

Ambler Mining District Industrial Access Road Preliminary Economic Impact Study

Final Report

DRAFT

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List of Acronyms

ACS: American Community Survey
ADEED: Alaska Department of Education and Early Development
ADF&G: Alaska Department of Fish & Game
AIDEA: Alaska Industrial Development and Export Authority
AMDIAR: Ambler Mining District Industrial Access Road
ANCSA: Alaska Native Claims Settlement Act
AVEC: Alaska Village Electric Cooperative
BEA: Bureau of Economic Analysis
BIA: Bureau of Indian Affairs
BLS: Bureau of Labor Statistics
CPI: Consumer Price Index
CRS: Community Revenue Sharing
DOLWD: Alaska Department of Labor and Workforce Development
DOTPF: Alaska Department of Transportation and Public Facilities
DMTS: Delong Mountain Transportation System
EIS: Environmental Impact Statement
GDS: Geographic Differential Study
IHS: Indian Health Service
NSR: Net smelter return
NWAB: Northwest Arctic Borough
PCE: Power Cost Equalization
PEA: Preliminary Economic Analysis
PILT: Payment in lieu of taxes
TPA: Tribal Priority Allocations
UKMP: Upper Kobuk Mineral Projects
USDA: United States Department of Agriculture
YKCA: Yukon-Koyukuk Census Area

The State of Alaska is considering the potential costs, benefits, and investment opportunities associated with construction and operation of an all-season, controlled-access industrial road connecting the Ambler Mining District to the Dalton Highway. The Ambler Mining District is located within the Northwest Arctic Borough (NWAB) in Northwest Alaska. The purpose of the road would be to facilitate access to, and development of, the richly-mineralized Ambler Mineral Belt. The road could also enhance the economic well-being of communities in general proximity of the road and mineral development projects.

The Ambler Mineral Belt has been characterized as one of the largest undeveloped copper-zinc mineral belts in the world. Known principal prospects include the Arctic, Bornite, SUN, and Smucker deposits. The district has been the target of exploration activity for many years but continues to have significant additional mineral exploration and development potential.

Most recently, mining company NovaCopper Inc. has been conducting an aggressive exploration program in the area, and has identified significant high-grade copper resources with development potential. NovaCopper and NANA Corporation have established a framework for exploration and development of the region's mineral resources, including NovaCopper's Arctic deposit (located on State of Alaska mining claims) and the NANA-owned Bornite deposit. Under the 2011 NANA-NovaCopper Exploration Agreement, NovaCopper has the exclusive right to explore the Bornite prospect and other land owned by NANA. The agreement also allows NovaCopper to use NANA lands for access and for construction of mining facilities.

Other mining companies, including Andover Mining Company, have also been evaluating mineral deposits in the region. However, with virtually no surface access to the region, exploration and mine development has been and will remain constrained. Over the long-term future, a transportation corridor will substantially increase the likelihood of multiple mine development in the district.

In 2013, the Alaska Industrial Development and Export Authority (AIDEA) and NovaCopper signed a Memorandum of Understanding for development of the Ambler Mining District Industrial Access Road (AMDIAR). Modeled after the Delong Mountain Transportation System (which supports the Red Dog mine), AIDEA is considering construction of a limited access industrial road to support mine development in the district. NovaCopper, along with any other industrial users of the road, would pay tolls to cover the cost of constructing the road. Multiple road design and construction options are under consideration, ranging in cost from \$190 million to \$400 million.

While facilitating mine development would be the principal purpose of the AMDIAR, a number of small communities in general proximity of the Ambler Mining District could benefit economically from road and mine development. Like many communities in rural Alaska, these communities struggle with high fuel costs, limited employment opportunities, and fundamental concerns about long-term economic sustainability.

The purpose of this study is to assess the local, regional, and statewide economic benefits associated with development of AMDIAR. More specifically, this study considers how development of a controlled-access industrial road, and related mining activity, might affect local communities by providing employment

opportunities to local residents and by reducing the cost of fuel and freight transportation. This study does not address the overall feasibility of road and/or mine development in the region, nor provide a cost/benefit analysis.

Socioeconomic Baseline Conditions

This report includes an assessment of socioeconomic conditions in communities potentially affected by road construction and mine development. Among the communities considered in this analysis are the NWAB villages closest to the Arctic and Bornite deposits, including the upper Kobuk River villages of Ambler, Shungnak and Kobuk. Other communities in the NWAB could be affected by mine development in the Ambler Mining District, either through employment opportunities for local residents or tax revenues (or Payments in Lieu of Taxes – PILTs) flowing from mines to the borough government.

The communities of Evansville and Bettles, located within the Yukon-Koyukuk Census Area (YKCA), are within a few miles of the proposed road route, near the eastern end of the AMDIAR. The communities of Alatna, Allakaket, Hughes, and Huslia are all some distance down the Koyukuk River from the potential road route. However, those four communities are represented by ANCSA village corporation K'oyitl'ots'ina, Limited, which may have business interests in road and mine development, in addition to employment opportunities for its shareholders.

The challenges these communities face include limited local employment and income opportunities and high cost of living. Per capita income is typically less than half the Alaska average and unemployment rates are several times higher than the statewide rate. The percentage of families living under the federally-defined poverty line is well above the statewide average, though this measure of economic well-being does not capture the economic value of subsistence activity. Most households in the study area communities consume about 1,000 pounds of subsistence resources annually.

Table ES-1. Selected Demographic and Economic Characteristics of Profiled Communities, Various Years

Communities	2013 Population	2010 % Alaska Native	2007-2011 Per Capita Income	2007-2011 % Unemployed	2007-2011 % Families Below Poverty Line
Kobuk	159	90%	\$11,184	15%	56%
Shungnak	294	94	10,261	38	28
Ambler	264	84	14,767	40	25
Bettles	14	0	47,560	*	*
Evansville	2	53	53,057	*	*
Alatna	26	97	*	60	*
Allakaket	108	95	15,611	53	39
New Allakaket	68	98	9,549	32	50
Hughes	88	96	17,396	33	*
Huslia	322	92	10,332	26	43
Alaska	736,399	17%	\$31,944	7.6%	6.6%

*Not reported due to small sample size.

Source: American Community Survey, 2007-2011 Five-Year Average; U.S. Census, 2000; and ADOLWD.

Potential Mine Development in the District

- The Ambler Mining District has long-term development potential in addition to the Arctic and Bornite deposits. Surface access would stimulate exploration activity in general and renew interest in other known prospects in the area, such as Andover Mining Company's SUN prospect and Teck's Smucker deposit (Teck is the operator of the Red Dog mine).
- This study focuses on the potential economic impact of a single mining operation. However, as a world-class mineral belt, the Ambler Mining District has the potential for multiple mine development and cumulative economic impacts significantly beyond what is currently foreseeable.
- The most advanced project in the Ambler Mining District is NovaCopper's Arctic Project. Preliminary economic analysis indicates that with an initial investment of \$718 million, a 10,000-ton per day surface mining operation with a 12-year mine life could be economically feasible. The mine would produce 370,000 tons of copper, lead, and zinc concentrates annually.
- NovaCopper is also assessing the development potential of the Bornite deposit, located approximately 11 miles southwest of the Arctic Project. Located on property owned by NANA Corporation, Bornite has approximately 100 million tons of Indicated and Inferred resources containing 3 billion pounds of copper. An economic feasibility study for developing a mine at Bornite has not yet been completed.

Employment Impacts of Road Construction and Mine Development

- Construction of the AMDIAR would be a three to four-year effort that would create an annual average of approximately 300 jobs, with potential peak employment of 450. Workers would earn a total of \$120 million in payroll (based on a \$400 million total construction budget).
- Development of the Arctic mine and construction of related ancillary facilities would require an annual average of approximately 400 workers over a two-year construction period, with a peak workforce of approximately 600. These workers would earn a total of \$100 million in wages.

Employment Impacts of Road Maintenance and Mine Operations

- Four maintenance stations are planned to support year-round road operations. An estimated total of 20 operating and maintenance personnel would staff these stations. These workers would earn an estimated total of \$1.6 million in annual payroll.
- Arctic mine operations would require a workforce of approximately 500. These workers would earn an estimated \$46 million in annual wages. Employment opportunities would expand if other district mining prospects are developed.

Resident Employment and Payroll

- It is estimated approximately 20 percent of the road and mine construction labor force would be drawn from communities in the NWAB and other small communities in the project area. At its peak, 90 regional residents would be expected to participate in the AMDIAR construction effort, while 120 regional residents would join the mine development project.

- Approximately 30 percent of the mine operations labor force would be drawn from the region; about 150 workers would earn just under \$14 million in annual wages. It is estimated that half of the mine operations workforce would be from elsewhere in Alaska, and about 20 percent would be nonresidents.

Table ES-2. AMDIAR and Arctic Mine Construction Employment and Wages, by Worker Residency

	Total	Regional Residents	Other Alaska Residents	Non-Alaska Residents
Employment (peak)				
AMDIAR construction	450	90	270	90
Arctic mine construction	600	120	300	180
Wages (millions)				
AMDIAR construction (4 year total)	\$120.0	\$24.0	\$72.0	\$24.0
Arctic mine construction (2 year total)	\$100.0	\$20.0	\$50.0	\$30.0

Source: McDowell Group estimates.

Table ES-3. AMDIAR and Arctic Mine Operations Employment and Annual Wages, by Worker Residency

	Total	Regional Residents	Other Alaska Residents	Non-Alaska Residents
Employment (annual average)				
AMDIAR operations & maintenance	20	10	10	0
Arctic mine operations	500	150	250	100
Wages (millions)				
AMDIAR operations & maintenance	\$1.6	\$0.8	\$0.8	\$0.0
Arctic mine operations	\$46.0	\$13.8	\$23.0	\$9.2

Source: McDowell Group estimates.

- In summary, Alaska residents would earn \$96 million (or 80 percent) of the estimated \$120 million total wages generated during the road construction effort, \$70 million (70 percent) of \$100 million total mine construction-related wages, and \$37 million (80 percent) of the Arctic's annual operating payroll of \$46 million

Total Employment and Payroll Impacts, Including Multiplier Effects

- Non-payroll spending by construction and mining companies, and spending by their employees, would create additional economic activity in Alaska, sometimes described as the "multiplier effect." Including multiplier effects, AMDIAR construction would have a direct, indirect and induced regional resident employment impact totaling 125 jobs over a four-year period. Mine construction would generate regional resident employment impacts totaling 170 jobs.
- AMDIAR road operations and maintenance would account for a total of 30 jobs and \$2 million in annual wages.
- Arctic mine operations would have a total regional resident employment effect of 250 jobs and \$20 million in annual wages.

- Statewide, Arctic mine operations would account for 1,000 direct, indirect, and induced jobs and \$79 million in annual wages.

Table ES-4. AMDIAR and Arctic Mine Construction-Related Employment and Wages, including Direct, Indirect, and Induced Effects

	Total Direct	Total Direct, Indirect & Induced	Regional Direct	Total Regional Direct, Indirect & Induced
Employment				
AMDIAR construction	300	470	90	125
Arctic mine construction	400	625	120	170
Wages (millions)				
AMDIAR construction (4 year total)	\$120	\$162	\$24	\$34
Arctic mine construction (2 year total)	\$100	\$135	\$20	\$28

Source: McDowell Group estimates.

Table ES-5. AMDIAR and Arctic Mine Operations-Related Employment and Wages, including Direct, Indirect, and Induced Effects

	Total Direct	Total Direct, Indirect & Induced	Regional Direct	Total Regional Direct, Indirect & Induced
Employment				
AMDIAR operations & maintenance	20	30	10	15
Arctic mine operations	500	1,000	150	250
Wages (millions)				
AMDIAR operations & maintenance	\$1.6	\$2.2	\$0.8	\$1.0
Arctic mine operations	\$46.0	\$79.0	\$14.0	\$20.0

Source: McDowell Group estimates.

Population Effects

- Road and related mine development in the Ambler Mining District could generate population growth in the region, or reduced out-migration that might occur in absence of development. In total, the Arctic mine would have a statewide population effect of about 1,600 residents, including approximately 600 in the region.

Government Revenues and Royalties

- Mine development in the region would generate revenues for the State of Alaska through mining license fees, royalties, and corporate income taxes. The preliminary economic analysis conducted for the Arctic Project indicates the mine would pay a total of \$115 million in mining license taxes over the life of the project along with \$158 million in corporate income taxes. Located on State of Alaska mining claims, the Arctic mine would also generate production royalties to the state, estimated at approximately \$58 million over the currently-planned 12-year project life.
- While the NWAB receives no sales tax or property tax revenues, the borough would likely receive an annual PILT from mining operations in the Ambler Mining District, such as that paid by Teck Alaska for

its Red Dog operation. Since 1989, when mining began at Red Dog, the mine has contributed approximately \$125 million in PILT to NWAB. Red Dog PILTs account for more than half of all NWAB revenues. To the extent that mine development in the Ambler Mining District occurs at the same scale as Red Dog, annual PILTs of between \$5 million and \$10 million annually are possible.

- NANA Corporation's interest in mine development in the Ambler Mining District includes net smelter return royalties from the Arctic mine, as well as the right to purchase up to 25 percent direct ownership of the project.
- As owner of the Bornite property, NANA would have substantial royalty interest in mine development and operations there. Since 1989 NANA has received (as the land owner) a total of \$1.04 billion in royalties from Red Dog, including \$143 million in 2013.

Regional Transportation Benefits

For communities in the study area, transportation of heavy freight and fuel is a major challenge. Huslia is the only community with reliable barge service and Bettles/Evansville are the only communities with any form of ground connection, via a seasonal ice road connecting to the Dalton Highway. Despite being located adjacent to rivers, barge service is unreliable or unavailable in all villages in the area (except Huslia) due to low water levels. Hughes, Ambler, Shungnak, and Kobuk occasionally have barge service during spring run off or during the fall rainy season. Water levels are too low for a barge to reach Allakaket and Alatna.

The need to fly fuel and freight into communities results in very high costs. For example, in 2012 Ambler received 98,000 gallons of fuel via 25 flights with an average cost of \$7.75 per gallon. The cost of flying fuel may rise as older aircraft in service for many years are eventually retired.

The analysis of how the AMDIAR might affect local transportation costs is complicated because some communities are not located in close proximity to the proposed road corridor. If road access were available to these communities, the result would be several million dollars in annual savings in shipping fuel and freight. Communities can be described as having significant, moderate, or minimal potential transportation benefit from road construction:

- ***Significant Potential:*** Evansville and Bettles, which are adjacent to the proposed route, would likely experience significant transportation benefit from construction of the AMDIAR.
- ***Moderate Potential:*** The Upper Kobuk River communities have moderate potential for transportation-related benefits from road construction, especially Kobuk, but also Shungnak, and to a lesser extent Ambler. Investment in spur roads would be required for year-round or seasonally maintained single-lane gravel roads suitable for use by a fuel truck.
- ***Minimal Potential:*** Alatna, Allakaket, Hughes, and Huslia are much farther from the corridor than the Upper Kobuk communities and are unlikely to ever have a road connection to the AMDIAR.

Summary

In summary, it is evident that road and mine development in the Ambler Mining District would have substantial economic impacts in communities within the NWAB and YKCA near the district, as well as statewide. Benefits to local communities would include employment opportunities during road and mine construction, and during mine operations.

As measured in this study, road maintenance and Arctic mine operations would bring 520 new direct jobs to the region. Arctic mine jobs would represent an 18 percent increase in employment in the borough. NWAB communities could also benefit from millions of dollars in annual PILTs made by mining operations to borough government. These local government revenues provide a funding opportunity to enhance community services within the borough. To the extent local communities in NWAB and YKCA can gain access to the road for movement of fuel and freight, lower cost of living would be an additional economic benefit associated with AMDIAR.

While this report focuses primarily on the economic effects of AMDIAR construction and operation of a single mine, the long-term potential for mining development in the region is well beyond the immediate benefits of road construction and Arctic mine operations alone. The richly mineralized Ambler Mineral Belt has the potential to become a major, multiple-producer mining district, generating economic benefits for the region over many years.

Introduction

The purpose of this study is to assess the economic benefits associated with construction and operation of an all-season, controlled-access industrial road connecting the Ambler Mining District to the Dalton Highway. The purpose of the proposed Ambler Mining District Industrial Access Road (AMDIAR) is to facilitate access to, and development of, the richly-mineralized Ambler mineral belt, located in the Northwest Arctic Borough (NWAB). Development of access to the area also has the potential to enhance the economic well-being of the region's communities and residents.

The Ambler Mining District has been the target of exploration activity for many years. Mining company NovaCopper has recently been conducting an aggressive exploration program in the area, identifying significant high-grade copper resources and initiating detailed economic evaluation of the property. Other companies, including Andover Mining Company and Teck, are also actively exploring the area's mining potential.

The Alaska Department of Transportation and Public Facilities (DOTPF) evaluated a range of potential transportation corridors to provide all-season access to the Ambler Mining District, including several routes from tidewater on Norton Sound or Kotzebue Sound to the west, several routes from the Elliott and Dalton Highways to the south and east, road-only options, rail-only options, and various combinations thereof. An approximately 200-mile road route to the Dalton Highway appears to be the most practical, lowest cost option. Multiple road design and construction options are under consideration, ranging in cost from \$190 million to \$400 million.

The Alaska Industrial Development and Export Authority (AIDEA) assumed a coordinating role on the AMDIAR project in 2013. AIDEA is a public corporation of the State of Alaska with a mission "To promote, develop, and advance economic growth and diversification in Alaska by providing various means of financing and investment." AIDEA and NovaCopper signed a Memorandum of Understanding in 2013 for development of the AMDIAR. The road would extend into the vicinity of several mining prospects, including NovaCopper's Arctic deposit, which is currently the most advanced prospect in the District with long-term development potential.

AMDIAR would be modeled after the Delong Mountain Transportation System (DMTS), which supports the Red Dog mine. Teck Alaska, as the operator of Red Dog, pays a toll for use of the state-owned DMTS, a 52-mile road and port facility that serve the mine's freight and ore concentrate shipment needs. Teck user fees to AIDEA repay the bonds issued for construction of the transportation system and provide a return on AIDEA's equity investment in the port and road. Initial construction of the DMTS cost \$180 million, with a subsequent upgrade of \$85 million, for a total cost of \$265 million. Through the end of June 2013, the State had received a total of \$443 million from Red Dog for use of the DMTS. Similarly, AIDEA would finance construction of the AMDIAR and NovaCopper, along with other industrial users of the road, would pay an annual toll to pay back the cost of the road's construction and maintenance.

AIDEA is initiating work on an environmental impact statement (EIS) for the road in 2014, with completion of a draft EIS targeted for 2016, and a final EIS by 2017. Upon completion of the EIS, AIDEA would seek a private consortium to design, construct, maintain, and operate the AMDIAR.

NANA Corporation, northwest Alaska's regional Alaska Native Claims Settlement Act (ANCSA) corporation, is a major land owner in and around the Ambler Mining District and, as such, is an important part of the cooperative effort to enhance access to the region's mineral resources and its communities. K'oyitl'ots'ina, Limited, is the ANCSA village corporation representing the economic and other interests of shareholders connected to Alatna, Allakaket, Hughes, and Huslia, communities located in the Yukon-Koyukuk Census Area (YKCA) that are potentially affected by road and mine development. Evansville, Inc. is the Native village corporation for Evansville.

This study considers the economic impact of road corridor and mine development, and compares those impacts to economic conditions and trends in the absence of road development. The period of analysis is from the present through 2035. While the economic influence of mine development in the Ambler Mining District may be felt statewide (through jobs, purchases, and tax payments), this study focuses mainly on regional impacts, in particular the communities in closer proximity to the proposed road corridor. For purposes of this study, these communities include:

- Ambler
- Kobuk
- Shungnak
- Evansville/Bettles
- Alatna/Allakaket
- Hughes
- Huslia

Potential economic effects in other NWAB/NANA region and YKCA/Doyon communities are also considered, as well as statewide impacts, but in much less detail.

Study Background and Objectives

The NANA and Doyon regions of Northwest Alaska include a large number of small, isolated communities that, to varying degrees, have struggled with economic sustainability. The communities in these regions are varied, but typically are remote, predominantly Alaska Native, subsistence-dependent, often with low median household incomes, limited cash income opportunities, and high unemployment/underemployment. These rural Alaska communities also contend with increasing living costs, driven by fuel prices that have nearly doubled in the past decade. Rising fuel prices have placed additional pressure on already stressed communities. Any improvement in surface transportation infrastructure may have the potential to bring down fuel costs, as well as costs for moving other goods and services into and out of the region.

Meanwhile, recent and on-going exploration activity in the Ambler Mining District (an area that has seen significant mineral exploration interest over many decades) suggests mine development may now be economically feasible with road access. NovaCopper's Arctic prospect is the most advanced exploration/pre-development project in the area. The deposit includes 27 million metric tons of Indicated and Inferred resources containing potentially commercial quantities of copper, zinc, lead, gold, and silver. Initial economic analyses suggest profitable mining may be possible, assuming a road is in place to connect the Ambler Mining District to the Dalton Highway. Other prospects in the Ambler Mining District also have potential for development, with suitable surface transportation infrastructure. NovaCopper is also investigating the nearby Bornite prospect, located on NANA-owned property, about 16 miles southwest of the Arctic deposit. Though lower grade than the Arctic deposit, it has Indicated and Inferred resources totaling 98 million metric tons. Other deposits in the district may also have long-term development potential, including Andover Mining Company's SUN prospect and Teck's Smucker deposit.

This study is intended to inform the State of Alaska and other stakeholders about the regional and statewide economic benefits associated with development of AMDIAR. While the cost of constructing the road has been estimated, prior to this study the benefits have not. This study considers how development of a controlled-use industrial road, and related mining activity, might benefit the region by providing employment opportunities to local residents, and by reducing the cost of fuel and freight transportation.

Methods and Sources

This study included a combination of primary and secondary research. Data sources include Alaska Department of Labor and Workforce Development (DOLWD) for employment, payroll and population data; Alaska Department of Commerce, Community, and Economic Development (DCCED) for a variety of information about the communities in the study area; the federal Bureau of Economic Analysis (BEA) for personal income data; U.S. Census Bureau for decennial census data and American Community Survey (ACS) data; and a number of other state and federal government sources as noted throughout the report. The Alaska Industrial Development and Export Authority (AIDEA) provided construction cost estimates for the AMDIAR.

