	56,764	8,034,348

Source: Personal communication with Alaska Oil and Gas Conservation Commission (AOGCC).

Note: AOGCC maintains production data. Production numbers are as of October 31, 2013.

* Number of completed wells that have been completed and not been plugged and abandoned, as of December 11, 2013.

** There are two gas storage leases in the Study Area: Ivan River and Pretty Creek.

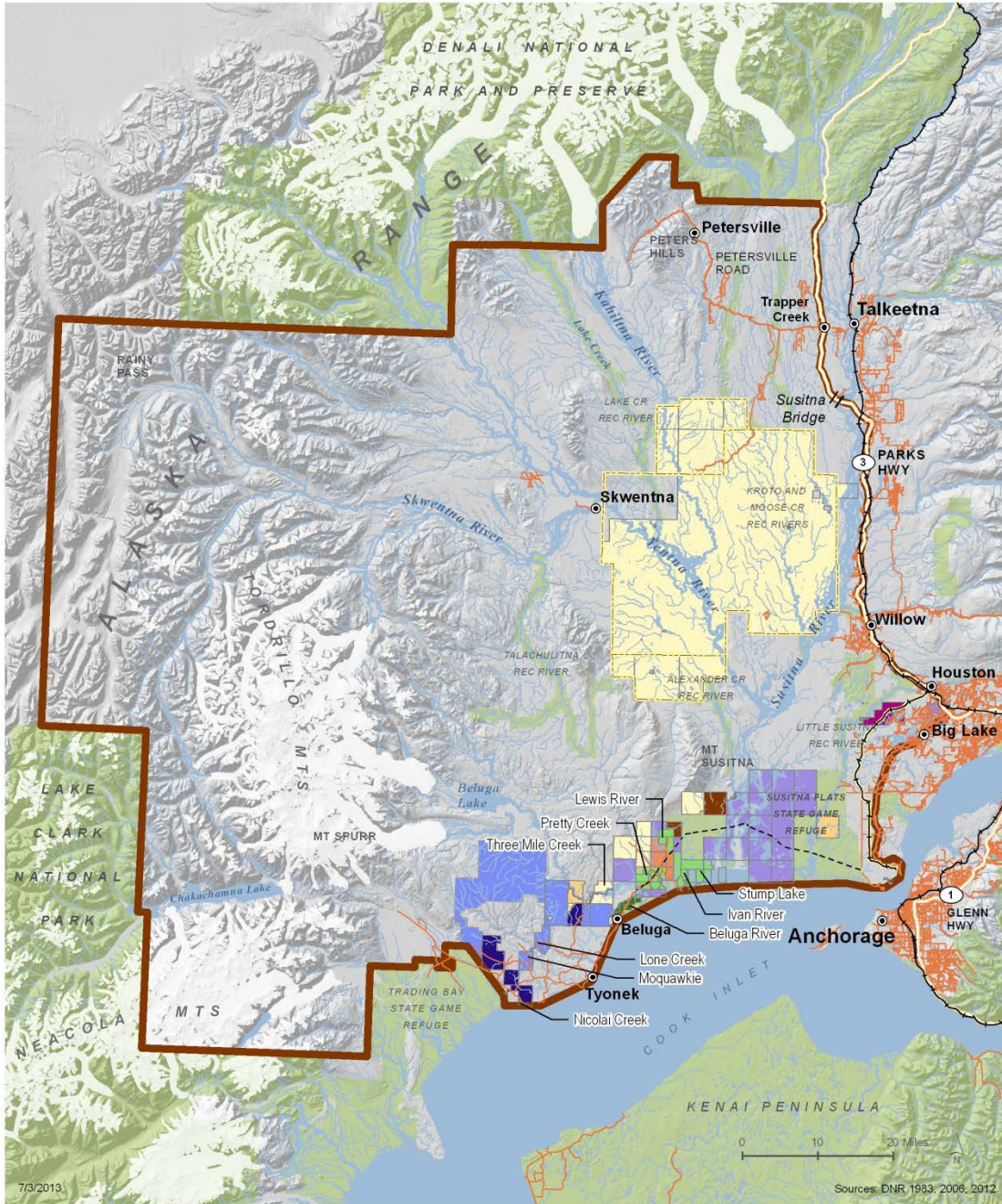
***Cumulative production for Beluga River is approximately 1.3 trillion cubic feet.