Information about the nature and scale of potential future mining development in the Ambler Mining District was drawn from the 2013 *Preliminary Economic Assessment Report on the Arctic Project, Ambler Mining District, Northwest Alaska*, prepared for NovaCopper by Tetra Tech. NovaCopper also provided information about the size and residency of its exploration program workforce in the Ambler region.

The Red Dog mine provides an important model for understanding the potential economic impacts of mine development in the study area. NANA Corporation provided residency information about the Red Dog workforce and other information pertaining to the actual and potential economic impact of mine development in the region. Related data was also drawn from the 2009 *Red Dog Mine Extension Aqqaq Project Environmental Impact Statement*.¹

¹ *Red Dog Mine Extension Aqqaq Project Final Supplemental Environmental Impact Statement, Volume 1, October 2009*. Prepared by Tetra Tech for the U.S. Environmental Protection Agency.

Primary research included interviews will include information regarding transportation infrastructure, service of firms engaged in mineral exploration activities, and the economic impact of past and present mining.

Assessments of future economic conditions in the study area are based on projections (where past trends are used) and changes in economic and demographic conditions. The study did not involve rigorous econometric modeling. Projections and professional judgment were used to estimate demographic conditions in the study area.

Study Limitations

Any forward-looking study is limited by the uncertainty of the future. This study does not consider the likelihood or timing of complex factors will determine if and when road development conditions for base and precious metals, the study area. This makes predicting future mine development difficult. At the scale of mine development, it is possible to consider how road development might affect the area economically, should road and mine development occur.

There is also uncertainty regarding the distribution of impacts. The study region includes a number of communities. The proposed all-season road route between the communities may not be able to make reasonable and informed assumptions about the impact of an industrial road, but how such access might affect the area is difficult to predict at this point in time.

Finally, there is analytical uncertainty associated with the study area, both with and without road/mine development. The ACS provides demographic and socioeconomic data for the study area, but these are projected into the future and forecasts (where expected conditions are considered in predicting future conditions). Forecasts for individual small communities often have variations in the data used to predict economic conditions.

Report Organization

Chapter 1 includes a brief overview of the study area and the opportunities in the Ambler Mining District. Chapter 2 provides an analysis of economic conditions in the study area. Chapter 3 provides an analysis of economic conditions to 2035. An analysis of mine development is provided in Chapter 4.

The appendices contain detailed borough-level data (Appendix 1), as well as economic and demographic data for the AMDIAR and related mine development (Appendix 2).

ultually occur would depend on a number of factors difficult to predict. The study area is limited by community-level data limitations. The Census Bureau's data for study area communities, but these survey-based data have high error margins. This limits sophisticated modeling of local economic conditions.

AMDIAR project and the significant mineral development project. Chapter 2 provides an analysis of borough and community-level data. Chapter 3 includes an analysis of regional and local baseline (no road) conditions and the regional and local economic impact of road and mine development.

Appendix 1 contains data reflecting socioeconomic trends and current conditions for the study area. Appendix 2 contains demographic profiles of the communities most directly affected by the proposed road (Appendix 2).

Interviews were conducted with individuals familiar with study area communities, particularly with those familiar with the proposed road route, and costs. Interviews were also conducted with representatives of the Ambler Mining District, and others familiar with the mining industry and activity in Northwest Alaska.

the study area, both with and without road/mine development, are projected into the future and forecasts (where expected conditions are considered in predicting future conditions). Forecasts for individual small communities often have variations in the data used to predict economic conditions. The study area is limited by community-level data limitations. The Census Bureau's data for study area communities, but these survey-based data have high error margins. This limits sophisticated modeling of local economic conditions.

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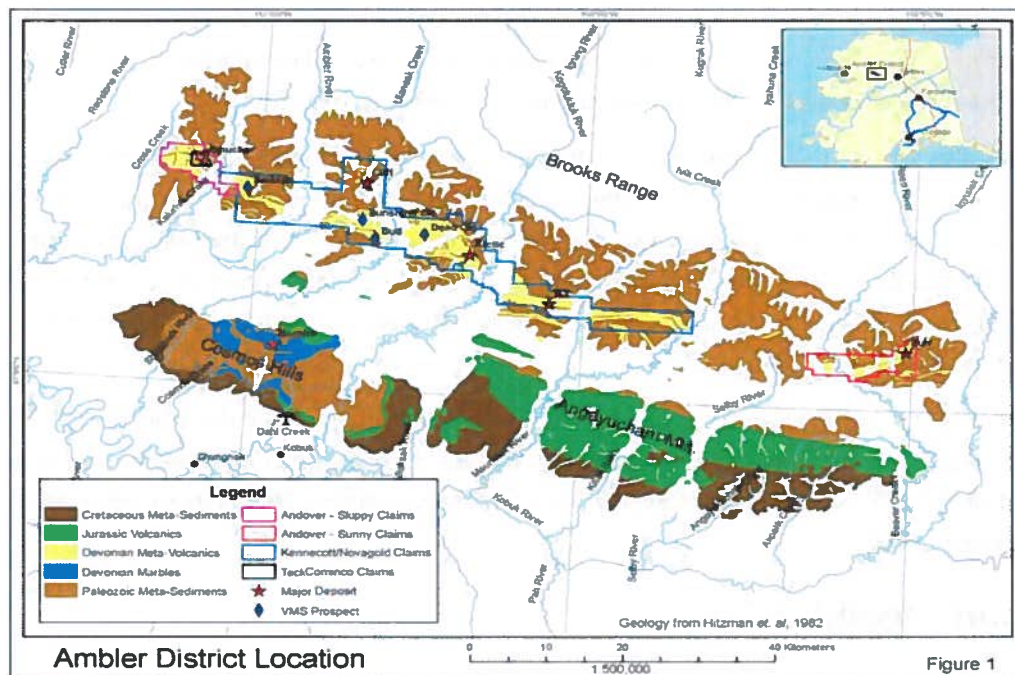
Chapter 1. Ambler Mining District Resources and Access Planning

Ambler Mining District Resources

The Ambler Mineral Belt is within the Ambler Mining District, a 75 mile-long northwest/southeast trending zone of mineralization that has been the target of mineral exploration activity for many years. Several projects in the Ambler Mineral Belt appear to have near-term or longer-term development potential, assuming suitable transportation infrastructure can be constructed. This includes NovaCopper's Upper Kobuk Mineral Projects (UKMP) which includes the Arctic and Bornite deposits, Andover Mining Corporation's SUN property, and Teck's Smucker deposit. These projects are described in some detail below.

The Ambler Mineral Belt has been characterized as one of the largest un-developed copper-zinc mineral belts in the world.² In addition to known principal prospects, the district has significant additional mineral exploration and development potential.

Figure 1. Ambler Mining District Location and Geology



Source: Andover Mining Corporation.

² <http://www.andovermining.com/wp-content/uploads/2011/12/Andover-Mining-Corp.-Presentation-20134.pdf>

The Arctic Project (NovaCopper)

The Arctic Project is NovaCopper's most advanced exploration/pre-development project in its UKMP and the most advanced project among all properties in the Ambler Mining District. The Arctic property is comprised of 112,000 acres of State of Alaska mining claims and patented federal mining claims, including 875 40-acre State claims, 481 160-acre State claims, and two patented federal claims totaling 272 acres. It is located approximately 20 miles northeast of Kobuk, 26 miles from Shungnak, and 40 miles east-northeast of Ambler.

The Arctic deposit includes 27 million metric tons of Indicated and Inferred resources containing copper, zinc, lead, gold, and silver. The Indicated and Inferred resources at Arctic have an average copper grade of 3.2 percent. NovaCopper's Preliminary Economic Analysis (PEA), completed by Tetra Tech in September 2013, indicates a surface mine and mill processing 10,000 tons of ore per day over a 12-year mine life could be economically feasible. The base case scenario assumes long-term metal prices of \$2.90/pound for copper, \$0.85/pound for zinc, \$0.90/pound for lead, \$22.70/ounce for silver, and \$1,300/ounce for gold. The PEA is based on the assumption an access road from the Dalton Highway will be constructed and financed like AIDEA's DMTS.

The processing facility would produce 370,000 tons of copper, lead, and zinc concentrates annually. The copper and zinc concentrates would be shipped out in bulk while the lead concentrate would be shipped off site in containers. Based on preliminary planning, these concentrates would be trucked to Port MacKenzie, located just north of Anchorage, then the concentrates would be transported by ocean to overseas smelters.

According to the NovaCopper's PEA, development of the Arctic Project will require an initial investment of \$718 million. That initial investment does not include the \$430 million required to construct the AMDIAR. For purposes of the PEA, it was assumed NovaCopper would pay a toll for using the ADMIAR of \$9.7 million annually for the 12-year mine life. That annual payment (which is based on a \$150 million, 30-year bond at a 5 percent interest rate) is contingent on the assumption the Arctic mine would be one of two or more large-scale users of the toll road.

Private transportation infrastructure that would be developed for the Arctic Project includes a 5,000-foot gravel airstrip capable of serving Dash 8 – Q400/Hercules C130 aircraft. The airstrip would be located approximately 13 miles from the project site, directly adjacent to the AMDIAR. The project would also require construction of an 11-mile road from the mine to the nearest location of the proposed AMDIAR, at a cost of \$27 million.

Electric power would be generated by four 3.6 MW diesel generators (with a fifth generator in reserve). Diesel fuel storage capacity would be provided by three 500,000 gallon tanks. Development of a liquefied natural gas (LNG) trucking operation from the North Slope to Fairbanks along the Dalton Highway might present an opportunity to use natural gas to generate electricity at the mine.³ Specific information regarding the economic implications of using natural gas to power the mine is not yet available; however, it has been estimated that the mine's power costs could be cut in half.⁴

³ AIDEA's Interior Energy Project includes a State of Alaska commitment of a \$125 million loan, a \$57.5 million capital appropriation, and \$150 million in bonds to support the development of the gas trucking project. <http://www.interiorenergyproject.com>.

⁴ AIDEA, 2014.

Mine telecommunications would include a Voice over Internet Protocol (VoIP) telephone system, satellite communications for voice and data, Ethernet cabling for site infrastructure, wireless Internet access, two-way radio communications at site, and satellite TV.

Annual operating costs, including the road toll costs, would total approximately \$64 million. Details about employment associated with road and mine construction, and mine operations, are provided in Chapter 4 of this report.

NovaCopper's objective is to complete a feasibility study for the Arctic deposit over the next two to three years. To achieve this, the company is planning to carry out additional environmental baseline studies, acid base accounting studies, marketing studies for the concentrates, and additional geotechnical and hydrologic modeling work. Exploration drilling may continue at the Bornite deposit to assist the evaluation of potential development synergies between the Arctic and Bornite resources.

A target date for the completion of a feasibility study on the project is late 2016/early 2017, though its completion is contingent on a myriad of factors. A completed feasibility study would be a key decision point regarding the initiation of the permitting process for project development.⁵

Bornite (NovaCopper)

NovaCopper is also assessing the development potential of the Bornite deposit, located approximately 11 miles southwest of the Arctic Project. Bornite is on property owned by NANA Corporation. Though lower-grade than Arctic, Bornite is a larger deposit. The Bornite deposit has been estimated to include nearly 100 million tons of Indicated and Inferred resources, including 7 million tons of Indicated resource at the Ruby Creek mineralized zone, another 48 million tons of Inferred resource at Ruby Creek, and 43 million tons of Inferred resource at the South Reef mineralized zone. With grades ranging from 1 percent to 2.5 percent copper, the Bornite deposit contains approximately 3.3 billion pounds of copper.⁶

Bornite has been the target of exploration activity for many years, with a total of 230,000 feet of drilling since 1957. Work on the property included the development of a 1,075-foot exploration shaft in 1966 which provided access for sampling, mapping, and underground drilling.

In 2013, NovaCopper drilled 13 holes totaling 26,700 feet. The company expects to continue its drilling program at Bornite to further measure the size and grade of the deposit, and eventually prepare a preliminary economic assessment similar to 2013 Arctic PEA. NovaCopper believes the Ruby Creek deposit has potential for surface mining. The South Reef zone would require underground mining.

A 16-mile gravel road connects the Bornite field camp to Kobuk. The Dahl field camp and airstrip lie along the road between Bornite and Kobuk. The 4,780-foot airstrip is suitable for larger aircraft, such as C-130s and DC-6s. Shungnak is 10 miles downriver from Kobuk, and Ambler another 30 miles further downriver from Shungnak.⁷

⁵ Personal communication with Scott Petsel, Upper Kobuk Mineral Projects (UKMP) Manager, NovaCopper, January 2014.

⁶ http://www.novacopper.com/s/Ambler_District.asp?ReportID=577394&_Type=Ambler-District&_Title=Bornite-Deposit.

⁷ NI43-101 Technical Report for the Upper Kobuk Mineral Projects Bornite Deposit–South Reef and Ruby Creek Zones, Northwest Alaska, prepared by BD Resources Consulting, Inc., for NovaCopper, February 8, 2013.

SUN (Andover)

Located about 34 miles from the Arctic deposit, the SUN prospect is owned by Andover Mining Company through its subsidiary, Andover (Alaska) Inc. The SUN property consists of a total of 230 State of Alaska claims, totaling 36,800 acres.

The most recent available estimates place SUN's resource at 2.2 million tons of Indicated resource, grading 1.4 percent copper and 4.1 percent zinc, along with lead, silver, and gold values. The Inferred resource is 11.6 million tons, grading 1.1 percent copper and 3.9 percent zinc, plus lead, silver, and gold values.⁸

As reported in the Arctic PEA, 96 drill holes totaling 63,000 feet have been completed on the SUN Property. This includes 47 holes drilled by Andover in 2007, 2011, and 2012 (previous drilling work had been performed by Anaconda, Noranda, Cominco, and Bear Creek).

Smucker (Teck)

Andover also has interest in property around the Smucker deposit, an inactive poly-metallic (copper-lead-zinc-gold-silver) prospect owned by Teck (operator of the Red Dog mine) and located about 24 miles northwest of the Arctic Project. Early estimates place the size of the Smucker resource at about 7.2 million tons at 0.5 percent copper and 4.9 percent zinc, plus lead, silver, and gold values.

Other Study Area Mineral Resources

In addition to the various poly-metallic hard-rock prospects in the Ambler Mining District, there are other mining resources in the region to which the AMDIAR may affect access (depending on approval of AMDIAR use). For example, gold placer mining in portions of the Koyukuk mining district could see improved access. Placer gold production in 2012 in portions of the Koyukuk mining district within or close to the corridor totaled 3,400 troy ounces. Twelve mechanical and three suction-dredge operations accounted for full-time equivalent employment of 25.⁹ The region also contains coal resources, including bituminous coal beds on the north side of the Middle Fork of the Koyukuk River. AMDIAR may also could support efforts to assess the development potential of the region's coal resources, which currently are poorly understood. Given the relatively small scale, or limited development potential, of these and other similarly obscure mineral resources, such as jade, in the study area, the economic implications of improved access are not considered in this study.

Transportation Corridor Planning

Originally funded through the State of Alaska's "Roads to Resources" initiative, the Ambler Mining District Industrial Access Road Project is an effort to develop surface transportation infrastructure to a rich mineral area within the NWAB.

⁸ Technical Report on the SUN Project, Brooks Range, Alaska. Mine Development Associates. Prepared for Andover Mining Corporation September 30, 2013.

⁹ Ambler Mining Region, Phase 1: Summary of Mineral Projects, Preliminary Draft. Prepared for AIDEA by Alaska Department of Commerce, Community, and Economic Development, Division of Economic Development, November 2013, page 15.

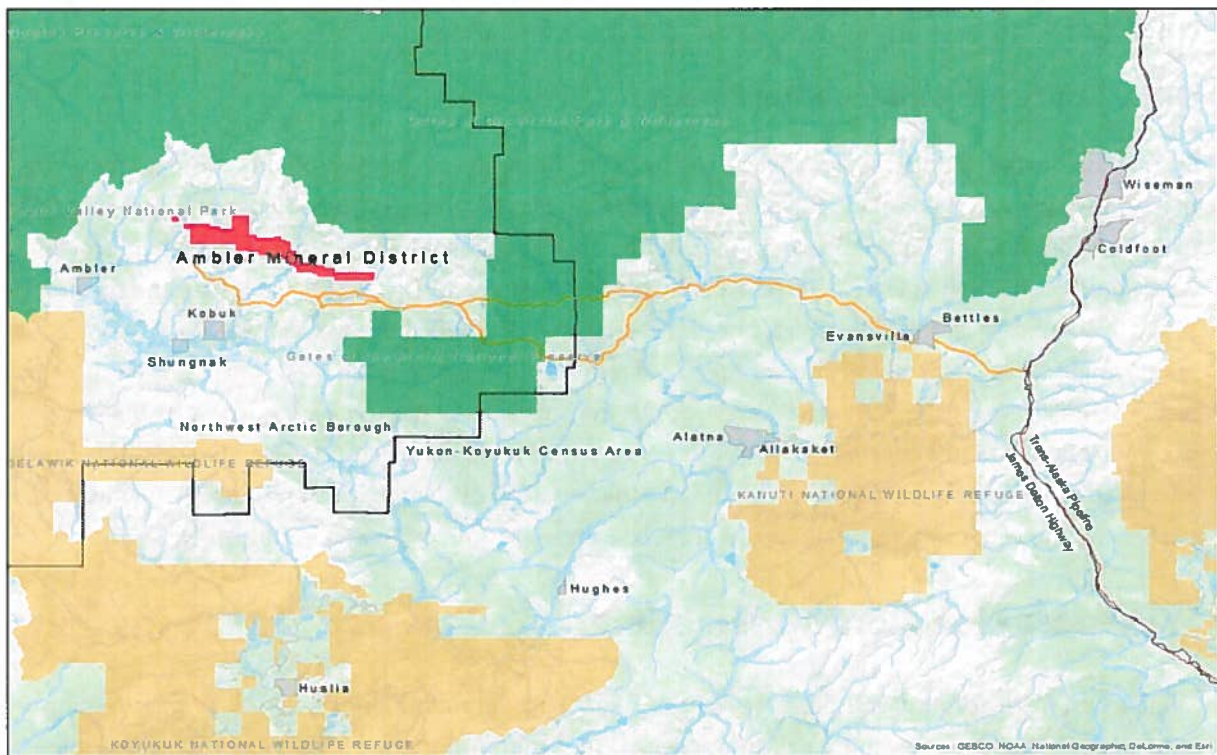
Beginning in 2010, DOTPF conducted reconnaissance-level investigation of a wide variety of easterly and westerly transportation corridor options. A roughly 200-mile route along the foothills of the Brooks Range from Mile 135 of the Dalton Highway is seen as the best option in terms of engineering feasibility and cost. The “Brooks East” corridor lies primarily on State of Alaska, NANA Corporation and Doyon lands. The route may ultimately be slightly longer or shorter than 200 miles depending on final alignment.

State of Alaska work conducted on the project to date includes reconnaissance-level route investigation, preliminary engineering and cost analysis, geotechnical studies, baseline environmental research, cultural resource analysis, and an extensive public outreach effort that included public meetings in the communities potentially affected by corridor development.

In 2013, project management was transitioned from DOTPF to AIDEA, to take advantage of AIDEA’s greater flexibility to work with private industry, ability to develop public/private partnerships, and use financing tools that would not otherwise be available to support development of the corridor.

Work planned for 2014 includes additional engineering and environmental work and submitting necessary applications to initiate the project’s environmental review process.

Figure 2. Ambler Mining District Industrial Access Road Location Map



Chapter 2: Regional and Community Socioeconomic Conditions

This chapter summarizes socioeconomic conditions in the region and communities around the Ambler Mining District and proximal to the AMDIAR. Study area communities include:

- Ambler
- Kobuk
- Shungnak
- Evansville/Bettles
- Alatna/Allakaket
- Hughes
- Huslia

Other communities could be affected by mine development in the Ambler Mining District, either through employment opportunities for local residents or tax revenues (or Payment in lieu of taxes (PILTs)) flowing from mines to the borough government. Among the communities included in this analysis are the villages closest to the Arctic and Bornite deposits, the upper Kobuk River villages of Ambler, Shungnak, and Kobuk. These communities are located in the NWAB.

Located within the YKCA, the communities of Evansville and Bettles are within a few miles of the proposed road route, near the eastern end of the AMDIAR. The communities of Alatna, Allakaket, Hughes, and Huslia are all some distance down the Koyukuk River from the potential road route; however, they are all represented by ANCSA village corporation K'oyitl'ots'ina, Limited, which may have business interests in road and mine development.

Community Socioeconomic Conditions and Trends

Communities in the study area exhibit several common socioeconomic characteristics and face many of the same economic challenges. As illustrated in the following table, most of the communities have relatively low per capita and average household income, and relatively high unemployment, and subsistence plays an important part in local community and household sustainability. Most have populations that are predominantly Alaska Native. All face high fuel and transportation costs.

Socioeconomic Characteristics

The challenges these and many other remote, rural Alaska communities face include a lack of local employment and income opportunities. As illustrated in the following table, per capita income is typically less than half the Alaska average and unemployment rates several times higher than the statewide rate (published unemployment rates understate actual unemployment in Alaska's small communities, so the percentage of working age adults is usually higher than reported). The percentage of families living below the federally-defined poverty line is far above the statewide average, though this particular measure of economic well-being fails to capture the economic and cultural value of subsistence activity.

Table 1. Selected Demographic and Economic Characteristics of Profiled Communities, Various Years

Communities	2013 Population	2010 % Alaska Native	2007-2011 Per Capita Income	2007-2011 % Unemployed	2007-2011 % Families Below Poverty Line
Kobuk	159	90%	\$11,184	15%	56%
Shungnak	294	94	10,261	38	28
Ambler	264	84	14,767	40	25
Bettles	14	0	47,560	*	*
Evansville	2	53	53,057	*	*
Alatna	26	97	*	60	*
Allakaket	108	95	15,611	53	39
New Allakaket	68	98	9,549	32	50
Hughes	88	96	17,396	33	*
Huslia	322	92	10,332	26	43
Alaska	736,399	17%	\$31,944	7.6%	6.6%

*Not reported due to small sample size.

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2010; and DOLWD.

Subsistence activity in Alaska communities is often measured in terms of pounds harvested per capita. Most communities in the study area have a high degree of dependence on subsistence resources.

Table 2. Study Area Subsistence Harvest Profile

	% Using	Pounds Per Household	Pounds Per Capita
Ambler (2009)	80%	968	272
Kobuk (2009)	93	982	220
Shungnak (2008)	98	1,182	243
Allakaket (2011)	100	1,351	525
Bettles (2011)	100	263	175
Evansville (2011)	100	81	53
Hughes (2002)	78	1,037	411
Huslia (2002) – Big Game	79	382	134
Huslia (2002) – Non-Salmon Fish	96	642	224

Source: Community Subsistence Information System, Alaska Department of Fish & Game (ADF&G).

Long-term and near-term population trends in the study area communities are provided in the following table. Trends vary from community to community, but most communities have experienced long-term and recent growth. Only Ambler and the very small communities of Bettles and Evansville have lower current population than in 1990 and 2000. The latest available population estimates show growth between 2010 and 2013 in all communities except Alatna and Bettles/Evansville (combined).

Table 3. Study Area Population and Percent Change, Various Years

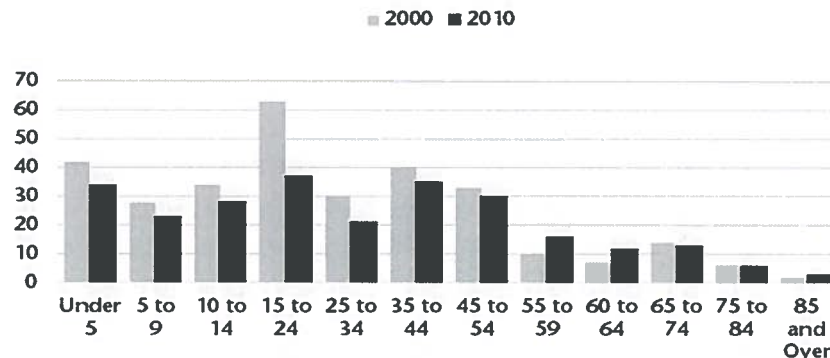
	1990	2000	2010	2013	% Change 1990-2013	% Change 2000-2013	% Change 2010-2013
Ambler	311	309	258	264	-15%	-15%	2%
Kobuk	69	109	151	159	130	46	5
Shungnak	223	256	262	294	32	15	12
Alatna/ Allakaket/New Allakaket*	170	168	208	202	19	20	-3
Bettles	36	43	12	14	-61	-67	17
Evansville	33	28	15	2	-94	-93	-87
Hughes	54	78	77	88	63	13	14
Huslia	207	293	275	322	56	10	17

*1990 Census only includes Allakaket.

Source: U.S. Census, 1990, 2000 and 2010; and DOLWD.

Growth in these communities is likely the result of several factors, though high birth rates are likely a primary reason. According to DOLWD, high rural birth rates among Alaska Natives living in rural areas have offset an on-going trend of rural to urban migration.¹⁰ Employment opportunities connected with mining industry activity in northwest Alaska may also be contributing to population growth in study area communities.

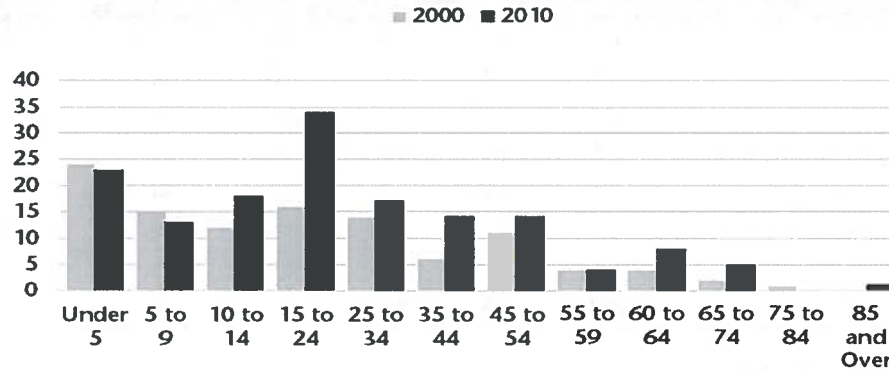
Population growth is typically a good indicator of economic growth, but that may not be the case in rural Alaska, where children may be accounting for a disproportionate share of the population, relative to working-age adults. Population data for Ambler and for Kobuk illustrate the effect of spikes in local birth rates on population trends in small communities. In Ambler, which experienced a general downward trend in population between 2000 and 2010 (from 309 to 258), the number of residents aged 15 to 24 dropped markedly over the ten-year period. In 2000, Ambler had a median age of 21.8 years. By 2010, the median age was 28.7. Evidently, as that age cohort reached working age, many left the community. Conversely, in Kobuk, where population increased between 2000 and 2010 (from 109 to 151 residents), the 2010 population count includes a disproportionate number of residents aged 15 to 24. Following the Ambler pattern, it would be reasonable to expect Kobuk's population to decline as that age group moves into working age.

Figure 3. Population of Ambler, by Age, 2000 and 2010

Source: U.S. Census, 2000 and 2010.

¹⁰Alaska Economic Trends, April 2013, Volume 33. DOLWD, Research and Analysis Section.

Figure 4. Population of Kobuk, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

Cost of Living

In addition to limited employment opportunities and low average income levels, study area communities struggle with high living costs, especially high fuel and transportation costs.

The 2008 Alaska Geographic Differential Study (GDS) provides measures of the relative cost of living in the Northwest Alaska region and in the smaller, isolated communities within the region.¹¹ In general, the 2008 GDS found the regional hubs in the northwest and far north Alaska (Barrow and Kotzebue) had living costs that are more than 50 percent higher than in Alaska's major urban centers, Anchorage and Fairbanks. As indicated in the following table, the cost of living in Kotzebue (as of 2008) was 61 percent higher than in Anchorage.¹²

Relevant to this study, GDS also found small communities with road access had a significantly lower cost of living than small communities off a road system. As indicated in the following table, small communities with road access (along the Parks, Elliot, Steese, and Richardson highways) have a cost of living not significantly different than Alaska's urban areas. Several small communities (included in GDS) without road access (the "Roadless Interior" communities) have a cost of living about one-third above the urban areas.

¹¹Alaska Geographic Differential Study, 2008, Prepared for Alaska Department of Administration by McDowell Group, Inc.

¹²GDS measured living costs only in communities where state government workers reside; therefore, places such as Ambler, Kobuk, and Shungak were not included in the analysis.

Table 4. Geographic Cost Differentials, 2008

Area/Region	2008 Differential
Anchorage	1.00
Fairbanks	1.03
Parks/Elliott/Steese Highways ⁽¹⁾	1.00
Glennallen Region ⁽²⁾	0.97
Delta Junction/Tok Region ⁽³⁾	1.04
Roadless Interior ⁽⁴⁾	1.31
Barrow	1.50
Kotzebue	1.61

(1) Includes Healy, Cantwell, Central, Nenana, Manley Hot Springs, and Talkeetna

(2) Includes Glennallen, Chitina, Paxson, Slana, and Tazlina

(3) Includes Delta Junction, Tok, Eagle, and Northway

(4) Includes Galena, Fort Yukon, and McGrath

Source: *Alaska Geographic Differential Study, 2008*, McDowell Group, Inc.

As illustrated in the following table, the cost of living in the Kotzebue and Roadless Interior communities, which together serve as imperfect but reasonable proxies for the study area communities, includes very high food, transportation, and other costs, relative to urban areas and communities with road access.

Table 5. Geographic Cost Differentials for Selected Household Items, 2008, Roadless Interior Communities and Kotzebue*

Area/Region	Parks/Elliott/Steese Highway Communities	Roadless Interior	Kotzebue
Cereals and breads	1.08	1.55	1.87
Dairy products	1.12	1.62	2.07
Fruits and vegetables	1.10	1.64	1.92
Fuel	1.22	1.80	2.04
Household Furnishings/Appliances	1.08	1.68	1.93
Interstate air travel	1.27	2.05	2.72

*Price differentials are relative to Anchorage.

Source: *Alaska Geographic Differential Study, 2008*, McDowell Group, Inc.

FUEL COSTS

The cost of fuel is a common thread through the high cost of living in remote communities, and communities in northwest and far north Alaska in general. Extreme climatic conditions mean that households need more heating oil to heat homes in the winter. Further, moving fuel to remote areas often requires fuel-barge transportation over long distances up-river, and in some cases delivery by air. Long shipping distances (whether by air or water) from supply hubs pushes up the costs of all household goods, from food to furniture. Fuel is needed to support subsistence lifestyles, for riverboats, ATVs, and snowmachines, as well as power electrical generators.

Rising fuel prices affect urban and rural households, but not equally. An increase in home heating oil prices from \$3 per gallon to \$4 in Anchorage might translate into an increase from \$5 per gallon to \$8 in Kotzebue, for example, because the cost to transport the fuel rises along with the commodity price.

The following tables provide detailed gasoline and heating oil prices for three of the study area communities, as well as other communities for points of reference. The communities of Eagle and Circle are included as a proxy example because they offer similar conditions as remote communities with road access. The data indicate that while fuel prices are substantially higher in remote road-access communities and in regional hubs, they are far lower than remote communities without road access.

Table 6. Gasoline Prices in Selected Communities, 2005 to 2013

Community	Nov 2005	Nov 2006	Nov 2007	Nov 2008	Jun 2009	Jun 2010	Jun 2011	Jul 2012	Jul 2013
Alatna	\$4.50	\$5.00	\$6.00	\$7.00	\$7.00	\$7.00	\$9.66	\$7.50	\$7.00
Hughes	4.75	5.50	6.00	8.50	7.00	7.50	8.25	8.25	8.25
Huslia	5.00	5.00	5.00	7.00	5.95	5.00	6.50	7.00	7.00
Kiana	4.75	5.25	5.92	7.21	7.21	6.50	6.70	7.50	7.00
Noorvik	4.68	4.88	4.88	7.22	7.36	5.43	6.20	7.60	7.57
Kotzebue	4.65	4.20	4.36	7.25	7.15	4.88	5.37	5.73	6.29
Eagle	3.50	3.75	3.75	5.50	4.50	4.50	4.60	5.00	5.00
Circle	3.30	3.65	3.64	4.70	3.95	\$6.00	5.25	5.55	5.50
Fairbanks	2.59	2.49	3.10	2.75	2.94	\$4.49	4.04	4.08	4.05

Source: Alaska DCCED, Alaska Fuel Price Reports.

Table 7. Heating Oil Prices in Selected Communities, 2005 to 2013

Community	Nov 2005	Nov 2006	Nov 2007	Nov 2008	Jun 2009	Jun 2010	Jun 2011	Jul 2012	Jul 2013
Alatna	\$4.00	\$4.50	\$6.00	\$5.50	\$5.50	\$6.50	\$7.50	\$6.50	\$7.00
Hughes	5.40	6.00	7.50	8.55	8.55	8.55	9.00	9.50	9.00
Huslia	4.50	4.50	4.50	7.00	7.00	4.25	6.00	7.00	7.00
Kiana	4.25	4.50	5.15	6.64	6.64	6.00	6.18	7.00	6.50
Noorvik	4.49	4.55	4.60	7.50	7.65	5.08	5.77	7.50	6.31
Kotzebue	4.55	3.86	4.20	6.35	6.35	4.64	5.30	5.68	6.07
Eagle	3.25	3.25	3.50	4.95	4.50	3.75	4.50	4.75	4.75
Circle	2.85	2.65	3.50	3.01	2.65	n/a	5.50	n/a	n/a
Fairbanks	2.44	2.25	3.20	2.63	2.71	3.22	4.00	3.78	3.85

Source: Alaska DCCED, Alaska Fuel Price Reports.

COST OF LIVING SUBSIDIES

The high costs associated with living in remote Alaska would be even higher without financial support from the state government. Utility and fuel expenditures are directly offset for residents through the Power Cost Equalization (PCE) program, described below.

Power Cost Equalization Program

The Alaska Energy Authority PCE program reduces the price paid by the consumer for electricity by providing payment directly to the power utility. The precise amount of the subsidy depends on a variety of factors and is determined by the Regulatory Commission of Alaska. In FY2012, the PCE paid out \$1.1 million to the power utilities in the study area, ranging from 37 cents per kilowatt-hour in Huslia to 74 cents per kilowatt-hour in Allakaket/Alatna. In general terms, the PCE targets a residential price, therefore any significant drop in the price of fuel would result in a drop in the PCE amount.

Table 8. Power Cost Equalization Payments, 2012

Community	Eligible kWh	PCE Payment	\$ per kWh
Allakaket/Alatna	223,700	\$166,362	\$0.74
Ambler	523,536	236,276	0.45
Bettlers/Evansville	122,938	62,030	0.50
Hughes	203,937	117,427	0.58
Huslia	549,796	201,144	0.37
Kobuk	138,363	70,026	0.51
Shungnak	416,946	263,646	0.63
Total	2,179,216	\$1,116,911	\$0.51

Source: AEA Power Cost Equalization Statistical Report, 2013.

Summary of Local Conditions

As illustrated above, socioeconomic conditions in study area communities include low levels of household income and high employment. Communities face high cost of living, and in particular high fuel costs, which affect costs for households, businesses, and organizations, such as schools. Power cost subsidies, while reducing costs for consumers, only shift the cost burden to other payers. Like many communities in rural Alaska, lack of local economic opportunity coupled with high cost of living raise questions about long-term sustainability.

Northwest Arctic Borough Conditions and Trends

The Ambler Mining District lies within NWAB. The NWAB's population of 7,796 residents (in 2013) are located in 11 communities ranging in population from 139 in Kobuk to 3,202 in Kotzebue, the region's government and commercial hub. NWAB is the second largest borough (by area) in Alaska, encompassing 35,898 square miles of land and 4,864 square miles of water.¹³ The borough was incorporated as a First-Class Borough in 1986 and became a Home-Rule Borough in 1987.

As of the 2010 Census, 87 percent of the NWAB population was characterized as "American Indian and Alaska Native alone or in combination with one or more other races." The median age was 25.7 years.

The NWAB economy is a blend of subsistence and cash activity. As of 2010 (the most recent available data), the three largest employers in the borough were Red Dog (including employment with Teck Alaska, NANA Management Services, and NANA/Lynden Logistics), Maniilaq Association, and the NWAB School District. Other significant employers included Northwest Inupiat Housing Authority, City of Kotzebue, and Alaska Commercial Company.¹⁴

A detailed profile of economic trends for NWAB is provided in Appendix 1, including a variety of income and employment indicators.

A relatively small part of the study lies within the boundaries of YKCA. The 146,000 square-mile YKCA had a total 2013 population of 5,650 residents scattered over more than 30 small communities, the largest of which

¹³ <http://www.nwabor.org/about.html>

¹⁴ In 2013, Red Dog had a total workforce of 639, including regular and temporary workers employed by Teck Alaska, NANA Lynden, and NANA Management Services.

is Fort Yukon, with a 2013 population of 590. Because only a small portion of the YKCA is of concern in this study, census area-level economic conditions and trends are not described in this report. In Appendix 2, relevant communities within YKCA (Evansville, Hughes, Huslia, Alatna, and Allakaket) are profiled in detail.

Regional Socioeconomic Trends

Population, total personal income, and per capita income have all been increasing in the NWAB over the past decade. Employment has generally been flat, though that is the result of a combination of declining public sector employment and increasing private sector employment.

The following table provides 9-year trend data for NWAB personal income, employment, wages, and population. Personal income and wage data has been adjusted to account for the affects of inflation and is presented in constant 2012 dollars.

- Between 2004 and 2012, total real (inflation adjusted) personal income increased by 31 percent and per capita income increased by 24 percent.
- Private sector employment was up 15 percent while government employment was down 2 percent. Total employment was up 8 percent.
- Employment in Kotzebue was up 9 percent between 2004 and 2012, while employment elsewhere in the borough was up 6 percent.
- Total wages increased by 38 percent between 2004 and 2012, including a 28 percent increase in the average monthly wage.
- Wages in Kotzebue were up 44 percent, compared to 12 percent elsewhere in the NWAB.
- NWAB population increased by 4.8 percent between 2004 and 2012. This included a 3 percent increase in Kotzebue and an increase of 6 percent in all other areas of the borough combined.

Table 9. NWAB Total and Per Capita Personal Income, 2004 to 2012 (2012\$)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Personal Income									
Total (\$M)	\$246	\$256	\$252	\$265	\$275	\$284	\$306	\$312	\$321
Per Capita	\$33,233	34,529	33,682	35,563	36,805	37,963	40,632	40,363	41,145
Employment by Sector									
Government	1,131	1,235	1,244	1,220	1,156	1,171	1,152	1,118	1,114
Private Ownership	1,591	1,761	1,667	1,705	1,732	1,721	1,764	1,756	1,828
Total	2,721	2,996	2,911	2,925	2,888	2,892	2,916	2,874	2,943
Employment by Location									
Kotzebue	1,813	1,969	1,923	1,883	1,884	1,940	1,971	1,962	1,980
All Other NWAB	908	1,027	988	1,042	1,004	952	945	912	963
Total	2,721	2,996	2,911	2,925	2,888	2,892	2,916	2,874	2,943
Wages									
Kotzebue (\$M)	\$112	\$120	\$123	\$120	\$123	\$129	\$134	\$136	\$161
All Other NWAB (\$M)	25	25	24	29	26	26	27	26	28
Total (\$M)	137	145	147	149	149	155	161	162	189
Average Monthly	4,201	4,042	4,214	4,231	4,310	4,465	4,614	4,705	5,358
Population									
Total	7,360	7,360	7,372	7,421	7,445	7,444	7,523	7,634	7,716
Kotzebue	3,142	3,123	3,105	3,121	3,124	3,154	3,201	3,225	3,237
All Other	4,218	4,237	4,267	4,300	4,321	4,290	4,322	4,409	4,479

Source: Income and wage figures are inflation-adjusted and derived from BEA and DOLWD data. Employment and population figures are from DOLWD.

Local government (including local government, tribal government, and school district employment) is the largest sector in terms of employment in NWAB. In 2012, local government accounted for an average of 985 jobs, representing 33 percent of all jobs in NWAB. Other prominent industries in NWAB include: educational and health services (e.g. Maniilaq Association), and natural resources and mining. Employment data for both of these industries are not reported in DOLWD's publicly available data due to confidentiality restrictions (data for sectors with fewer than three establishments and/or where a single firm accounts for more than 80 percent of sector employment is non-disclosable, under federal regulation). Another prominent sector was "trade, transportation, and utilities"—averaging 358 jobs in 2012 and representing 12 percent of all jobs in NWAB.

Table 10. NWAB Annual Average Employment by Major Sector, 2004 to 2012

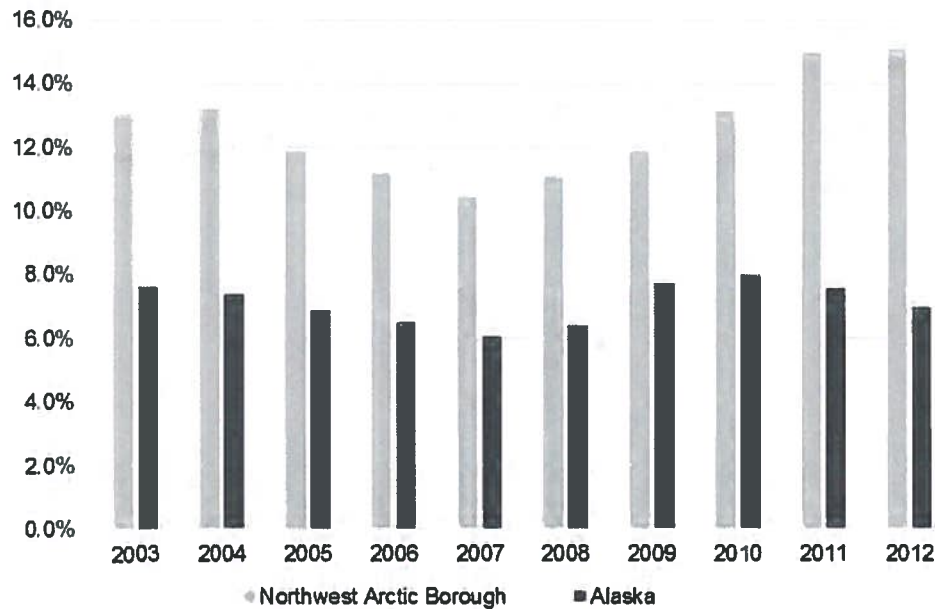
Industry	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Industries	2,721	2,996	2,911	2,925	2,888	2,892	2,916	2,874	2,943
Total Government	1,131	1,235	1,244	1,220	1,156	1,171	1,152	1,118	1,114
Federal Government	55	57	54	50	47	46	51	48	50
State Government	69	68	67	68	69	67	71	75	79
Local Government	1,007	1,111	1,123	1,102	1,040	1,058	1,030	995	985
Private Ownership	1,591	1,761	1,667	1,705	1,732	1,721	1,764	1,756	1,828
Goods-Producing	388	457	465	476	-	-	-	-	-
Natural Resources and Mining	365	405	438	421	-	-	-	-	-
Construction	23	47	26	56	63	73	62	43	56
Service-Providing	1,202	1,305	1,202	1,229	-	-	-	-	-
Trade, Transportation And Utilities	304	273	265	284	304	356	337	346	358
Information	56	58	55	48	55	55	58	52	53
Financial Activities	87	111	114	130	135	-	-	-	-
Professional And Business Services	7	8	3	3	-	-	-	17	-
Educational And Health Services	567	547	543	537	-	-	-	-	-
Leisure And Hospitality	133	264	167	169	174	179	172	176	185
Other Services	50	43	56	59	44	40	44	59	66
Unclassified Establishments	-	-	-	-	-	-	-	1	-
Manufacturing	-	5	-	-	-	-	-	-	-

Source: DOLWD Quarterly Census of Employment and Wages.

The unemployment rate in the NWAB averaged 15.1 percent in 2012, about double the Alaska average of 7 percent. The NWAB unemployment rate has been generally trending up over the past several years; it averaged 10.4 percent in 2007.