³³ Resource Development Council Webpage. *Alaska's Oil & Gas Industry Background*. Available at: www.akrdc.org/issues/oilgas/overview.html (accessed March 2013).

³⁴ DNR-DOG. December 2013. *Active Oil and Gas Lease Inventory* Webpage. Available at: <http://dog.dnr.alaska.gov/Publications/OGInventory.htm> (accessed December 2013).

³⁵ DNR-DOG. 2012. *Cook Inlet Land and Lease Working Interest Ownership* Map. Available at: http://dog.dnr.alaska.gov/Publications/Documents/CookInlet/Maps/Working_Interest_Ownership_Cook_Inlet_2012Dec.pdf (accessed March 2013).

Figure 2-4. Oil and Gas Resources



Oil and Gas Permits/Leases

West Susitna Access to Resource Development

Aurora Gas	Escopeta Oil & Gas Corp.	Pacific Energy AK Operation	Susitna Exploration License Area
Apache Alaska Corp.	Conocophillips AK, Inc	Hilcorp Alaska	Study Area
Aurora Exploration	Cook Inlet Energy	Linc Energy AK, Inc.	Park or Refuge
		Storm Cat Energy Corp.	

Apache Alaska Corporation

As of early 2013, Apache is conducting on- and off-shore programs in the Northern Cook Inlet region. Apache's programs consist of conducting extensive 3-D seismic operations in large areas using nodal technology for offshore, onshore, and transition zone acquisition. The land-based seismic analysis has been conducted on land owned by Tyonek Native Corporation and subsurface land owned by CIRI, as well as on State-owned lands. On-shore, Apache is drilling their first Cook Inlet well (Kalachabuna #2, or K2) on CIRI acreage located northeast of Nicolai Creek on the southern end of the Study Area.³⁶ Apache said these efforts will help identify potential locations for drilling in the future. Another well, Kalachabuna 1, was drilled in 1980 by a different company at the time.

Apache said they need product before a pipeline, and they do not currently have alignments for roads or infrastructure identified. Apache said they have a good working relationship with the Native Village of Eklutna and Tyonek Native Corporation. According to Apache, the Native Village of Eklutna advocates that Apache use existing infrastructure and not build a road, citing their concern that opening this area with a road would ruin the value and the subsistence lifestyle for residents.

The current workforce accesses the area by air, unless traveling by land directly from Tyonek. Apache recognizes there would be pluses and minuses to a West Susitna access road to the region. The road would make the area more useful and economically efficient, and access would not be restricted by weather (e.g., barging and ice, flying and visibility).

Apache currently has temporary camp facilities and a drill waste disposal pit near Tyonek. Apache said they have approximately 60 workers onsite. There is a potential for an 80-person camp in the future, should multiple locations for additional exploratory drilling be identified. When possible and feasible, Apache uses existing facilities. Apache said the area is pretty good for its power needs.

Based on results from testing, the existing drilling will be wrapped up in summer 2013. At this time, Apache is not sure where this project will go next. They have no concentrate or finished product, but would hope to transport gas and oil by pipeline. There are no estimated volumes at this time. Operations would be years away.

Aurora Gas, LLC

Aurora Gas, LLC is in the operations and development drilling phases. Aurora stated they have four units in the southern portion of the Study Area and recently drilled two new wells. The units are Three Mile Creek Field, Lone Creek, Moquawkie Unit, and Nicolai Creek Unit. Aurora is targeting shallow gas in these units and Apache bought the deep rights. The size of Aurora's lease area is approximately 45,000 acres. Aurora said they are in partnership with Cook Inlet Energy, Inc. on the Three Mile Creek wells. Aurora said production could vary annually, but they plan to be in production for 10-15 years. Aurora said there are more leases to drill after obtaining the seismic data from Apache.