The NWAB unemployment rate averaged 12.6 percent between 2003 and 2012, while the statewide average was 7.1 percent over the same period. The lowest unemployment rate for NWAB over the past 10 years was in 2007 (10.4 percent) and the highest occurred in 2012 (15.1 percent).

Figure 5. NWAB and Alaska Unemployment Rates, Percentage, 2003 to 2012



Source: DOLWD.

Table 11. NWAB and Alaska Unemployment Rate, Percentage, 2003 to 2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
NWAB	13.0	13.2	11.9	11.2	10.4	11.1	11.9	13.1	15.0	15.1
Alaska	7.7	7.4	6.9	6.5	6.1	6.4	7.7	8.0	7.6	7.0

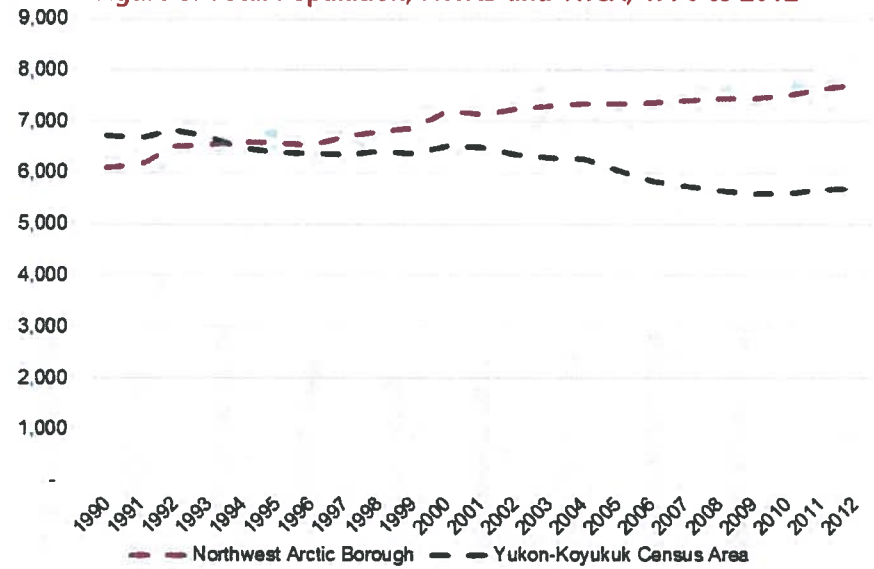
Source: DOLWD.

While this regional baseline analysis focuses mainly on NWAB, it is informative to examine socioeconomic trends in YKCA. NWAB has two key economic engines that YKCA lacks, a regional hub with substantial service sector development (Kotzebue) and a major resource development project that generates high-wage employment opportunities (Red Dog).

NWAB experienced a steady upward trend in population from 1990 to 2013—increasing by 1,603 from 6,113 to 7,796 (28 percent). Meanwhile YKCA experienced a steady downward trend in population from 1990 to 2013—decreasing by 1,064 from 6,714 to 5,650 (16 percent). ADOLWD population data lists 39 places in YKCA, the largest being Fort Yukon with 590 residents.

Other data illustrates how socioeconomic conditions differ in the two areas. For example, median household income in NWAB is 70 percent higher than in YKCA. The percentage of households earning less than \$25,000 per year in YKCA is more than double the NWAB level. Average monthly wages are 63 percent higher in NWAB than in YKCA.

Figure 6. Total Population, NWAB and YKCA, 1990 to 2012



Source: DOLWD.

Table 12. Demographic and Economic Characteristics of NWAB, YKCA and Statewide

Communities	2013 Population	Median Age (2010)	Average Monthly Wage (2012)	2007-2011 Median Household Income	2007-2011 % Households with Income Below \$25,000
YKCA	5,650	35.3	\$3,290	\$35,335	38.4%
NWAB	7,796	25.7	\$5,358	\$59,893	17.7%

Source: U.S. Census, 2010; and DOLWD, and ACS, 2007-2011 Five-Year Average.

Chapter 3: Forecast of Baseline (No Road) Economic Conditions to 2035

This chapter provides analysis of the economic and population forecast for the NWAB and for study area communities within the borough. Population projection data for the YKCA Area is also provided.

A variety of issues will shape economic conditions and trends in NWAB and in communities potentially affected by AMDIAR. The Red Dog Mine has played a key role in providing steady, high-wage jobs, as well as revenues to support local government operations. With ore reserves sufficient to support production for another 20 years, the mine should remain an important and stable force in the regional economy. Perhaps less certain is the flow of state and federal dollars that are an important part of the regional economy.

Regarding the future, other socioeconomic considerations include population growth that is expected to occur even in the absence of underlying cash-economy support. Comparatively high birth rates in the region are expected to continue compensating for any out-migration. Heavy reliance on, and a strong cultural identity around, subsistence will also continue provide socioeconomic stability to the area.

This chapter begins with a summary of population projections prepared by DOLWD. A discussion of conditions and outlook for the region's key economic drivers follows.

DOLWD Population Projections Through 2035

DOLWD routinely publishes population projections for Alaska and boroughs/census areas within the state.¹⁵ The projections of future population are based on historical trends and expected rates of fertility, mortality, and migration. In DOLWD's most recent report, NWAB's population is projected to increase to 9,302 residents by 2035, an average annual rate of growth of 0.8 percent (1,586 residents above the 2012 population of 7,716). This is a slower rate of growth as experienced from 1990 to 2012, of 1.1 percent.

The NWAB's median age is expected to increase from the 2010 median of 25.7 years to 26.3 in 2025 before declining to 25.1 in 2035. DOLWD projections indicate natural growth (births outnumber deaths) will more than compensate for a slight net outmigration from the borough.

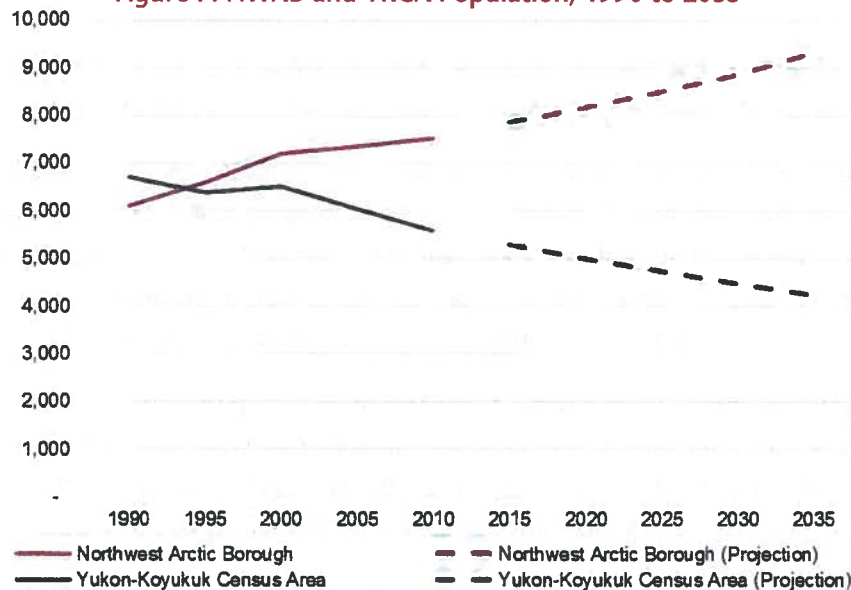
In contrast, YKCA's population is projected to steadily decrease to 4,232 residents in 2035, a loss of 1,450 residents from the 2012 population of 5,682. From 1990 to 2012, YKCA's population decreased at an average annual rate of 0.7 percent. This trend is expected to steepen through 2035 with an average annual decrease of 1.3 percent.

The YKCA's median age is expected to increase steadily from the 2010 median of 35.4 years to 38.4 in 2035. Natural growth (births outnumber deaths) will be slightly positive for the period, but not sufficient to compensate for net outmigration from the census area.

¹⁵ *Alaska Population Projections, 2010 – 2035*, DOLWD, Research and Analysis Section, April 2012.

The NWAB birth rate of 27.7 per 1,000 is second only to Wade-Hampton Census Area (31.8) among all Alaska boroughs and census areas (the statewide rate was 24 in 2010). DOLWD also notes rural areas with high fertility rates, such as NWAB, and negative values for net-migration, will grow continuously through natural increase.

Figure 7. NWAB and YKCA Population, 1990 to 2035



Source: DOLWD.

Table 13. NWAB and YKCA Population, 1990 to 2035

	NWAB	NWAB 5-Year % Change	YKCA	YKCA 5-Year % Change
1990	6,113	--	6,714	--
1995	6,591	7.8%	6,390	-4.8%
2000	7,208	9.4	6,510	1.9
2005	7,360	2.1	6,042	-7.2
2010	7,523	2.2	5,588	-7.5
2015	7,864	4.5	5,288	-5.4
2020	8,185	4.1	5,001	-5.4
2025	8,516	4.0	4,736	-5.3
2030	8,865	4.1	4,476	-5.5
2035	9,302	4.9	4,232	-5.5

Source: DOLWD.

Outlook for Key Local and Regional Economic Drivers

Population projections such as those prepared by DOLWD consider past demographic trends and expected future shifts in those trends. They do not explicitly consider economic forces that may cause in- or out-migration to and from regions or communities. While connecting quantitatively the effect of changing economic forces on population is beyond the scope of this study, it is useful to consider the outlook for key economic drivers.

It is important to note traditional, subsistence communities in the study area have a resilience that goes beyond what is possible with cash economies. Nevertheless, key economic drivers in the NWAB and its communities that affect residents' economic well-being and community sustainability include:

- Resource development in the region, and related employment opportunities,
- Federal funds that flow to regional and local service providers, and
- State funds to support infrastructure construction and public services.

Resource Development

It is difficult to overstate the importance of the Red Dog Mine in the NWAB economy as a source of employment and income, and revenues to the borough government. As such, the economic well-being of the borough is closely tied with continuing operations at Red Dog. Red Dog is the largest single employer in the NWAB. In 2013, Red Dog had a total workforce of 639, including regular and temporary workers employed by Teck Alaska, NANA Lynden, and NANA Management Services.

The *Aqqaq Extension Environmental Impact Statement, Socioeconomic Impact Analysis* (prepared in part by McDowell Group) provides a useful case study for considering local residents' participation in the mine work force. The impact assessment is based on 2007 data. Nevertheless, it illustrates the distribution of mine jobs and income among the small communities in the NWAB and the regional population and commercial center (Kotzebue).

In 2007, 100 Red Dog employees resided in the NWAB, earning a total of \$9 million in annual payroll. At that time the largest concentration of Red Dog employees were in Kotzebue (where 20 employees resided), Noatak (17 employees), and Noorvik (18 employees). From 1989 through 2007, 237 different Kotzebue residents and 108 different Noatak residents had been employed at the mine. Another 15 NWAB residents had been employed by Red Dog contractors, NANA Management Services and NANA/Lynden.

From 1989 through 2007, Red Dog jobs generated \$118.6 million in payroll for residents of NWAB. Employees from elsewhere in Alaska earned a cumulative total of \$306.5 million, including \$24.8 million in 2007. Non-Alaskans employed at the mine have earned a cumulative total of \$130.2 million, including \$8.3 million in 2007.

More recently, according to Teck, in 2010, 113 Alaska resident workers lived in NWAB communities, including Ambler, Buckland, Deering, Kiana, Kivalina, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, and Shungnak. These figures do not include contractors working at Red Dog, including those that are NANA subsidiaries. Also, 169 of Red Dog's Alaska resident workers lived in Anchorage, as of 2010.

Regarding the impact of Red Dog on borough government, the NWAB received Red Dog-related payments in lieu of taxes (PILT) of \$8.9 million in FY2011, \$13.0 million in FY2012, and \$8.7 million in FY2013.¹⁶ Between 1989 and 2012, the mine has contributed approximately \$120 million in PILT to NWAB. The Red Dog PILT is the Borough's single most important source of revenue, accounting for well over half of NWAB general fund revenues.

Red Dog is operated by Teck; however, NANA Corporation is the property owner and as such earns royalties on the mine's net earnings. Since 1989 NANA has received a total of \$1.04 billion in royalties from Red Dog, including \$143 million in 2013. Under the Section 7(i) and 7(j) provisions of the Alaska Native Claims Settlement Act (ANSCA), \$609 million has been shared with other regional and village corporations since 1989.

¹⁶ Source: NWAB, 2013

These royalties to NANA support corporate operations and dividends to shareholders, both of which contribute to personal income for residents of NWAB and elsewhere in Alaska.

Boding well for the future, in 2010, Red Dog began mining the Aqqaluk deposit, which is adjacent to and adjoins the main deposit, adding to the mine's proven and probable reserves and extending its mine life to 2031.

State and Federal Government Spending

Government funding supports a wide variety of services in rural Alaska and is an important part of local cash economies. As described in Chapter 3, the largest employers in the study area communities are government-supported entities such as health care clinics, schools, tribal governments, and city governments. While there is little doubt government will continue to play a critical role in these local economies, it is useful to consider whether various forms of government funding will be a stable or changing parts of the economic landscape.

FEDERAL FUNDING

Federal funding supports a variety of activities within NWAB, including the borough government itself, the NWAB School District, Maniilaq Association, and most of the local village governments and tribes. Federal funds flow into the borough from a variety of sources within the federal government. Following is a brief overview of the various sources of federal funds that flow to the NWAB economy. While beyond the scope of this analysis to forecast future funding from these sources, overlaying the federal funding outlook nationwide is growing political pressure to balance federal spending with revenues.

Significant sources of federal funds to NWAB include the Bureau of Indian Affairs (BIA) and the Indian Health Service (IHS).

The BIA funds basic tribal services through Tribal Priority Allocations (TPA). Services funded include social services, adult vocational training, child welfare, natural resources management, and contract support. Tribes that receive these allocations may establish their own priorities and reallocate federal funds among programs in this budget category. Alaska Region FY2014 TPA base funding totals \$23.2 million. Operations funds totaled \$2.4 million for all BIA Alaska regional programs, including Aid to Tribal Governments, Self-Determination, Natural Resource Management, Real Estate Services, Community and Economic Development, Social Services, and Housing Development.

The IHS, an agency in the Department of Health and Human Services, provides federal health services to American Indians and Alaska Natives. The IHS Tribal Self Governance Program authorizes federally-recognized tribes to negotiate with IHS to fund and manage programs IHS would otherwise provide. Tribes administer over half of IHS resources through contracts and compacts.¹⁷ In Northwest Alaska, Maniilaq Association is the main provider of health and social services and one of the largest employers in the NWAB (it is an important employer in Upper Kobuk communities). Maniilaq provides services for about 6,500 people.

Self-Governance Funded Compacts in Alaska in FY2012 totaled \$599.2 million for all areas. Nationally, the IHS discretionary budget has increased by 32 percent since FY2008. The program currently operates with a budget over \$5 billion (FY2014 budget of \$5.7 billion), up from a 2012 budget of \$5.4 billion; and a FY2013 continuing

¹⁷ IHS FY2014 Budget Justification.

resolution for \$5.5 billion. Funds requested for IHS in 2014 total \$4.4 billion in budget authority, or \$5.7 billion at the program level.

Maniilaq administers substantial federal funds through IHS Self Governance Funded Compacts. Funding for the compacts decreased between FY2012 and FY2013 from \$42.9 million to \$40.8 million, a 5 percent cut. This decline in funding is occurring as program costs are increasing.

Table 14. Maniilaq IHS Funding, FY2009-2013 (million)

FY Year	2009	2010	2011	2012	2013
Funding	\$37.8	\$41.5	\$38.4	\$42.9	\$40.8

Source: IHS

Maniilaq also receives a series of grants from IHS that total an additional \$3 million to \$4 million annually. The approximate amount of those grants has remained relatively stable between FY2008 and FY2013. Grants included funds for a number of different programs, including Promoting Safe and Stable Families; Injury Prevention; Health Center Cluster Demonstration Grants; and a Nutrition Services Incentive Program.

Maniilaq Association administers BIA Tribal Self Governance Compacts. Since, FY2008, the compacts have grown, from \$1.1 million in FY2008 to \$1.9 million in FY2013.

A variety of other federal agencies account for federal dollars flowing to the NWAB economy, including:

- **Department of Education** funding to NWAB school district has varied from year to year, with over \$9 million reported in both FY 2010 and FY 2011.
- **US Department of Agriculture (USDA) Rural Development Community Facilities Programs** support rural areas through grants, loans, and loan guarantees for community facilities. The programs focus on essential facilities for health care (such as hospitals and health clinics), education, and public safety.
- **Environmental Protection Agency (EPA) Indian Environmental General Assistance Program** is intended to help build capacity within tribes to develop and manage environmental protection programs, including solid and hazardous waste programs.
- **U.S. Fish and Wildlife Service** contracts with various entities in the borough to conduct a variety of studies and tasks, most regarding wildlife populations in the area.
- **Department of Justice's Indian Country Law Enforcement Initiative**, Bureau of Justice Assistance supports the Tribal Courts Assistance Program.

A variety of other federal funding sources provide additional support to entities active in the NWAB, such as the Denali Commission, Bureau of Land Management, and others.

Though not all study area communities were researched in detail, Ambler is probably typical in terms of direct federal funding. Recent BIA TPA base funding for Ambler is summarized in the following table.

Table 15. Ambler BIA Tribal Priority Allocation Base Funding, FY2012-2014

FY	2012	2013	2014
Aid to Tribal Government	\$62,021	\$62,854	\$65,130
Indian Child Welfare Act	\$31,858	\$31,943	\$31,940
Total	\$93,879	\$94,797	\$97,070

Source: BIA.

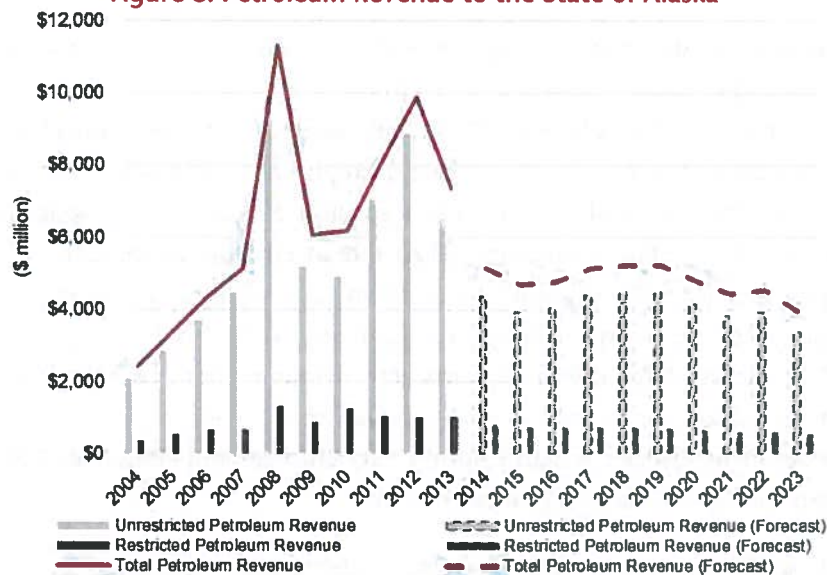
The only other consistent federal funding that has flowed into Ambler in recent years is EPA funding for the Indian Environmental General Assistance Program. Funding from the EPA has remained relatively steady annually, ranging from \$110,000 in FY2008 to \$125,000 in both FY2011 and FY2013. No EPA funds were reported in FY2012, and in FY2010 it was a bit higher at \$236,000. Other federal funds that flow to Ambler sporadically come from Department of Health and Human Services, BIA, and USDA.

STATE FUNDING

State of Alaska funding for capital projects, schools, city government operations, subsidies such as the PCE, and others are an important part of local economies throughout the state. The shadow of long-term decline in oil production from the North Slope has clouded the state revenue picture for many years. Production began declining in 1990, but rising oil prices have more than off-set that decline. However, state spending is now predicted to exceed revenues for the next several years, placing pressure on the State to reduce spending.

Alaska's petroleum revenue totaled \$7.4 billion in 2013 and is forecasted to steadily decrease to \$3.9 billion by 2023. Unrestricted petroleum revenue totaled \$6.4 billion in 2013 and represented 92 percent of all unrestricted petroleum revenue for the State of Alaska. By 2023, unrestricted revenue is forecasted by the Alaska Department of Revenue to total \$3.4 billion. Restricted petroleum revenue totaled \$1.0 billion in 2013 and is forecasted to be \$0.6 billion by 2023.

Figure 8. Petroleum Revenue to the State of Alaska



Source: Alaska Department of Revenue

Table 16. Alaska Petroleum Revenue Forecast to 2023 (\$ million)

Fiscal Year	Unrestricted Petroleum Revenue	Percent of Unrestricted Revenue from Oil	Restricted Petroleum Revenue	Total Petroleum Revenue
2012	\$8,857.8	93%	\$1,026.5	\$9,884.3
2013	6,352.0	92	1,036.1	7,388.1
2014	4,359.5	88	760.1	5,119.6
2015	3,935.0	87	742.1	4,677.1
2016	4,022.6	87	738.6	4,761.2
2017	4,382.5	88	742.8	5,125.3
2018	4,480.8	88	738.5	5,219.3
2019	4,486.5	87	723.8	5,210.3
2020	4,136.3	86	666.3	4,802.5
2021	3,802.8	84	617.9	4,420.7
2022	3,932.7	85	616.3	4,549.0
2023	3,380.4	82	561.5	3,941.8

Source: Alaska Department of Revenue.

Summary

The economic outlook for the NWAB and for the study area communities depends on a variety of factors (as described above), including demographic trends, trends in state and federal government spending, continuing operations at Red Dog, the cost of living, and other factors. For purposes of this study, the general question is whether population trends established in study area communities can reasonably be expected to persist, or if some socioeconomic trend or event might change the trajectory. As indicated in the following table, Kobuk, Hughes and Huslia have experienced significant population growth over the past 20 years. Shungnak and the Alatna/Allakaket communities have also experienced growth, though at much slower paces. Meanwhile Ambler's population has trended down slowly and Bettles/Evansville population is down sharply.

Table 17. Study Area Community Historical Population Trends

	Ambler	Kobuk	Shungnak	Alatna/ Allakaket	Bettles/ Evansville	Hughes	Huslia
5-year trend	6.3%	19.5%	3.1%	5.8%	-39.4%	20.8%	13.3%
10-year trend	-7.8%	30.6%	8.9%	19.0%	-60.0%	31.8%	11.3%
20-year trend	-12.3%	110.4%	15.5%	16.3%	-59.2%	45.0%	52.2%

Source: McDowell Group estimates, based on DOLWD data.

It is interesting to note some of Ambler's population decline may actually be related to the economic opportunity provided to its residents by Red Dog. According to the Red Dog Mine Extension Aqqaluk Project EIS, of the 68 residents that had worked at the mine at some point between 1989 and 2007, 12 Ambler residents who went to work at Red Dog ultimately left the community (as of 2007), more than any other NWAB community except Kotzebue. Among other NWAB communities that have had more residents work at Red Dog, Noorvik (125 Red Dog workers) had nine workers migrate from the community, Noatak (108 Red Dog workers) had two migrate out, and Kiana (80 Red Dog workers) had seven migrate out. The reasons for Ambler's disproportionate out-migration rate are unclear.

In any case, Ambler's population trend shifted to the positive about five years ago, perhaps marking the beginning of a longer-term growth trend similar to neighboring communities. Recent growth in the upper Kobuk communities of Ambler, Kobuk, and Shungnak are likely driven by two key forces, increasing birth rates and cash income opportunities offered by mineral development projects in the region (resident participation in NovaCopper's Upper Kobuk Mineral Projects (UKMP) are detailed in the following chapter).

In summary, as described in this and previous chapters, the local and regional economies potentially affected by AMDIAR are subject to a variety of economic and demographic forces. How those forces change over the next 20 years is of course uncertain; however, it is reasonable to expect:

- Red Dog Mine will continue to provide a key source of economic activity over the next 20 years. Potential for additional mineral resource development exists (see next chapter).
- Uncertainty around state and federal spending in NWAB will persist. Given growing pressure to control spending, state funding is unlikely to keep pace with inflation. The same is true for federal funding.
- Population growth may continue in the near-term in some NWAB communities, but is unlikely to persist over the long-term absent economic growth. YKCA population decline will continue.
- Employment opportunities will remain limited in the study area communities, and per capita income will remain low.
- Communities will continue to struggle with high (and potentially increasing) cost of fuel for vehicles, home heating, and generating electricity.

Chapter 4: Road and Mine Economic Impact Analysis (With Road Scenario)

Scale of Potential Development

The purpose of the AMDIAR is to support mineral development in the Ambler Mining District, an area that has been characterized as one of the largest undeveloped copper-zinc mineral belts in the world. Known principal prospects include the Arctic, Bornite, SUN, and Smucker deposits. Further, while the district has been the target of exploration activity for many years, it continues to have significant potential for additional discoveries. Over the long-term, the area has high potential for multiple mine development, if surface access is developed.

Quantifying the potential long-term economic impact associated with mine development in the Ambler Mining District, assuming surface access be developed, is difficult because the scale and timing of mine development is uncertain. A variety of complex factors will determine when mine development might occur, and the number of mines that might ultimately be developed. Changing market conditions for base and precious metals, potential discoveries of new deposits, and other factors make predicting future mine development difficult.

It is important to note road and mine development will be coordinated to the fullest extent possible. Though exploration activity would likely continue in the Amber Mining District, mine development in the foreseeable future will not happen in the absence of road access. Conversely, road construction as currently conceived cannot happen in the absence of the mining activity that will be required to repay the State (AIDEA) for its investment in road construction.

How much mine development will be required to justify road construction is difficult to say (and will depend on the cost of road construction). While the Arctic PEA assumes annual toll payments of \$9 million, the prospect of a public-private partnership for road development could spur additional investment in Ambler Mining District exploration activity. In particular, intensive drilling at the Arctic and Bornite deposits would be conducted with the goal of establishing a copper resource sufficient to support an operation either larger or more profitable (or both) than defined in the Arctic PEA – a mining operation that by itself could justify road construction. Other prospects, such as the SUN and Smucker deposits, would also likely see renewed and more aggressive exploration activity.

Recognizing that the long-term economic benefits associated with road development could be two or three times that of the Arctic Project alone, for purposes of this economic impact assessment the Arctic PEA is used to guide the analysis of mine-related economic impacts in nearby communities, the NWAB, and statewide.

Economic Impact of Road and Mine Development

The economic impact of road and mine development would include the following:

- Temporary jobs (and related wages) associated with road construction
- Temporary jobs (and related wages) associated with mine development
- On-going jobs and wages associated with road maintenance/operations
- On-going jobs and wages associated with mine operations
- Revenues to local and state government

Each of these sources of economic activity is described in more detail below.

Road and Mine Construction-related Jobs and Wages

The construction effort associated with development of the AMDIAR will have significant temporary employment and income effects. The duration of the road construction project and its labor requirements have not yet been determined. For purposes of this analysis it is assumed a three to four-year construction period would be required for the 200-mile road. It is further assumed a \$400 million construction budget would include approximately \$120 million in total wages.¹⁸

Assuming employment and wages are evenly distributed over a four-year construction phase, annual wages would average approximately \$30 million. Annual average employment associated with these wages is estimated at 300 jobs. At the peak of the construction effort, the number of workers engaged in the project would be much higher, perhaps 450 jobs.

Mine development and construction of related ancillary facilities will also generate substantial employment and wages. Specific estimates of construction-related employment are not available. However, data provided in the PEA suggests the \$770 million construction budget will include approximately \$100 million in total wages. The number of workers will vary with season and stage of the construction program, though annual average employment of 400 could be expected over a two-year construction period, with a peak workforce of approximately 600.

Road and Mine Operations-related Jobs and Wages

Four road maintenance stations would be constructed to support year-round road operations. An estimated total of 20 operating and maintenance personnel would staff these stations. These workers would earn an estimated total of \$1.6 million in annual payroll.

Based on information provided in the Arctic PEA, the mine operating labor force will total slightly more than 500 workers. Mining operator and maintenance staff would vary somewhat year to year; however, in the first five years of production, employment would average 195 operators and 95 maintenance personnel.

¹⁸ AIDEA has estimated AMDIAR construction costs at between \$190 million and \$400 million, depending on design and construction assumptions. This economic impact analysis is based on the higher estimate.

It is not evident in the Arctic PEA that employment related to trucking concentrates from the mine to the nearest transshipment point is included in the job count itemized in the preceding table. Trucking supplies into the mine, and trucking concentrates out could account for 50 or more additional jobs.

While a detailed analysis of data provided in the Arctic PEA indicates a job-count of 511, given the preliminary nature of the PEA, for purposes of this study a rounded estimate of 500 jobs is used.

Table 18. Arctic Project Operational Employment

	Job Count
Mining Operating Labor	
Operating Labor	195
Maintenance Labor	95
Total Mining Operating Labor	290
Process Operating Labor	
Operating Staff	14
Operating Labor	52
Maintenance	63
Metallurgy Lab & Quality Control	13
Total Process Operating Labor	142
General & Administrative Staff	
G&A Staff	36
G&A Hourly	14
Total G&A	50
Surface Service Labor	
Surface Service	29
Total Surface Service	29
Total Operating Employment	511

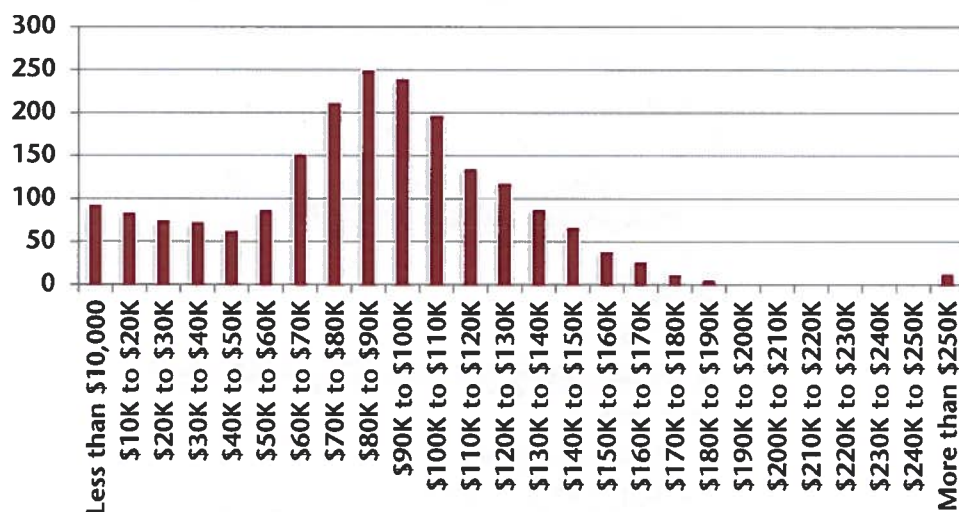
Source: Arctic PEA, 2013

Wage data is not provided in the Arctic PEA; however, using mining industry averages it is possible to estimate annual payroll that would be generated at the mine. In 2012, the average monthly wage earned in Alaska's metal mining industry was \$8,423, or \$101,076 annually, based on DOLWD data. The Arctic mine average annual salary would be expected to be lower, initially, than the statewide average, as Arctic would have a comparatively less-experienced labor force. Further, in estimating an average wage for Arctic, it is important to note wages will include those earned by a variety of contract workers, in areas such as camp support (food service and housekeeping), camp security, trucking services, and others. Red Dog provides an example of contract services provided at mining operations. Two NANA subsidiary operations play major roles in Red Dog Mine operations. NMS provides meals and lodging services for mine employees, and NANA Lynden Logistics provides transportation and logistics support for the mine, including transporting materials and supplies to and from the mine and trucking zinc concentrate from the mine to the port. NANA subsidiaries also provide drilling through NANA/Major Drilling, oil products through NANA Oilfield Services, security through NMS Security, professional/technical services through NANA WorleyParsons and NANA/Pacific, training by NMS Training Systems, and temporary workers through NMS Staffing.

In any case, actual wages paid at commencement of mine operations will depend on prevailing wages at that time, availability of suitably skilled labor, and mining and major construction projects in Alaska potentially competing for the same workers.

At the request of McDowell Group, DOLWD prepared an analysis of the distribution of annual wages, across various categories of annual wages, in Alaska's metal mining industry. As illustrated in the following graph, annual wages are clustered in the \$70,000 to \$110,000 ranges. The graph also illustrates the wide distribution of annual wages, including a substantial number of high-wage jobs, over \$110,000 annually. In fact, based on this data, nearly one in five workers (18.5 percent) had annual income greater than \$110,000 in 2010. The workers at the lower end of the distribution, earning less than \$30,000 in 2010, apparently includes a number of part-time workers, or workers otherwise employed on a limited basis.

Figure 9. Distribution of Alaska Metal Mining Annual Wages, by Number of Workers, 2010*



* Includes only workers with wages in all four quarters of 2010.
Source: DOLWD.

For purposes of this study, it is assumed Arctic mine's 511 workers would earn an annual average wage of \$90,000, about 10 percent below the current metal mining industry average. At that average wage, Arctic mine workers would earn a total of approximately \$46 million.

Workforce Residency

Road and Mine Construction

The local and regional economic impact of road and mine construction (and mine operations) will depend largely on resident participation in the project labor force. Overall, non-Alaska residents accounted for 20.4 percent of Alaska's construction industry workforce in 2011, about equal to the economy-wide average of 20.1 percent.¹⁹

¹⁹ *Residency of Alaska Workers, 2011*. Alaska Department of Labor and Workforce Development, Research and Analysis Section.

The mine construction labor force will include a large number of workers in a wide variety of occupations. In fact, the range of occupations would not be substantially different than would be required for construction of a natural gas pipeline in Alaska, which according to DOLWD would involve more than 100 different occupations. This includes numerous construction specialties, drivers, camp support personnel, security personnel, administrative personnel, and many others.

Construction employment in the Northern Region of Alaska, including North Slope Borough (with Prudhoe Bay), NWAB (with Red Dog Operations), and Nome Census Area, may suggest the level of nonresident participation that could reasonably be expected during AMDIAR construction and mine development. Of the 2,264 construction workers in the Northern Region in 2010, 22 percent were local residents, 49 percent were nonlocal Alaska residents, and 30 percent were nonresidents, according to ADOLWD data. The percentage of nonresidents in the Ambler region-related construction labor force would likely be somewhat higher than was the case in the Northern Region in 2010, as Northern Region data includes permanent positions held by workers meeting local area residential and commercial construction needs in Barrow, Kotzebue, and Nome.

Mine Operations

According to DOLWD, in 2011 (the most recently published data available), 35.1 percent of the workers in Alaska's metal mining industry were nonresidents. Red Dog, a good proxy for an Arctic mining operation, has a lower percentage of nonresidents in its workforce than the industry average because of NANA's ownership of the property and related shareholder hire provisions. Red Dog has approximately 20 percent nonresident participation in its labor force.²⁰

Nonresident participation in the metal mining industry varies by specific occupation. Certain occupations where mines have the greatest challenges finding suitably-skilled Alaska-resident labor pool are listed in the following table, along with average quarterly earnings data.

Table 19. Worker Residency in Selected Metal Mine Occupations, 2011

Occupation Title	Total Workers	Percent Alaska Nonres.	Average Quarterly Resident Earnings	Average Quarterly Nonres. Earnings
Mining Machine Operators, All Other	566	32.7%	\$18,172	\$15,954
Miners, Except Drillers and Machine Operators	419	55.1	22,471	26,492
Extraction Workers, All Other	257	44.7	18,952	18,833
Millwrights	205	34.1	24,673	27,274
Mining and Geological Engineers Including Mining Safety Engineers	125	47.2	23,895	19,111
Mechanics, Mine Machinery	103	36.9	25,831	29,312
Mobile Heavy Equipment Mechanics, Except Engines	59	35.6	23,565	23,903
Electricians	53	50.9	26,040	26,744

Note: Occupation totals include only workers in the metal mining industry. Additional workers in these occupations may be found in other industries.

Source: "Nonresidents Working in Alaska, 2011," DOLWD.

²⁰ This estimate is based on 2009 DOLWD data. After 2009, employment data for individual business was no longer made available by DOLWD.

Summary

Local participation in the road and mine construction effort, and during mine operations, will depend on a number of factors, including the size of the suitably skilled labor force, the intensity of outreach, recruiting, and training programs, transportation provisions between communities and the mine, and the characteristics of the various contractors engaged in the project. To the extent that local firms are hired to perform various construction-related functions, more local residents are likely to participate in the project labor force. NANA Corporation subsidiaries, in particular, have capacity to play significant roles in the project. K'oyitl'ots'ina, Limited, the ANCSA village corporation representing the economic (and other) interests of shareholders connected to Alatna, Allakaket, Hughes, and Huslia, also has subsidiary business interests potentially suitable for participating in various aspects of road and mine development.

It is important to note the Memorandum of Understanding between NANA and NovaCopper includes shareholder hiring preferences as well as development of training and educational programs with the purpose of building skills among local residents and shareholders interested in exploration and mining related employment. NovaCopper's hiring practices for its UKMP have attracted significant NANA shareholder participation, including shareholders who reside in the region. In 2013, 69 of the 120 workers (58 percent) were NANA shareholders. Among those shareholders, 59 were regional residents. These employment figures include NovaCopper and contractors NANA Management Services, Boart Longyear (drilling contractor), Yukuskokon (miscellaneous services), among others.

Table 20. NovaCopper UKMP Workforce Profile, 2011-2013

	2011	2012	2013
Number of Employees	112	192	120
Number of NANA Shareholders	57	98	69
Percent of NANA Shareholders	51%	51%	58%
Number of Regional NANA Shareholders	50	51	59
Percent of Regional NANA Shareholders	45%	47%	49%
Total Number of Shareholders Hired	51	114	149

Source: NovaCopper.

Most of the regional resident workforce is drawn from the communities of Kobuk, Shungnak, and Ambler. However, in 2013 residents from Kiana, Noorvik, Selawik, Deering, Noatak, and Kotzebue also participated in the project.

Table 21. NovaCopper UKMP Workforce by Place of Residence, 2011-2013

Place of Residence	2011	2012	2013
Kobuk	25	25	7
Shungnak	11	25	22
Ambler	10	18	15
Kiana	0	1	2
Noorvik	0	6	4
Selawik	3	6	5
Buckland	0	2	0
Deering	0	0	2
Kivalina	0	0	0
Noatak	1	1	1
Kotzebue	0	6	1
Other Region	7	7	10

Source: NovaCopper.

Data from NANA regarding shareholder employment at Red Dog also illustrates regional resident participation in the mining industry. In 2013, 228 Red Dog workers were NANA shareholders who reside in NWAB. Another 134 shareholders (that work at Red Dog) reside in Anchorage.

Table 22. NANA Shareholder Employment at Red Dog by Place of Residence

Place of Residence	2013	1988-2012 Total Hires
Kobuk	2	5
Shungnak	7	42
Ambler	15	74
Kiana	24	99
Noorvik	34	143
Selawik	19	93
Buckland	6	73
Kivalina	12	87
Noatak	42	132
Kotzebue	67	290
Anchorage	134	347
Other	3	16

Source: NANA.

Over the past 25 years, a relatively large number of NWAB residents have worked at Red Dog, at one time or another. For example, while 15 Ambler residents worked at Red Dog in 2013, since 1988 a total 74 Ambler residents have been employed at the mine at some point (this data only includes NANA shareholders – additional non-shareholders residents likely also worked at Red Dog). According to data provided by NANA, from January 1, 1989 through September 30, 2013, shareholders earned total gross wages of \$857.6 million.

The construction and operations labor forces for the road and mine will be drawn from a broad geographic horizon. Some workers will be from the small communities in the project area, others from more distance communities of the Northwest Alaska region, and a much larger number will come from Fairbanks and Southcentral. In addition, a number could come from outside Alaska, especially to fill highly specialized positions.

For both the construction and operations phases, the size of the local labor force is the limiting factor in the number of local residents potentially employed at the project. The three communities of Ambler, Kobuk, and Shungnak, have a total combined population of 717 residents according to 2013 ADOLWD population estimates (with less than half of that number working age adults).

While it is not possible to predict how many workers from each community will ultimately join the road and mine construction labor force, or the road and mine operations labor force, it is possible to make reasonable estimates. The large, temporary construction labor force will most likely include a higher percentage of non-residents than during mine operations. Based on the Red Dog experience, it is reasonable to assume a quarter to as much as a third of the operations work force could be drawn from the NWAB and adjacent communities in the YKCA. Specific assumptions about labor force residency are summarized in the following table.

Table 23. AMDIAR and Arctic Mine Workforce Residency Distribution

	Total	Regional Residents	Other Alaska Residents	Non-Alaska Residents
Construction Phase				
AMDIAR construction*	450	20%	60%	20%
Arctic mine construction*	600	20%	50%	30%
Operations Phase				
AMDIAR operations & maintenance	20	50%	50%	0%
Arctic mine operations	500	30%	50%	20%

*Peak employment.

Source: McDowell Group estimates.

Based on these estimates, approximately 20 percent (\$24 million) of the \$120 million in total AMDIAR construction project wages would flow to regional residents. Another \$20 million would flow to regional residents via participation in the Arctic mine construction labor force (20 percent of \$100 million project payroll). Road operations and maintenance would generate \$0.8 million in annual wages for regional residents, based on the assumption that half the wages would go to residents of communities in the region. Based on the assumption that 30 percent of the mine operations workforce resides in regional communities, approximately \$14 million in annual wages would go to NWAB and YKCA residents.²¹

²¹ For purposes of this analysis, estimates of regional resident income ignore the possibility that non-residents might earn somewhat higher wages than regional residents, given that non-residents are typically more skilled and experienced than residents, in start-up situations.

Table 24. AMDIAR and Arctic Mine Workforce Estimates, by Residency

	Total Workers	Regional Residents	Other Alaska Residents	Non-Alaska Residents
Construction Phase				
AMDIAR construction*	450	90	270	90
Arctic mine construction*	600	120	300	180
Construction Phase				
AMDIAR operations & maintenance	20	10	10	0
Arctic mine operations	500	150	250	100

*Peak employment.

Source: McDowell Group estimates.

According to these estimates, Alaska residents would earn \$96 million of the estimated \$120 million in total wages generated during the road construction effort. Alaskans would earn \$70 million of the \$100 million total mine construction-related wages and would earn \$37 million of Arctic's annual operating payroll of \$46 million.

Table 25. AMDIAR and Arctic Mine Wages, by Worker Residency (millions)

	Total Wages	Regional Residents	Other Alaska Residents	Non-Alaska Residents
Construction Phase				
AMDIAR construction	\$120.0	\$24.0	\$72.0	\$24.0
Arctic mine construction	100.0	20.0	50.0	30.0
Operations Phase				
AMDIAR operations & maintenance	\$1.6	\$0.8	\$0.8	\$0.0
Arctic mine operations	46.0	13.8	23.0	9.2

Source: McDowell Group estimates.

As a final note about the workforce residency issue, the Red Dog experience suggests that obtaining a high-paying job may lead some residents to relocate to Anchorage, for lifestyle, economic, or other personal reasons. Teck records indicate 20 Kotzebue residents that worked at Red Dog moved to Anchorage or elsewhere in Alaska. Twelve Ambler residents migrated out of the community, as did nine Noorvik residents.²²

Local, Regional and Statewide Indirect and Induced Employment and Income

The direct employment and wage estimates presented above do not include all of the jobs that would be linked to AMDIAR and related mine development. Non-payroll spending by developers and spending by their employees creates additional economic activity in Alaska, sometimes described as the "multiplier effect." Multiplier effects include:

- Indirect impacts, including jobs and income in businesses providing goods and services to the mine. Indirect effects also include the economic activity that results from payment of taxes to state, local and federal government.
- Induced impacts, including the jobs and income created as a result of mine employees spending their payroll dollars in the economy.

²² Red Dog Mine Extension Aqqaq Project Final Supplemental EIS, October 2009, pg. 309.

At the statewide level, the magnitude of indirect effects in Alaska related to AMDIAR will depend on the extent of in-state spending on goods and services. Many of the materials required to operate a large hardrock mine are not manufactured in Alaska; for example, drilling supplies, explosives, and chemical reagents used in ore processing. Purchases of other goods may or may not affect the Alaska economy. Fuel, for example, could be supplied by in-state refineries. Food for workers housed at the mine site could also be provided by Alaska wholesalers or shipped directly from Puget Sound.