Aurora said that access is a priority and a West Susitna access road would be very useful. Fuel comes in by barge or is flown in at a greater expense. There are no roads. Aurora said they need all forms

³⁶ DNR-DOG. December 2012. *Cook Inlet Oil and Gas Activity Map*. Available at: http://dog.dnr.alaska.gov/GIS/Data/ActivityMaps/CookInlet/Cook_Inlet_Oil_and_Gas_Activity_Map_20121206.pdf (accessed March 2013).

of transport. Like Apache, Aurora experienced transportation infrastructure difficulties when the Chuit bridge was washed out in 2012. This impacted their activities at Lone Creek and the Three Mile Creek locations. The implications of the bridge washout meant employees who are residents of Tyonek had to be flown into the project sites, which resulted in additional costs of lodging, rental vehicles, etc.

Aurora has a few existing production facilities, including a well house, with additional new well facilities on the way. Long-term infrastructure needs include a 40-person camp. Aurora said they are self-contained for power.

Cook Inlet Energy, LLC

Cook Inlet Energy, LLC (CIE)³⁷ provides oil and gas extraction services and currently has two active exploration operations north of Beluga called Olson Creek and Otter. CIE also has a large land position in the Susitna basin. CIE has approximately 680,000 gross acres and five potential targets at this time. According to DNR records, CIE has a 30 percent stake in the Three Mile Creek lease (gas production facilities). Natural gas production and/or oil could begin as early as 2014, although CIE is still in the exploration phase and planned annual production is not yet determined. The projects would be developed only if economically viable, which presupposes certain minimum production rates. An economically viable project would typically have a life of at least 20-30 years.

In early 2013, CIE constructed a trail from Willow to the Yentna River with a snow road and ice bridge over the river. CIE said property owners and visitors in the Skwentna/Yentna/Deshka area appreciated and made extensive use of the snow road because it provides a route to points west that is safer and shorter than running over the Susitna and Yentna rivers. CIE said the new trail saved travelers to Skwentna 34 miles round trip from Willow.

CIE said they fly or barge in most of their fuel and supplies to the Beluga area. Drill rigs and other equipment get barged in at Tyonek. In the Susitna area, access has been overland by way of ice bridges and snow roads. CIE currently has no air support capabilities in the Susitna area, but said they would develop landing areas prior to drilling. CIE said they will need to bring in supplies for pipelines and surface facilities. Crews would be brought in by fixed-wing aircraft. CIE plans to barge out large volumes of drilling mud and cuttings. Building roads and pads requires heavy equipment.

Currently, crews are either local or coming in via air. If a road were available, crews might drive in from Tyonek or the Mat-Su Valley. CIE has been actively improving and expanding a gravel road and pad system in the Olson Creek/Otter area, including a gravel pit and a new bridge across Olson Creek.

CIE has partnered with other companies, such as CIRI, to help improve infrastructure on the west side of Cook Inlet. CIRI's affiliate, Stone Horn Ridge, is using the Coffee Creek pad for their UCG exploration and is in the same area as Olson Creek and Otter. CIE has two pads and a drill rig in the Olson Creek/Otter area.

CIE may construct facilities, pipelines, and/or camp(s) at Olson Creek, Otter, and/or their prospects in the Susitna Basin. CIE said they would benefit from the expansion of utilities, such as

³⁷ The company was incorporated in 2009 and operates as a subsidiary of Miller Energy Resources, Inc., according to Bloomberg Businessweek, available at: <http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=108801500> (accessed March 2013).

power and telecommunications, and would need to make major investments in local transportation infrastructure and pipelines. A gas pipeline connecting the Susitna Basin area to the existing natural gas grid is a significant hurdle.