Alaska produces virtually none of the goods and materials that businesses and households consume. The vehicles, equipment, food, clothing, building materials, electronics, and furniture used/consumed in Alaska are all imported into the state from Lower 48 (or international) suppliers. As such, Alaska multipliers are generally low compared to other states.

Similarly, indirect effects at the local and regional level depend on the type and magnitude of local and regional spending. The Northwest region, in general, and study area communities in particular have poorly developed service and supply sectors. This limits the potential for indirect economic benefits, especially in the smaller communities.

Induced effects depend on the income and demographics of the workforce. High per worker wages mean greater disposable income and typically greater spending in the local economy. (The mining industry pays wages about twice the all-sector average in Alaska.) Independent of income, demographic characteristics of the workforce-related population, such as the number and age of dependents, can affect demand for other workers in a community, such as teachers and health care workers.

MODELING OF MULTIPLIER EFFECTS

Input-output models, such as IMPLAN™ (the most widely-used U.S. input-output model for analyzing the economic impact of industrial and commercial development projects) provide local and statewide multipliers for the mining industry (as well as numerous other sectors of the economy).

Precisely measuring the indirect and induced impact of any component of the economy requires econometric modeling beyond the resources available for most economic impact studies. However, by using models it is possible to broadly measure the magnitude of total direct, indirect and induced economic effects. IMPLAN™ uses borough level and statewide employment and payroll data to define linkages between industries in the local economy and multipliers that predict the total impact of an economic stimulus.²³

Multipliers provide a measure of the relationship between basic industry activity (mining, for example) and activity in an economy's service and support sector. Multipliers can show either the number of direct, indirect and induced jobs created per million dollars of output (spending) or the number of jobs or payroll dollars created in the support sector for each direct job or direct payroll dollar. IMPLAN™ measures jobs in terms of "annual average full and part-time employment." The total (peak) number of jobs affected by a mine will be larger than the annual average.

²³ IMPLAN™ (IMpact Analysis for PLANning) was originally developed for the U.S. Forest Service by the University of Minnesota to assist with land and resource management planning. IMPLAN™ is now owned and managed by Minnesota IMPLAN Group, (MIG) Inc.

IMPLAN™ multipliers capture only “backward linkages.” That is, they capture only jobs associated with purchases of goods and services by a mine (for example) and its employees. IMPLAN™ multipliers do not capture “forward linkages,” or those downstream jobs associated with adding value to a mine’s product, refinery jobs for example, or metal-related manufacturing jobs.

Regional analysis can be conducted as any combination of census areas (or states for national-level analysis). IMPLAN™ produces its most accurate impact analyses for larger geographic areas (regions and statewide). It is least useful in localities where data is scarce, especially Alaska’s underdeveloped rural census areas, and where multipliers are generally very small.

It is important to note industry multipliers measured by IMPLAN™ or other sources (the federal government produces sets of industry multipliers in its “RIMS” model) are approximations of highly complex economic relationships. Nevertheless, while IMPLAN™ nearly always requires some degree of modification, experience has shown that IMPLAN™ with appropriate modifications typically produces reasonable multipliers for Alaska’s mining industry. McDowell Group has studied the economic impacts of several operating mines in Alaska (Greens Creek, Fort Knox, Pogo, and Red Dog), including detailed analysis of local and other instate vendor-by-vendor spending, in support of mine operations. These studies have provided opportunities to “ground-truth” IMPLAN™ multipliers and determine how they can be most accurately used to predict the economic impact of future mine development.

CONSTRUCTION PHASE

IMPLAN™ generates a number of construction industry multipliers. For purposes of estimating indirect and induced effects of AMDIAR construction activity and mine construction activity, an average of two sectors is used. These sectors include “Construction of new nonresidential manufacturing structures,” and “Construction of other new nonresidential structures.” The induced component of each of these multipliers was adjusted downward to account for nonresident participation in the construction workforce. IMPLAN™ multipliers and adjusted multipliers for employment and labor income (payroll) are provided in the following table.

Table 26. Statewide Construction Phase Employment and Payroll Multipliers

	Employment	Adjusted Employment	Payroll	Adjusted Payroll
Construction of new nonresidential manufacturing structures	1.62	1.46	1.37	1.27
Construction of other new nonresidential structures	1.84	1.66	1.53	1.43
Averages	1.73	1.56	1.45	1.35

Source: IMPLAN. Adjusted by McDowell Group to account for nonresident participation.

Based on these multipliers (and assuming a \$400 million construction budget), road construction would be expected to have a total employment and payroll impact of about 470 jobs (with the multiplier applied to annual average employment of 300 workers over a four year period) and \$162 million in total wages. Mine construction would have a total employment effect of approximately 625 jobs and \$135 million in wages, over a two-year period.

The regional multipliers associated with road and mine construction would be relatively low (less than 1.15), and largely associated with induced effects. Few construction-related services, supplies, and materials would be procured from businesses located in the region.

OPERATIONS PHASE

IMPLAN™ produces statewide mining industry employment multipliers of 2.2 for “Mining copper, nickel, lead, and zinc.” Adjusting the induced component of the multiplier downward to account for nonresident participation in the operations workforce results in an employment multiplier of 2.0, which is used to calculate total statewide direct, indirect and induced employment.

IMPLAN™ produces statewide mining industry labor income multipliers of 1.82 for “Mining copper, nickel, lead, and zinc.” With an adjustment for nonresident workers, a labor income multiplier of 1.72 is used to calculate total statewide direct, indirect and induced payroll.

IMPLAN™ produces mining industry employment multipliers of 1.25 for “Mining copper, nickel, lead, and zinc” in the NWAB, and a labor income multiplier of 1.21. Adjusting these multipliers to account for non-resident workers in the labor force (resulting in lower induced effects) indicates an employment multiplier of 1.20 and payroll multiplier of 1.13. These multipliers are used to estimate total local and regional direct, indirect and induced employment and labor income associated with AMDIAR and mine operations.

SUMMARY

Estimates of total regional and statewide employment and wages are provided in the following tables. Based on the multipliers described above, AMDIAR construction would generate an average total of 95 temporary jobs for Northwest region residents and total wages of \$34 million (or about \$8.5 million per year over four years). Construction of the mine would create 130 regional resident jobs over two years with \$28 million in total wages (\$14 million per year). AMDIAR and mine operations would account for 275 jobs for residents of the region and approximately \$21 million in annual wages.

Table 27. AMDIAR and Arctic Mine Employment Impacts, including Regional Direct, Indirect and Induced Effects

	Total Direct (Ann. Ave.)	Regional Direct (Ann. Ave.)	Regional Direct (Peak)	Regional Indirect & Induced	Total Regional Employment
Construction Phase					
AMDIAR (4 year total)	300	60	90	35	125
Arctic mine (2 year total)	400	80	120	50	170
Operations Phase					
AMDIAR	20	10	10	5	15
Arctic mine	500	150	150	100	250

Source: McDowell Group estimates.

Table 28. AMDIAR and Arctic Mine Wage Impacts (millions), including Regional Direct, Indirect and Induced Effects

	Total Direct Wages	Regional Direct	Regional Indirect & Induced	Total Regional Wages
Construction Phase				
AMDIAR (4 year total)	\$120.0	\$24.0	\$10.0	\$34.0
Arctic mine (2 year total)	100.0	20.0	8.0	28.0
Operations Phase				
AMDIAR	\$1.6	\$0.8	\$0.2	\$1.0
Arctic mine	46.0	14.0	6.0	20.0

Source: McDowell Group estimates.

Statewide the economic impacts of AMDIAR construction are estimated at 470 temporary jobs and \$162 million in wages (about \$40 million a year for four years), including all direct, indirect and induced effects. Mine construction would account for 625 jobs over two years and \$135 million in total wages (about \$68 million annually). AMDIAR and mine operations would account for just over 1,000 jobs and approximately \$80 million in annual wages.

Table 29. AMDIAR and Arctic Project Employment Impacts, including Statewide Direct, Indirect and Induced Effects

	Direct (Ann. Ave.)	Indirect & Induced	Total
Construction Phase			
AMDIAR (4 year average)	300	170	470
Arctic mine (2 year average)	400	225	625
Operations Phase			
AMDIAR	20	10	30
Arctic mine	500	500	1,000

Source: McDowell Group estimates.

Table 30. AMDIAR and Arctic Project Wage Impacts (millions), including Statewide Direct, Indirect and Induced Effects

	Direct	Indirect & Induced	Total
Construction Phase			
AMDIAR (4 year average)	\$120.0	\$42.0	\$162.0
Arctic mine (2 year average)	\$100.0	35.0	135.0
Operations Phase			
AMDIAR	\$1.6	\$0.6	\$2.2
Arctic mine	\$46.0	\$33.0	\$79.0

Source: McDowell Group estimates.

Local, Regional and Statewide Population Effects

AMDIAR and related mine construction and operation will have direct and indirect population effects. Participation rates can be used to estimate long-term population effects associated with an increase in the number of jobs in a community, region, or state. The participation rate is a measure of the relationship between the number of jobs and the number of residents in an area. Based on BEA employment data and population data from the U.S. Census and DOLWD, the participation rate in Alaska has ranged from 0.63 to 0.65 over the past ten years, averaging 0.64 over that period. This means there has been an average of 64 jobs for every 100 residents in the state. (The job count includes jobs held by residents and nonresidents.)

Participation rates vary from place to place, depending on a variety of factors. Larger communities, with better-developed economies, typically have higher participation rates than smaller communities. Participation rates also depend on transportation infrastructure, which can either constrain or enhance access to jobs outside a resident's hometown.

As illustrated in the following table, urban areas in Alaska have substantially higher participation rates than rural areas. Anchorage population and employment data suggests a high participation rate (0.69); however, that is the result of a large number of Mat-Su residents who work in Anchorage. Similarly Mat-Su's participation rate is low, as a result of many of its residents commuting to work in Anchorage. Together, Anchorage and Mat-Su have a participation rate (0.62) close to the statewide average (0.64).

Rural areas of Alaska have participation rates around 0.50. Three rural areas examined for purposes of this study had ten-year average participation rates ranging from 0.46 (NWAB – location of Red Dog Operations) to 0.54 in the Lake & Peninsula Borough. Bethel Census Area, a large area with Bethel as its regional hub, averaged about 0.52 for the 2000 through 2010 period.

Table 31. Participation Rates in Alaska and Selected Local Areas

	2010 Population	2010 Employment	2010 Participation Rate	Ave. Participation Rate (2000-2010)
Alaska	710,231	447,852	0.631	0.636
Anchorage	291,826	200,082	0.686	0.690
Mat-Su Borough	88,995	33,337	0.375	0.378
Anchorage/Mat-Su	380,821	233,419	0.613	0.624
Lake & Peninsula Borough	1,631	801	0.491	0.539
NWAB	7,523	3,471	0.461	0.459
Bethel Census Area	17,013	8,647	0.508	0.516

Source: Population data from DOLWD, employment data from BEA.

AMDIAR-related population effects in nearby communities are difficult to predict. Some affects of AMDIAR-related job opportunities could include:

- Providing jobs for local residents who are unemployed or have not been in the labor force due to lack of employment opportunities.
- Attracting local people who are already employed (either seasonally or year-round) by other local businesses or organizations. This shifts the demand for workers to other local employers.

- Prompting people living outside the region to move back to communities where they may have family or other roots.
- Prompting mine workers living in nearby communities to relocate – for a variety of lifestyle reasons – to larger population centers, such as Fairbanks or Anchorage. The relatively high-wage jobs offered by mining jobs could make this kind of relocation possible.

NWAB and Red Dog Mine provide a reasonable case study for examining population effects of mine development. Construction of the mine began several years in advance of first production in 1989. Between 1980 and 1990, several communities experienced substantial population growth. While a variety of economic and demographic forces were at work during this period, employment opportunities at Red Dog likely contributed to the jump in population in several of these communities.

Table 32. NWAB Area Population, and Red Dog Operations Employment, 1970, 1980, 1990, 2000 and 2010, by Community

Community	1970	1980	1990	2000	2010	Teck Employment 1989-2007*
Ambler	169	192	311	309	258	68
Buckland	104	177	318	406	416	59
Deering	85	150	157	136	122	16
Kiana	278	345	385	388	361	80
Kivalina	188	241	317	377	374	80
Kobuk	—	62	69	109	151	3
Kotzebue	1,696	2,054	2,751	3,082	3,201	237
Noatak	293	273	333	428	514	108
Noorvik	462	492	531	634	668	125
Selawik	429	535	596	772	829	78
Shungnak	165	202	223	256	262	37

*Number of residents employed at Red Dog at some point during the 1989 to 2007 period.

Source: DOLWD and Teck Alaska Inc., 2008.

CONSTRUCTION PHASE POPULATION IMPACTS

During the construction phase there could be temporary and long-term population affects. A number of workers joining the AMDIAR-related workforce (especially workers from the Northwest region) during the construction stage will transition into long-term (permanent) positions during mine operations. This could include equipment operators, truck drivers, laborers, mechanics and maintenance workers, camp support personnel, and variety of other occupations. Other workers, such as construction project managers and specialists in various construction trades, will only be employed during a portion of the construction time frame.

In addition, temporary construction jobs are typically associated with higher participation rates, meaning there are usually fewer dependents connected with workers than there are with workers holding longer-term jobs. In any case, AMDIAR and mine construction, while requiring several hundred workers (with nonresidents filling approximately 20 percent to 30 percent of these jobs), is not expected to result in significant population in-migration or outmigration, in the Northwest region or in Alaska overall.

OPERATIONS PHASE POPULATION IMPACTS

Assuming the current statewide participation rate (0.64) persists, population effects of AMDIAR would be approximately 1,600 residents associated with direct, indirect and induced jobs connected to road and mine operations. Most of the population growth would be in the Fairbanks or Anchorage areas. It is important to note these figures are estimates of net population growth only to the extent that other forces in the economy are not placing a drag on population growth.

There is less certainty about the population effects of mine operations in the Northwest region and in the communities along the corridor. If historical participation rates in the NWAB (0.46) persist, regional population effects associated with AMDIAR would equal about 600 residents.

State and Local Revenue Impacts

STATE OF ALASKA PAYMENTS

The mining industry generates significant revenues to the State of Alaska through a number of mechanisms, such as mining license fees, rental, royalties, material sales, and other fees. These revenues are described below.

Mining License Tax

The Alaska mining license tax is a graduated tax levied on the net income of all mining property in the state irrespective of land ownership status, capping at 7 percent, less exploration and other credits. Specifically, there is no tax if net income is \$40,000 or less; \$1,200 plus 3 percent over \$40,000; \$1,500 plus 5 percent over \$50,000; and \$4,000 plus 7 percent over \$100,000. New mining operations are exempt from the mining license tax for a period of 3.5 years after production begins. The state collected \$40.7 million in mining license tax in FY2012.²⁴ The Arctic PEA estimates the mine would pay a total of \$115 million in mining license taxes over the life of the project.²⁵

Corporate Net Income Tax

The State of Alaska levies a corporate net income tax based on federal taxable income, with certain Alaska adjustments. Multi-state corporations apportion income on a "water's edge" basis using the standard apportionment formula of property, payroll, and sales. Tax rates are graduated from 1 to 9.4 percent in increments of \$10,000 of taxable income. The maximum rate (9.4 percent) applies to taxable income of \$90,000 and higher. The Arctic PEA estimates the mine would pay a total of \$158 million in State corporate income taxes over the life of the project.

Total annual State income taxes paid by the mining sector is highly variable year-to-year. The State of Alaska collected \$26.8 million in corporate income tax from Alaska's mining sector in FY2013, \$15.0 million in FY2012, and \$81.8 million in FY2011.

²⁴ Annual Report, Tax Division, Department of Revenue, FY 2012.

²⁵ Preliminary Economic Assessment Report on the Arctic Project, Ambler Mining District, Northwest Alaska. Prepared for NovaCopper by Tetra Tech, September 2013, page 29.

Annual Claim Rental

The Annual Rental law (AS 38.05.211) requires locators and holders of State mining locations to pay an annual cash rental. The requirement applies to mining claims, leasehold mining leases, offshore mining leases and prospecting sites on state land. For all traditional mining claims (40 acres), the annual rental amount is \$35 per year for the first five years, \$70 per year for the second five years, and \$170 per year thereafter. For a quarter section mining claim (160 acres), the annual rental amount is \$140 per year for the first five years, \$280 per year for the second five years, and \$680 per year thereafter. For all leases, the annual rent is \$0.88 per acre per year for the first five years, \$1.75 per acre for the second five years, and \$4.25 per acre per year thereafter.

The Arctic Project includes 875 40-acre and 481 160-acre State of Alaska claims. As such, by the time production begins, claim rental payments would likely total approximately \$0.5 million annually.

In FY2010, the mining industry paid \$7.2 million in annual State of Alaska claim rentals.

Production Royalty

The Production Royalty law (AS 38.05.212) requires holders of state mining locations to pay a production royalty on all revenues received from minerals produced on state land. The production royalty is 3 percent of net income as determined under the Mining License Tax Law (AS 43.65), and regulations (15 AAC 65). A production royalty return must be filed and all required royalty payments must be made by anyone:

- 1) Owning, leasing, and operating a mining property
- 2) Owning a mining property and receiving lease fees, royalty payments based on production, or a combination of lease fees and royalty payments from the property
- 3) Leasing a mining property from another person and operating the property
- 4) Possessing a mineral interest, whether an economic or production interest, in a producing property, including royalty, receiving lease fees, working or operating interests, net profits, overriding royalties, carried interests in, and production payments.

For purposes of this study it is assumed production royalties from the Arctic Project would total approximately half of the amount paid in mining licenses taxes, or approximately \$58 million over the life of the project. In FY2010, the production royalty payment from minerals on state land was \$1.3 million.

PAYMENTS TO LOCAL GOVERNMENT

The NWAB receives no sales tax or property tax revenues. However, the borough would likely receive an annual payment in lieu of taxes (PILT), such as that which is stipulated in an agreement between Teck Alaska and NWAB. In FY2010, Teck Alaska's PILT payment to the Borough totaled \$6.7 million, and represented 52 percent of the Borough's total General Fund revenues. Red Dog Operations is the Borough's single most important source of revenue (the borough was formed in 1986, three years prior to commencement of Red Dog operations, to provide services to the region's residents using revenue generated by the PILT).

The NWAB received Red Dog-related PILTs of \$8.7 million in FY2013, \$13.0 million in FY2012, and \$8.9 million in FY2011.²⁶ Since 1989 when mining began at Red Dog Operations, the mine has contributed approximately \$125 million in PILT to the NWAB.

The Arctic PEA does not note or quantify any PILTs to NWAB, though some negotiated arrangement similar to that with Teck/Red Dog is likely. Considering the details of such an arrangement for the Arctic mine, and potential annual payments, is beyond the scope of this study. The purpose of these payments would be to support the NWAB in its efforts to provide various services to the residents of the borough, including residents who are employed at the Arctic mine.

Royalty Payments

In 2011 NovaCopper and NANA entered into an agreement that consolidates NovaCopper's and NANA's land holdings and provides a framework for the exploration and development of the area's mineral resources. The agreement gives NovaCopper the exclusive right to explore the Bornite area and other ANCSA lands (owned by NANA) and to utilize NANA lands for access and for construction of mining facilities. In exchange, NovaCopper will grant NANA a 1 percent net smelter return (NSR) royalty on the Arctic mine. Further, if a mine is constructed, NANA will have the right to purchase a 16 to 25 percent direct interest in the Arctic Project or to receive a 15 percent NSR.²⁷ Regarding potential development of the NANA-owned Bornite property or ANCSA Lands, NovaCopper and NANA will execute a mining lease to allow for construction and operation of a mine. These leases will provide NANA a 2 percent net smelter royalty on production from Bornite and a 2.5 percent net smelter royalty on production from the ANCSA lands.

It is not possible to predict royalty revenues to NANA from the Arctic mine or other mine development in the Ambler Region; however, royalties paid to NANA by Red Dog provide an indication of the potential magnitude of such payments. Red Dog Mine is operated by Teck under an agreement with the property owner, NANA Regional Corporation. As owner of the Red Dog property, NANA Corporation earns royalties on the net earnings on the mine. Through most of the mine's life, NANA was earning royalties equal to 4.5 percent of net smelter returns. However, with full recovery of certain capital expenditures by year-end 2007, NANA now earns a royalty equal to 25 percent of net production from the mine. NANA's share of net production will increase by increments of 5 percent every five years, up to a maximum of 50 percent.

Since 1990 NANA has received a total of \$1.04 billion in royalties from Red Dog, including \$143 million in 2013.

It should be noted that neither the Arctic Project or Bornite deposit are located on ANCSA land and therefore royalties paid to NANA from those projects would not be subject to Section 7(i) and 7(j) provisions of the 1971 Alaska Native Claims Settlement Act (ANCSA). Under Section 7(i), ANCSA corporations are mandated to annually redistribute 70 percent of their net revenue earned on subsurface developments of lands given to them by the settlement among the 12 regional corporations (the 13th Region is not included) based on shareholder enrollment. (The purpose of this clause was to create an opportunity to share the wealth between

²⁶ NWAB, 2013

²⁷ Preliminary Economic Assessment Report on the Arctic Project, Ambler Mining District, Northwest Alaska. Prepared for NovaCopper by Tetra Tech, September 2013, page 29.

those regions rich in natural resources and those that are not.) Of NANA's \$1.04 billion in total royalties, \$609 million were shared with other regions, as required by Section 7(i). The Ambler district does include significant acreage of ANSCA land; to the extent that mineral resources located on those lands are developed, royalties would be subject to Section 7(i). A portion of the 7(i) payments are then distributed as 7(j) payments to ANCSA village corporations

Effect of Road Corridor Development on Transportation Costs

This section of the report looks at the how construction of the AMDIAR might affect the cost of shipping fuel and freight to study area communities. For all of the communities in the study area, transportation of heavy freight and fuel is a major challenge. Huslia is the only community with reliable barge service and Bettles/Evensville is the only community with any form of road connection (with a seasonal ice road). Despite being located adjacent to rivers, barge service is unreliable or unavailable (except for Huslia) due to low water levels. Hughes, Ambler, Shungnak, and Kobuk occasionally have barge service during spring run off or during the fall rainy season.²⁸ Water levels are too low for a barge to reach Allakaket, Alatna, New Allakaket, Bettles, and Evansville.

All of the communities have access to well-maintained gravel runways with regular air service. The cargo and passenger air transportation system includes multiple carriers providing passenger and cargo service.²⁹ The combined number of passenger enplanements for the study region was 13,713 in 2012. Airstrips are large enough to accommodate a Hercules C-130 / L-382, albeit with a reduced payload.³⁰ For a full payload of 48,000 pounds, a runway of at least 5,000 feet is preferred.

Table 33. Airport Infrastructure and Traffic Volumes in Study Area Communities, 2012

	Runway Size	Cargo and Mail (in- and out-bound) (lbs.)	Passenger Enplanements
Ambler	(1) 3,000' x 60' (2) 2,400' x 60'	734,509	2,405
Alatna/Allakaket	4,000' x 100'	383,124	1,844
Bettles and Evansville	5,190' x 150'	164,288	2,137
Kobuk*	4,000' x 75'	1,324,021	1,598
Hughes	3,380' x 100'	212,344	925
Shungnak	4,000' x 60'	784,916	2,231
Huslia	4,000' x 75'	629,815	2,886

* The 4-year average prior to 2012 was 118,000 lbs.
Source: Bureau of Transportation Statistics T-1000, Table 310.

²⁸ Crowley has not been able to deliver fuel by barge to Ambler since 2011.

²⁹ Everts Air Cargo, Everts Air Fuel, Ryan Air Cargo, Lynden Air Cargo, Desert Air, and Bering Air all serve the region.

³⁰ Personal correspondence with Lynden Air Cargo (which delivers to Kobuk and can land on 4,000').

COST OF FUEL AND FREIGHT TRANSPORTATION

The analysis of how the AMDIAR might affect transportation costs is complicated by the fact that none of the study area communities are located immediately along the proposed road corridor (with the exception of the smallest communities, Evansville/Bettles). Investment in spur roads would be required to connect Ambler and Shungnak to the AMDIAR with a year-round or even seasonally maintained single lane gravel road suitable for use by a fuel truck. Kobuk has road access to the Bornite airstrip and camp. Alatna/Allakaket, Hughes and Huslia are much farther from the corridor than the Upper Kobuk communities.

While construction and operation of a year-round gravel spur road would result in the greatest benefit from a surface transportation cost perspective, spur road construction is not necessarily the only way these communities could benefit from the AMDIAR. Options might include utilization of ice roads and/or development of electrical interties connecting communities to the mine's power generating facilities.

Ice Road: Ice roads are frequently used in northern regions to facilitate surface transportation of fuel and heavy freight to remote areas. In general, an ice road would be the lowest cost option in terms of construction and maintenance. Ice roads are, of course, seasonal and can only be used once the ice is thick enough to support vehicle weight. The community of Bettles/Evansville annually constructs an ice road to the Dalton Highway. Installation and maintenance for this roughly 20-mile ice road is reported to cost \$64,000, while reportedly saving the community and local businesses over \$400,000 annually in transportation costs. These figures have not been independently verified. The ice road is open to the public for six to ten weeks depending on weather conditions.

The technical feasibility and cost of ice road construction between the upper Kobuk communities and the AMDIAR have not been studied. With regard to potential for reducing fuel and freight shipping costs, it is important to note standard size fuel trucks would most likely not be able to travel on an ice road. Use of smaller volume trucks would have higher per-gallon costs.

Electrical intertie to the mine: The development of an industrial grade road to the Ambler mining district could significantly reduce the cost of installing an intertie electrical network between the mine and the communities of Shungnak, Kobuk, and Ambler. This option could reduce the cost of electricity locally, but would not affect the cost of fuel for home heating or for vehicles. The cost of constructing an intertie between the upper Kobuk communities and the Arctic Project has not been estimated. The uncertain and potentially short mine life (12 years) would raise questions about the overall costs versus benefits of the intertie option.

While there may be substantial barriers to developing either seasonal (ice road) or year-round (gravel) road connections between the communities and the AMDIAR, this cost analysis assumes that such a connection exists, as described below.

Methodology

Aggregate information on expenditures related to cargo transportation in the study area are difficult to obtain. A model was constructed to estimate the weight and cost of goods transported on a per capita basis and extrapolated to the population as a whole. Analysis was conducted to estimate the weight of goods which could reasonably be switched to ground transport, if such an option was available. Estimates were made of the current cost associated with air transport and used to calculate potential cost avoidance.

Commodities were grouped in three categories: fuel, food, and consumer goods. Estimates of per capita consumption by weight and cost were calculated separately for each category. The three categories were combined to estimate the total cargo transportation expenditures per capita. Fuel transportation costs were estimated relative to the price of fuel in other villages. Transportation costs for food and consumer goods were estimated from published and unpublished freight rates.

Working under the scenario of a limited access road, any new ground transportation is assumed to be periodic with a maximum frequency of once per month. This report assumes the Alaska Bypass Program will effectively remain in place from the perspective of the customer. In other words, savings that accrue to USPS are excluded.³¹

FUEL

Study area communities are powered by diesel fuel for electricity, heating oil for warmth, and gasoline for personal vehicle transportation. Compared to urban centers, the full cost of energy is extremely high. Multiple studies have been undertaken to look at reducing energy costs and there is an annual "Alaska Rural Energy Conference."³² An estimated 834 gallons (5,671 pounds) of fuel per person in the study area are currently consumed annually.³³ Challenges associated with transporting fuel include its inherent hazardous nature, the weight of the product, and finding suitable aircraft to carry the fuel. On the positive side, fuel has a long shelf-life allowing for bulk fuel purchases. Whenever possible, and more accurately, whenever water conditions allow, fuel is transported by barge.³⁴ Communities accessible by barge have fuel storage tanks enabling receipt of large fuel deliveries. These communities would not require additional infrastructure if a ground delivery system was available. (Storage capacity in Allakaket and Hughes may be insufficient to store large quantities).

Fuel consumption for each community was estimated using a combination of reported and estimated data. Of note, on a per capita basis, Bettles consumes a disproportionate volume of fuel and is excluded from the average per capita calculation.

³¹ USPS estimated savings would be approximately \$2 million based on BTS data and assuming savings of \$1 per pound.

³² List several Rural Alaska energy studies including a recent AVEC study and the NANA Region Strategic Energy Plan, 2008. The 9th Alaska Rural Energy Conference is in Fairbanks, September 225, 2014.

³³ NANA Region Strategic Energy Plan, 2008. PCE data 2012, NANA school audit, Doyon Energy Audit

³⁴ In recent years only Huslia has been accessible by barge. Fuel is flown in on regular flights in loads of 3,000 to 5,000 gallons. For example, in 2012 Ambler received 98,000 gallons of fuel via 25 flights with an average cost of \$7.75 per gallon.

Table 34. Estimated Fuel Consumption (Gallons)

	Power Generation	Other	Total	Population	Gallons per Capita
Ambler	97,721	143,904	241,625	271	892
Shungnak	117,382	71,340	188,722	269	702
Kobuk	0	92,936	92,936	141	659
Allakaket	56,765	129,696	186,461	200	932
Bettles	48,752	62,626	111,378	20	5,569
Hughes	38,169	72,800	110,969	87	1,276
Huslia	77,522	172,131	249,653	315	793
Total	436,311	745,434	1,181,745	1,303	
<i>Per Capita (excluding Bettles)</i>	<i>302.1</i>	<i>532.2</i>	<i>834.3</i>		<i>834</i>

Source: McDowell Group estimates.

Fuel Transportation Costs

Fuel prices are highly variable and reflect changes in crude oil prices, market pressures, weather changes, and transportation costs. Fuel in communities without road access are as much as double the price of fuel in Fairbanks. To accurately attribute the cost associated with air transportation relative to ground transportation, two independent estimation methods were used. One method compared the price of fuel in Eagle with Hughes and Huslia over a five-year period. Eagle (population 161 including Eagle Village) is connected to the road network and is remotely located approximately 362 road miles from Fairbanks. Hughes (population 87) is approximately 210 miles from Fairbanks by air. Huslia (population 315) is approximately 290 miles from Fairbanks by air and has seasonal barge access. This comparison reveals an average premium of \$2.89 in communities without road access. The second method was an ordinary least squares (OLS) regression analysis of 29 communities. This analysis estimates a premium of \$3.25 when using air transport over truck transport and a premium of \$1.64 when using air transport over barge transport, supporting the estimate of \$2.89 on average.³⁵

Table 35. Estimated Fuel Transportation Costs

Fuel	Gallons	Weight (lbs)	Air Transportation Costs
Total Consumption	1,181,745	8,035,863	\$3,415,242
<i>Exclusions</i>	<i>- 94,693</i>	<i>- 643,910</i>	<i>- \$273,662</i>
Net	1,087,052	7,391,953	\$3,141,580
Fuel per capita	834	5,671	\$2,411

Source: McDowell Group estimates.

The estimated transportation cost for fuel of \$2.89 per gallon results in a total transportation cost of \$3.1 million for fuel in study area communities. Fuel is estimated to account for 78 percent of the weight transported into study area communities. It must be noted that this cost is not entirely borne by the residents as it includes fuel for heat and power in the local utilities, government buildings and schools. Further, under the Power Cost

³⁵ Barge transport costs are estimated to be more than truck transport costs in this model. This is likely due to the remote nature of communities that require barge transport and that these communities may also require air delivery during winter months. The intent of the model was to confirm the use of comparative community estimates.

Equalization (PCE) program residents do not pay the full price of electricity. The majority of costs for government buildings and schools are covered by state and federal funding.

FOOD

Food is a unique commodity to transport as it includes perishable items (e.g. fruit and dairy products), semi-perishable items (e.g. root vegetables and baking supplies), and non-perishable items including processed foods. In the absence of local consumption data, national estimates were used as a starting point. The average US citizen eats an estimated 1,923 pounds of food per year.³⁶ However, all of the communities in the study area have significant subsistence activity. For purpose of this analysis, an average of approximately 400 pounds per person are attributed to subsistence activity. Of the remaining 1,514 pounds, half of the weight is assumed to continue being shipped by air service. This assumption takes into account custom food orders and perishable goods unsuitable for monthly ground transportation. An estimated 757 pounds of food per person per year could be transported by alternative means.

Food Transportation

Food transportation costs range from 43 cents per pound to over \$2 per pound. The current transportation cost is assumed to average \$0.50 per pound based on Bypass Mail / Parcel Post rates. This rate is likely low for freeze and chill products, however as they are assumed to continue to be transported via air services this does not affect the analysis.

Table 36. Estimated Food Transportation Costs

Fuel	Weight (lbs)	Air Transportation Costs
Total Consumption	2,505,278	\$986,371
Exclusions	-1,518,907	- \$493,186
Net	986,371	\$493,186
Food per capita	757	\$379

*Exclusions include subsistence, which has no associated shipping costs.
Source: McDowell Group estimates.

CONSUMER GOODS

Aggregate cargo data available from the Bureau of Transportation Statistics includes industrial cargo, which is not necessarily part of local consumption. Due to the inclusion of industrial cargo in aggregate statistics, estimates of residential consumption were made. Given the high cost of goods, relatively low income, and limited commercial enterprises, it is unlikely consumption in the study region is as high as the typical Alaska or U.S. household. Furthermore, a road connection may change the consumption patterns. Nonetheless, using various data sources, the weight of material goods shipped to study area communities is estimated to average 1,140 pounds per person per year. Of these goods, it is assumed 25 percent will continue to be transported by air.³⁷ The remainder is an estimate of 855 pounds per person per year, which could be transported by ground.

³⁶ USDA Factbook 2001-2002, Chapter 2, Profiling Food Consumption in America.

³⁷ A resident of Allakaket reported that when they needed to replace their stove the shipping cost was \$300 for a \$150 stove.

Consumer Goods Transportation Costs

These goods are assumed to be transported at a current rate of \$1.25 per pound for a total transportation cost of \$1.4 million. Of note, there is a large margin of error associated with this estimate. Goods can be transported by Bypass Mail at a rate of approximately 50 cents per pound whereas other goods may require special handling charges. Most carriers have fixed minimum delivery charges in addition to surcharges for large-volume, low-weight items.

Table 37. Estimated Consumer Goods Transportation Costs

Fuel	Weight (lbs)	Air Transportation Costs
Total Consumption	1,485,759	\$1,857,198
Exclusions	-371,440	-\$464,300
Net	1,114,319	\$1,392,899
Consumer goods per capita	855	\$1,069

Source: McDowell Group estimates.

SUMMARY OF TRANSPORTATION COSTS

Recognizing that air cargo would not be entirely replaced, estimates were made of the cost associated with cargo that could be transported by other means. The total cost associated with air transportation is estimated to be \$5.0 million annually for residential cargo that could be transported by other means.

Table 38. Estimated Expenditures Related to Transportation

	Weight (Pounds)	Cost per Pound (Weighted Average)	Transportation Expenditures (per Person)	Transportation Expenditures (Total)
Fuel	5,671 (78%)	\$0.43	\$2,410 (62%)	\$3,140,569
Food	757 (10%)	\$0.50	\$379 (10%)	\$493,186
Other	855 (12%)	\$1.25	\$1,069 (28%)	\$1,392,899
Total	7,283	\$0.53	\$3,647	\$5,026,653

Source: McDowell Group estimates.

When considering alternative transportation options, study area communities can be grouped into four sub-regions based on their proximity to the AMDIAR.

Sub-Region 1 (Ambler, Shungnak, and Kobuk)

These three villages have a combined population of 681 residents, representing 52 percent of the study area total. They are relatively close to each other with Ambler 24 miles from Shungnak, and Shungnak 7 miles from Kobuk by air. A ground link from Ambler to the AMDIAR via Shungnak and Kobuk would be less than 50 miles. Given their close proximity, they may be able to pool resources, particularly with regards to fuel purchases and storage. An intertie currently brings power generated from Shungnak to Kobuk. Economies of scale and existing infrastructure may facilitate consolidating power generation with Ambler.

Sub-Region 2 (Bettles and Evansville)

Bettles and Evansville are adjacent to each other and have a combined population of 20. They are roughly a mile from the proposed AMDIAR and could connect relatively easily. They use a disproportionate amount of fuel because of visitor traffic. In addition, the community is currently connected to the Dalton Highway with an annual ice road. This existing ground access reduces somewhat the potential transportation benefits associated with AMDIAR. Suffice to say the seasonal public access ice road connection is significantly different than a limited industrial use access road. The small resident population was assumed to benefit, on average, at the same value as the study area as a whole.

Sub-Region 3 (Alatna, Allakaket, and New Allakaket)

Alatna, Allakaket and New Allakaket are adjacent to each other and straddle the Koyukuk River. They have a combined population of 200. The winding Koyukuk River connects with the proposed AMDIAR; however, the distance is comparable to the distance from Allakaket to the Dalton Highway. In contrast to Bettles, Allakaket does not construct a seasonal ice road suggesting the costs outweigh the benefits. It is unlikely a connection to the AMDIAR would be beneficial if a connection to the Dalton Highway is not.

Sub-Region 4 (Hughes and Huslia)

Hughes and Huslia are 58 miles and 121 miles by air respectively from Allakaket. They have a combined population of 402. Considering the distances involved and the existing barge access to Huslia, it is unlikely a ground link to the AMDIAR would be pursued in any way.

SAVINGS ASSOCIATED WITH SURFACE ACCESS

Truck transportation costs are assumed to average half the cost of airfreight. The cost savings is not as great as may be expected because the distance from Fairbanks is substantial. In addition to the physical distance, the time involved would likely require an overnight stay for the driver. Lastly, there are very limited opportunities to pick up freight for the return journey. Ground cargo is estimated to cost an average of \$0.28 per pound or 53 percent of the cost of air cargo. Overall, this would result in a savings of \$2.4 million per year at 2013 rates. This is an estimate based on average costs for delivery on the existing road network. It excludes any additional charges that may be associated with delivery along an industrial road such as tolls and carrier surcharges.

Table 39. Potential Annual Savings With Ground Transportation vs Air Transportation (millions)

	Fuel	Food	Consumer Goods	Total
Air	\$3.14	\$0.49	\$1.39	\$5.03
Truck	\$1.67	\$0.26	\$0.74	\$2.66
Potential Savings	\$1.48	\$0.23	\$0.65	\$2.36

SUMMARY OF REGIONAL TRANSPORTATION BENEFITS

For communities in the study area, the cost of transporting fuel and heavy freight is a major barrier to economic sustainability and growth. Huslia is the only community with reliable barge service and Bettles/Evansville are the only communities with any form of ground connection, via a seasonal ice road connecting to the Dalton Highway. Barge service is unreliable or unavailable in all villages in the area (except Huslia) due to low water levels. Hughes, Ambler, Shungnak and Kobuk occasionally have barge service during spring run off or during the fall rainy season, however, water levels are too low for barges to serve Allakaket and Alatna. In the absence of barge service, communities must often rely on costly delivery by aircraft to move fuel and freight.

Analysis of how the AMDIAR might affect local transportation costs is complicated because some communities are not located in close proximity to the proposed road corridor. If road access were available to these communities, several million dollars in annual savings would result, from lower costs for shipping fuel and freight. Below, communities are categorized as having significant, moderate, or minimal potential transportation benefits from road construction:

- **Significant Potential:** Evansville and Bettles, which are adjacent to the proposed route, would experience significant transportation benefit from construction of the AMDIAR.
- **Moderate Potential:** The Upper Kobuk River communities have moderate potential for transportation-related benefits from road construction, especially Kobuk, but also Shungnak, and to a lesser extent Ambler. Investment in spur roads would be required for year-round or seasonally maintained single-lane gravel roads suitable for use by a fuel truck.
- **Minimal Potential:** Alatna, Allakaket, Hughes, and Huslia are much farther from the corridor than the Upper Kobuk communities and are unlikely to ever have a road connection to the AMDIAR.

Alaska Department of Commerce, Community, and Economic Development (DCCED) Division of Community and Regional Affairs (DCRA). 2014. Community Information.

<http://commerce.alaska.gov/cra/DCRAExternal/community> (accessed January 2014).

_____. 2011. Financial Documents Delivery System.

http://www.commerce.state.ak.us/dca/commfin/CF_FinRec.cfm (accessed December 2013).

_____. January 2013. "Alaska Fuel Price Report: Current Community Conditions."

http://commerce.alaska.gov/dcra/pub/Fuel_Report_2013_January.pdf. (Accessed December 2013).

Alaska Department of Commerce, Community, and Economic Development, Division of Economic Development. Prepared for AIDEA. "Ambler Mining Region, Phase 1: Summary of Mineral Projects, Preliminary Draft." November 2013.

Alaska Department of Education and Early Development. 2012. Statistics & Reports.

www.eed.state.ak.us/stats/ (accessed December 2013).

Alaska Department of Fish and Game, Subsistence Hunting and Fishing. 2014. Harvest Information for Community. <http://www.adfg.alaska.gov/sb/CSIS/index.cfm?ADFG=harvInfo.harvestCommSelComm> (accessed January 2014).

Alaska Department of Labor and Workforce Development, Division of Research and Analysis (DOLWD DRA). 2007. Employment Data (Firm Listing). Unpublished data.

_____. 2013. 1880 to 1990 Census Data. <http://labor.alaska.gov/research/census/hist.htm> (accessed January 2014).

_____. 2013. 2000 Census. <http://labor.alaska.gov/research/census/cen2000.htm> (accessed January 2014).

_____. 2013. 2010 Census – Demographic Profiles. <http://live.laborstats.alaska.gov/cen/dparea.cfm> (accessed July 2013).

_____. 2013. Population Estimates. <http://laborstats.alaska.gov/pop/popest.htm> (accessed January 2014).

_____. 2013. Population Projections 2010-2035. <http://laborstats.alaska.gov/pop/popproj.htm> (accessed January 2014).

_____. 2013. Quarterly Census of Employment and Wages (QCEW).

<http://labor.alaska.gov/research/qcew/qcew.htm> (accessed January 2014).

_____. 2013. Residency of Workers, 2011. <http://laborstats.alaska.gov/reshire/historical/NONRES11.pdf> (accessed January 2014).

_____. 2013. Unemployment Rate Data. <http://live.laborstats.alaska.gov/labforce/> (accessed January 2014).

Alaska Department of Natural Resources, Division of Oil and Gas. 2013. Oil and Gas Revenue.

<http://dog.dnr.alaska.gov/Royalty/Revenue.htm>. (accessed December 2013).

Alaska Department of Revenue, Tax Division. "2013 Annual Report."

<http://www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1038r>.

Alaska Energy Authority. "Power Cost Equalization Program Statistical Data by Community." April 2013.

<http://www.akenergyauthority.org/PDF%20files/pcereports/fy12statisticalrptcomt.pdf>. December 2013.

Alaska Industrial Development and Export Authority (AIDEA). 2011. <http://www.aidea.org/> (accessed January 2014).

Andover Mining Corporation. "Safe Jurisdictions – Grade – Infrastructure Corporate Presentation."

<http://www.andovermining.com/wp-content/uploads/2011/12/Andover-Mining-Corp.-Presentation-20134.pdf>. PowerPoint. 2013.

BD Resources Consulting, Inc. Prepared for NovaCopper. "NI43-101 Technical Report Resource Estimation– Ruby Creek Zone Bornite Deposit Upper Kobuk Mineral Project Northwest Alaska." 8 February 2013.

BD Resources Consulting, Inc. Prepared for NovaCopper. "NI43-101 Technical Report for the Upper Kobuk Mineral Projects Bornite Deposit–South Reef and Ruby Creek Zones, Northwest Alaska." 18 July 2013.

Bureau of Economic Analysis. 2013. Regional Data – GDP and Personal Income. U.S. Department of Commerce.

<http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5#reqid=70&step=1&isuri=1&7023=7&7024=Non-Industry&7001=749&7090=70&7029=49&7022=49> (accessed January 2014).

Bureau of Indian Affairs. U.S. Department of the Interior, Indian Affairs. 2014. <http://www.bia.gov/> (accessed December 2013).

City of Allakaket. Telephone conversation. 25 November 2013.