ConocoPhillips Alaska, Inc.

In Southcentral Alaska, ConocoPhillips owns 100 percent interest in the Kenai Liquefied Natural Gas (LNG) facility and operates the Tyonek Platform in the North Cook Inlet field and the Beluga River natural gas field. The Beluga River natural gas field falls within the Study Area, whereas the North Cook Inlet field does not.

The Beluga River natural gas field serves major customers in Southcentral Alaska, including local utilities and industrial consumers. Net natural gas production averaged nearly 20 million cubic feet per day in 2011. ConocoPhillips Alaska, Inc. has a 50 percent stake in the Beluga River Unit, and co-ventures Municipality of Anchorage (MOA)-Municipal Light and Power (ML&P) and Hilcorp have 33.3 percent and 16.67 percent, respectively.

ConocoPhillips declined the request for an interview. However, they said they have a neutral position on the importance of accessing the West Susitna region by land. They said “while land access could be useful, it is not considered critical for operation of the Beluga River Unit or future development.”

Hilcorp Alaska, LLC

Hilcorp has interest in multiple on-shore units in the Study Area in northern Cook Inlet, including Lewis River; Ivan River (with a gas storage lease); Pretty Creek (with a gas storage lease); Stump Lake; and Beluga River Unit, in part with ConocoPhillips Alaska, Inc., and the MOA. Hilcorp’s stake in the Beluga River Unit is 16.67 percent.

Hilcorp only recently entered the Cook Inlet market when they acquired all of Chevron, Union Oil Co. of California’s assets in 2012. The recent acquisition of Marathon’s assets further expanded Hilcorp’s holdings to 70 percent of the gas production in Cook Inlet.

Hilcorp declined the request for an interview. However, Hilcorp said while they consider land access to the West Susitna region useful, they currently have no projects that would be directly impacted by road access.

- Oil funds more than half the State budget – 56 percent in fiscal year 2012 – and about 90 percent of State general funds
- “The balance sheet of Alaska history is simple: One Prudhoe Bay is worth more in real dollars than everything that has been dug out, cut down, caught, or killed in Alaska since the beginning of time.” – Terrence Cole, Alaska Historian

- Alaska Economic Trends June 2013

(Alaska Department of Labor and Workforce Development;

<http://labor.alaska.gov/trends/jun13.pdf>)

2.3.2 Other Oil and Gas Resources Potential

Oil and gas exploration within Alaska's Railbelt Energy Region, which encompasses most of Alaska's major population centers, has received significant focus in recent years as a means to bring more affordable energy to the region. The DNR-DGGS has recently published a summary of findings on exploitable fossil fuel (e.g., coal [as discussed in Section 2.2.3] and conventional and unconventional oil and gas) and geothermal energy resources in the Railbelt region.³⁸ This section briefly summarizes available information regarding oil and gas resource potential as it relates to the Study Area (geothermal energy is addressed in Section 2.6).

Conventional Oil and Gas. The Railbelt region contains several important basins that hold oil and gas potential. Within the Study Area, the Cook Inlet and Susitna basins contain resource potential. The Cook Inlet basin, which encompasses the very southern part of the Study Area, has been producing oil and gas since the late 1950s, though production from existing fields has been declining.³⁹ Ongoing exploration and active leases, however, suggest the potential for additional discoveries, and significant focus in recent years has been on identifying recoverable gas reservoirs to supply future energy to southcentral Alaska. The USGS has estimated that the Cook Inlet Region has 599 million barrels of oil (*est. value \$63.3 billion*⁴⁰) and 13.7 trillion cubic feet of natural gas (*est. value \$76 billion*⁴¹) to be discovered.⁴² The State of Alaska is attempting to incentivize new exploration by offering major tax credits to private industry.

By comparison, the Susitna basin to the north has experienced relatively little exploration and has no proven economic oil and gas resources. To date, only two wells have been established west of the Susitna River, in 1964 and 1980.⁴³ Portions of the Susitna basin are eligible for new drilling due to two adjacent exploration licenses issued on State lands in 2003.

Coalbed Methane (CBM). The potential for CBM gas recovery within the Study Area is strong. The USGS recently estimated more than 4.5 trillion cubic feet of coalbed gas (*est. value \$25 billion*⁴⁴) remains undiscovered in the greater Cook Inlet area.⁴⁵ However, the recoverable amount of coalbed

³⁸ DNR-DGGS. 2012. Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska. Edited by Robert Swenson et al. p. 94-112.

³⁹ DNR-DGGS. 2012. Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska. Edited by Robert Swenson et al.

⁴⁰ The estimate of \$63.3 billion is based on the forecasted price for fiscal year 2014 for North Slope Oil of \$105.68 per barrel.

⁴¹ Potential sale revenue was determined by applying the September 2013 natural gas citygate price (citygate is a point or measuring station at which a distributing gas utility receives gas from a natural gas pipeline company or transmission system). According to the EIA, this value was \$5.55/thousand cubic feet. The estimate of \$76 billion is based on \$5.55/thousand cubic feet for citygate value, per U.S. EIA natural gas prices. Available at: http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SAK_m.htm (as accessed December 2013).

⁴² Stanley, Richard G. et al. 2011. Assessment of Undiscovered Oil and Gas Resources of the Cook Inlet Region, South-Central Alaska, 2011. Prepared by the Cook Inlet USGS Assessment Team. Available at: <http://pubs.usgs.gov/fs/2011/3068/> (Accessed December 2013)

⁴³ DNR-DGGS. 2012. Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska. Edited by Robert Swenson et al.

⁴⁴ Coalbed gas is considered a component of natural gas. For purposes of deriving an estimated value, the \$5.55/thousand cubic feet natural gas price was applied, per U.S. EIA pricing. Available at: http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SAK_m.htm (as accessed December 2013)

⁴⁵ Stanley, Richard G. et al. 2011. Assessment of Undiscovered Oil and Gas Resources of the Cook Inlet Region, South-Central Alaska, 2011. Prepared by the Cook Inlet USGS Assessment Team. Available at: <http://pubs.usgs.gov/fs/2011/3068/> (Accessed December 2013)

gas, especially within the Study Area, is likely much less due to large regions located offshore that are unlikely to be economically developed.⁴⁶ The resource potential is greatest in regions with higher rank coals (bituminous and semi-anthracite coals located outside the Study Area). Regardless, subbituminous coal rank areas (see Figure 2-2) located within the Study Area represent regions with CBM potential. While these areas are vast in size, CBM production in the Study Area is non-existent. A 3-year, collaborative study between DGGs, DOG, and USGS is currently underway to learn more about the Susitna Basin's hydrocarbon potential.⁴⁷ Field investigations seek to determine from the coal sampled in the region its potential as a primary fuel source and the capacity of the coalbeds to produce and store methane gas. This study is an important component of the DGGs' multiyear In-State Gas Program. The Tyonek area may hold the greatest potential for CBM resource production within the Study Area due to existing infrastructure of petroleum development.

Other (Unconventional) Natural Gases. Other natural gases potentially present within the Study Area include tight gas sands, shale gas, and gas hydrates. These unconventional gases appear to have greater geologic potential of occurring in the lower Cook Inlet region to the south of the Study Area, and do not hold strong economic potential at present.⁴⁸

⁴⁶ DNR-DGGs. 2012. Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska. Edited by Robert Swenson et al. p. 105.

⁴⁷ DNR-DGGs. April 2013. Status of A Reconnaissance Field Study of the Susitna Basin, 2011. By Robert Gillis et al.

⁴⁸ DNR-DGGs. 2012. Fossil Fuel and Geothermal Energy Sources for Local Use in Alaska. Edited by Robert Swenson et al.



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