Comstock, Jeff. Quality Sales Food Service, Bush Sales. Telephone conversation. December 2013.

Crowley Marine. Kotzebue Sales Associate. Telephone conversation. November 2013.

Indian Health Services. U.S. Department of Health and Human Services. 2014. <http://www.ihs.gov/> (accessed December 2013).

Interior Energy Project. *Bringing North Slope Natural Gas to Alaskans*. <http://www.interiorenergyproject.com> (accessed January 2014).

Mathiasson, Ingemar. Northwest Arctic Borough, Energy Coordinator. Telephone conversation. November 2013.

McDowell Group, Inc. Prepared for Alaska Department of Administration, Personnel and Labor Relations. "Alaska Geographic Differential Study, 2008." April 2009.

Mine Development Associates. Prepared for Andover Mining Corporation. "Technical Report on the Sun Project, Brooks Range, Alaska." 30 September 2013.

NANA Regional Corporation. "Region Strategic Energy Plan, 2008."

http://apps1.eere.energy.gov/tribalenergy/pdfs/nana_strategic%20planning_final_report_first_steps.pdf. 19 March 2009.

NANA Regional Corporation. Unpublished data. December 2013.

Northwest Arctic Borough. *The Northwest Arctic Borough (NAB)*. 2013. <http://www.nwabor.org/about.html> (accessed December 2013).

NovaCopper. *Bornite Deposit*. 2012.

http://www.novacopper.com/s/Ambler_District.asp?ReportID=577394& Type=Ambler-District& Title=Bornite-Deposit (accessed December 2014).

_____. *Welcome to the Upper Kobuk Mineral Project*. 2012.

http://www.novacopper.com/s/Ambler_District.asp?ReportID=577396& Type=Ambler-District& Title=Arctic-Deposit (accessed December 2014).

Olson, Lisa. Fred Meyer, Alaska Bush Orders. Telephone conversation. December 2013.

Pafford, Brad. United States Postal Service, Office of Inspector General. Telephone conversation. January 2014.

Petsel, Scott. NovaCopper, Upper Kobuk Mineral Projects (UKMP) Manager. Telephone conversation. January 2014.

Smith, Fred. Northwest Arctic Borough, Economic Development Officer. Telephone conversation. 16 December 2013.

Teck Alaska. Unpublished data. 2013.

Tetra Tech. Prepared for NovaCopper. *Preliminary Economic Assessment Report on the Arctic Project, Ambler Mining District, Northwest Alaska*. http://www.novacopper.com/i/pdf/reports/2013_Arctic_PEA_FINAL.pdf. 12 September 2013.

_____. Prepared for U.S. Environmental Protection Agency. *Red Dog Mine Extension Aqqaluk Project Final Supplemental Environmental Impact Statement, Volume 1*. October 2009.

U.S. Census Bureau (USCB); American Community Survey (ACS), 2007-2011 5-Year Estimates. <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> (accessed various January 2014).

United States Department of Agriculture, Office of Communications. "Agriculture Factbook 2001-2002." <http://www.usda.gov/factbook/2002factbook.pdf>. March 2003.

Appendices

Appendices: Study Area Socioeconomic Baseline Conditions and Community Profiles

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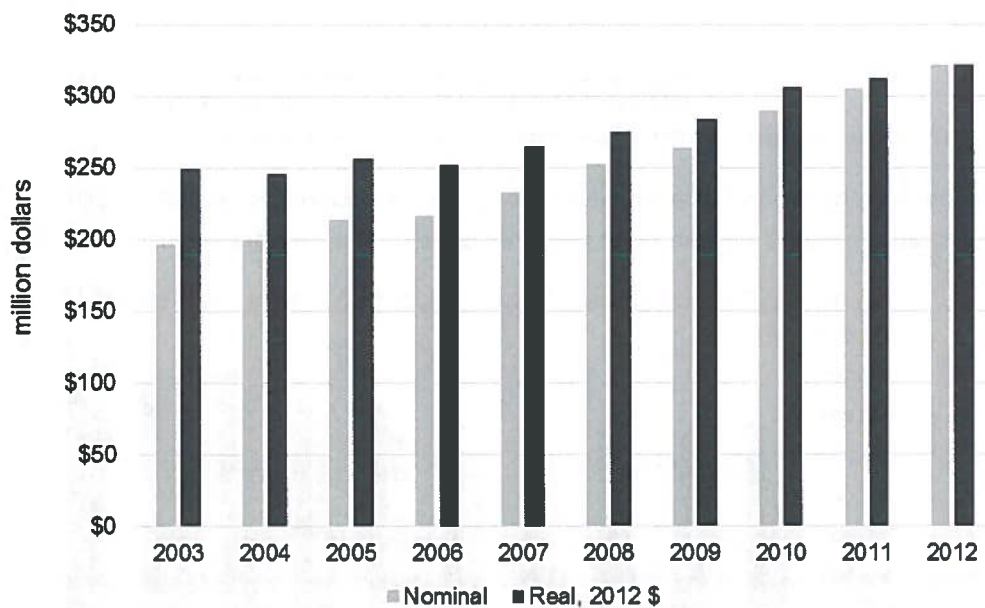
Appendix 1: Study Area Socioeconomic Baseline Conditions

Overview of Regional Economic Conditions

Northwest Arctic Borough Income and Employment Trends

Personal income in the Northwest Arctic Borough (NWAB) totaled \$321 million in 2012 (the most recent data available from BEA). Total personal income was on an upward trend from 2006 through 2012, following several years of little or no growth. From 2006 to 2012, personal income in NWAB increased 48 percent in nominal terms and 28 percent in inflation-adjusted dollars. The average annual increase from 2006 to 2012 was 6.0 percent in nominal dollars and 3.3 percent in real dollars.

Figure 1. NWAB Personal Income, Total Nominal and Real (2012 \$millions)



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Table 1. NWAB Personal Income, Total Nominal and Real (2012 \$millions)

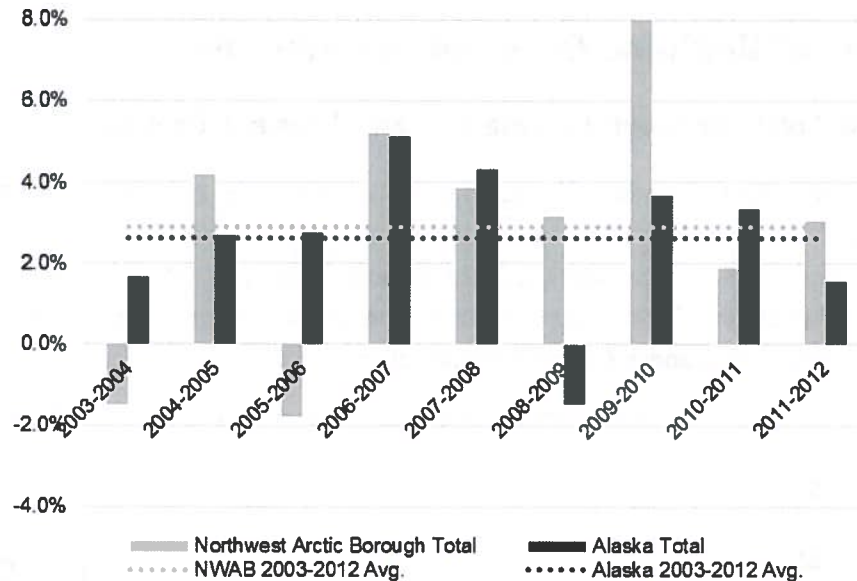
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nominal	196.9	199.0	213.6	216.5	232.9	252.9	264.0	290.1	305.1	321.3
Real, 2012 \$	249.6	245.8	256.1	251.5	264.6	274.8	283.5	306.2	311.9	321.3

Source: Nominal values from BEA Inflation adjustment based on the BLS Anchorage CPI.

From 2003 to 2012, inflation-adjusted total personal income increased more rapidly in the NWAB than in Alaska overall; by 21 percent in NWAB, versus 12 percent in Alaska. During this same period the average annual increase was 2.2 percent in NWAB and 1.3 percent in Alaska.

From 2003 to 2012, NWAB experienced annual growth in total personal income that was 0.26 percent higher than the Alaska average. This average includes NWAB growth between 2008 and 2009 that was 6.2 percent higher than the statewide average and growth from 2009 to 2010 that was 5.6 percent higher.

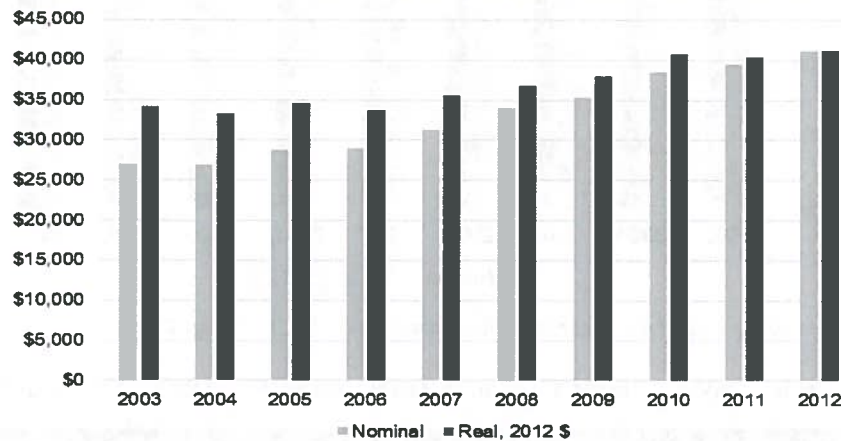
Figure 2. NWAB and Alaska Personal Income (Total), Annual Rate of Change (2012 \$)



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Per capita (per person) personal income in NWAB was \$41,145 in 2012. From 2006 to 2012, NWAB's inflation-adjusted per capita personal income increased by 22 percent, at an average annual rate of 3.4 percent.

Figure 3. NWAB Per Capita Personal Income, Nominal and Real (2012 \$)



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Table 2. NWAB Per Capita Personal Income, Nominal and Real (2012 \$)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nominal	26,940	26,904	28,808	29,001	31,301	33,870	35,350	38,506	39,483	41,145
Real, 2012 \$	34,138	33,233	34,529	33,682	35,563	36,805	37,963	40,632	40,363	41,145

Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

In 2012, NWAB's per capita personal income of \$41,145 was 17 percent below the Alaska average of \$49,436. However, per capita income has been growing faster in the NWAB than statewide. In 2003 the average NWAB resident earned \$34,138 and the average Alaskan earned \$44,209 in personal income. From 2003 to 2012, inflation-adjusted per capita personal income increased by 21 percent in NWAB, versus the statewide average of 12 percent. On an annual basis NWAB increased at an average rate of 2.2 percent, versus an Alaska average of 1.3 percent (Figure 4).

Figure 4. NWAB and Alaska Per Capita Personal Income, Annual Rate of Change (2012 \$)

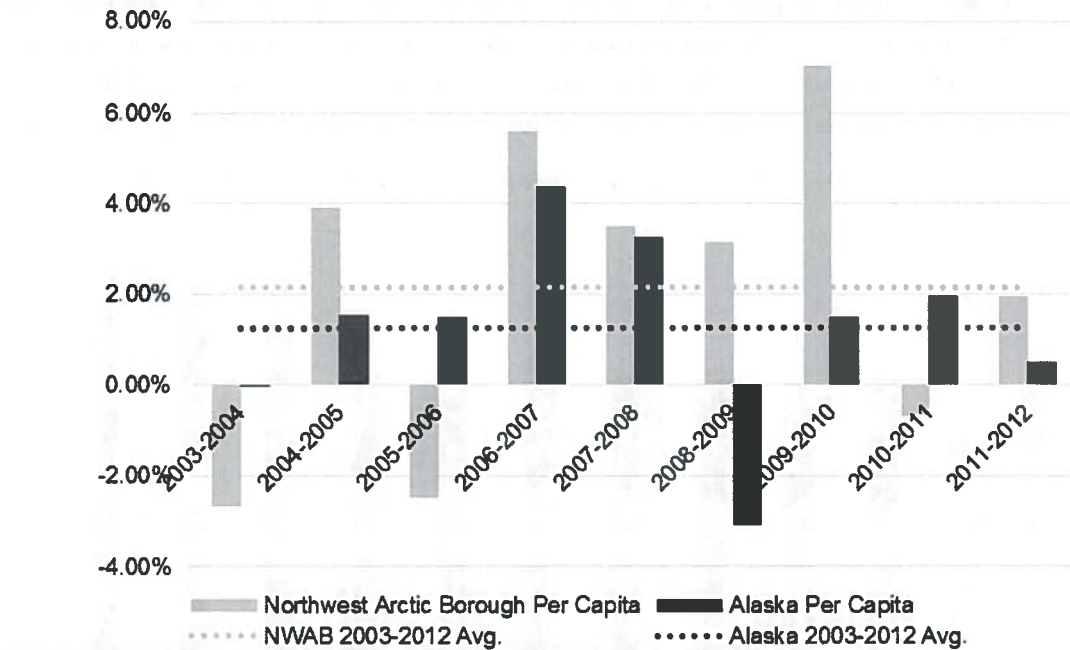


Table 3. Personal Income and Per Capita, Annual Rate of Change (2012 \$)

	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Personal Income									
NWAB	-1.5%	4.2%	-1.8%	5.2%	3.9%	3.2%	8.0%	1.9%	3.0%
Alaska	1.7	2.7	2.7	5.1	4.3	-1.5	3.7	3.3	1.6
Per Capita									
NWAB	-2.6%	3.9%	-2.5%	5.6%	3.5%	3.1%	7.0%	-0.7%	1.9%
Alaska	0.0	1.5	1.5	4.3	3.2	-3.1	1.5	1.9	0.5

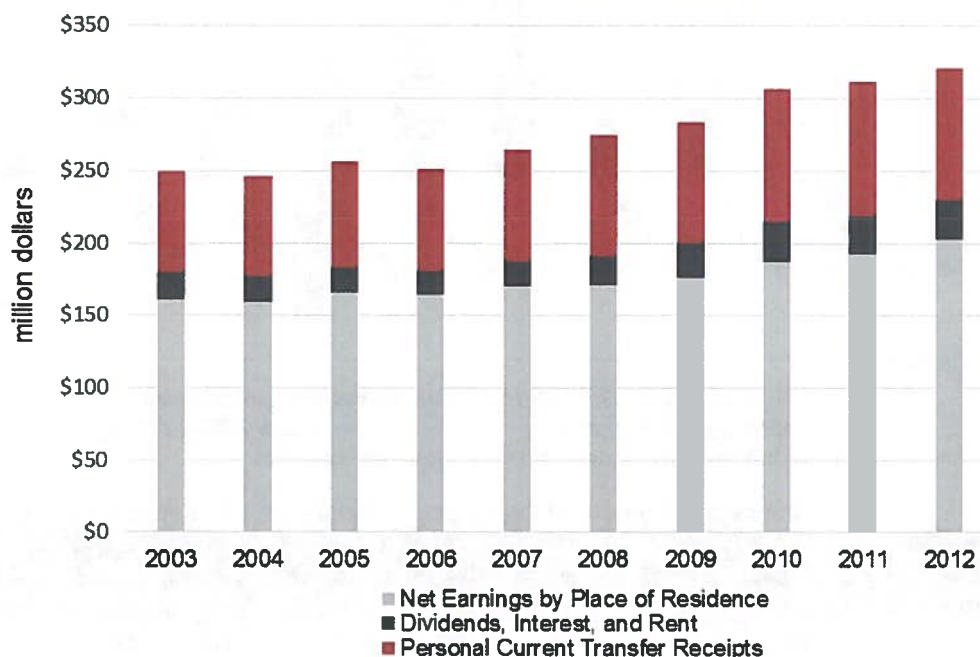
Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

The BEA database disaggregates personal income by three main categories: (1) net earnings by place of residence, (2) dividends, interest, and rent, and (3) personal current transfer receipts. Net earnings by place of residence represented 63 percent of personal income in NWAB in 2012. Net earnings by place of residence increased \$41.6 million from \$160.7 million in 2003 to \$202.3 million in 2012. During this time, \$38.2 million (92 percent) of the increase occurred from 2006 to 2012.

Dividends, interest, and rent represented 9 percent of personal income in NWAB in 2012. From 2003 to 2012, this category increased by \$9.1 million, from \$18.6 million in 2003 to \$27.7 million in 2012. Dividends, interest, and rent decreased by \$0.6 million from 2003 to 2007 and then increased by \$11.1 million between 2007 and 2012.

Personal current transfer receipts represent benefits received by individuals for which no current services are performed (e.g. Permanent Fund Dividend, retirement insurance, disability insurance, Medicare, food stamps, earned income tax credit, unemployment insurance, veterans' benefits, etc.). Personal current transfer receipts in NWAB were responsible for 28 percent of NWAB's personal income in 2012, versus an average contribution to personal income of 15 percent in Alaska in 2012. Similar to the other components of personal income, transfer receipts were stable from 2003 to 2006—totaling \$70.3 million in 2003 and \$71.1 million in 2006—followed by an average annual increase of 4.4 percent from 2006 to 2012 and reaching \$91.4 million in 2012.

Figure 5. NWAB Personal Income, by Category (2012 \$)



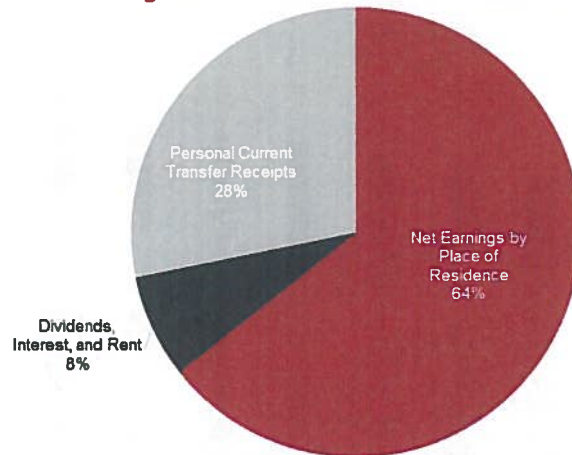
Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Table 4. NWAB Personal Income, by Category (2012 \$millions)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Net Earnings by Place of Residence	\$160.7	\$158.7	\$166.4	\$164.1	\$170.6	\$170.9	\$175.9	\$187.0	\$192.6	\$202.3
Dividends, Interest, and Rent	18.6	18.6	16.9	16.3	16.6	20.1	23.9	27.8	25.9	27.7
Personal Current Transfer Receipts	70.3	68.5	72.8	71.1	77.4	83.7	83.6	91.3	93.4	91.4

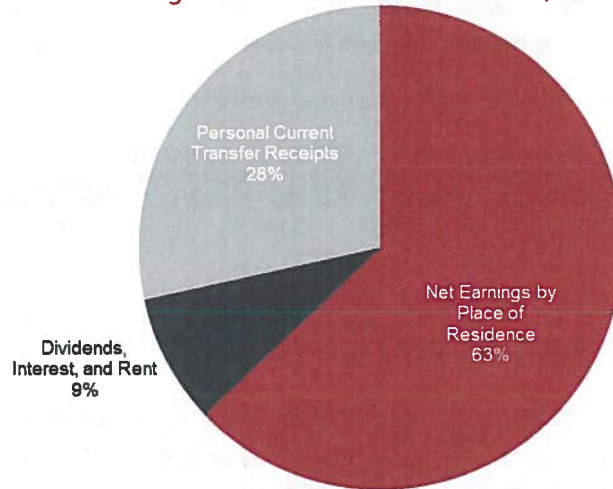
Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Figure 6. NWAB Personal Income, 2003



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

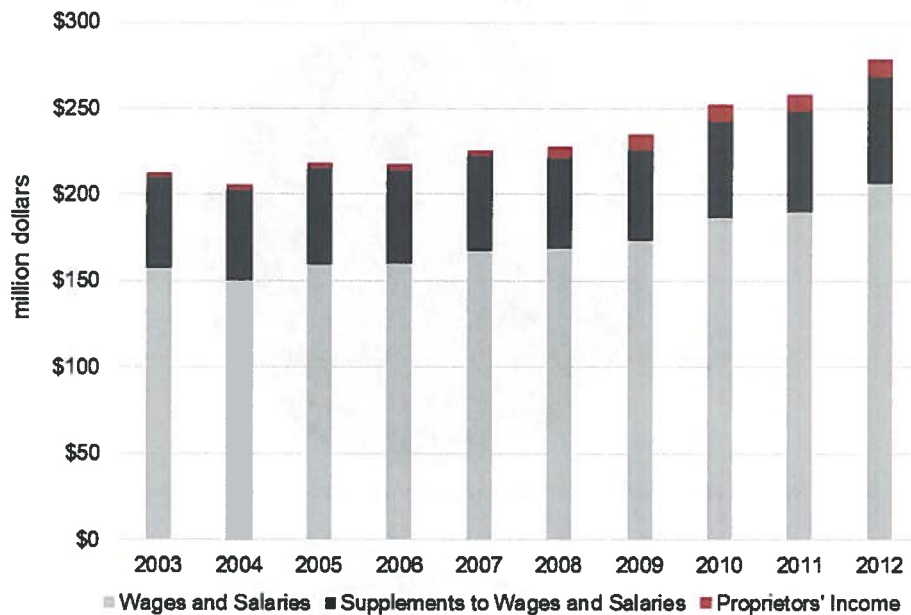
Figure 7. NWAB Personal Income, 2012



Source: Nominal values from BEA. The values do not require adjustments for inflation since the data are in 2012 dollars.

Earnings by place of work is a slight modification of the net earnings by place of residence. Earnings by place of work includes contributions for government social insurance and does not adjust for residence. Earnings by place of work can be disaggregated by employee compensation—wages and salaries as well as supplements to wages and salaries—plus sole proprietorships and partnerships. Wages and salaries totaled \$206.5 million in 2012 and represented 74 percent of earnings by place of work in NWAB. Supplements to wages and salaries totaled \$61.8 million in 2012 and represented 22 percent of earnings by place of work in the borough. Proprietors' income was consistently the smallest category of earnings by place of work for NWAB, totaling \$10.6 million in 2012—although it has increased its contribution to total earnings by place of work from 1 percent in 2003 to 4 percent in 2012.

Figure 8. NWAB Earnings by Place of Work (2012 \$millions)



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

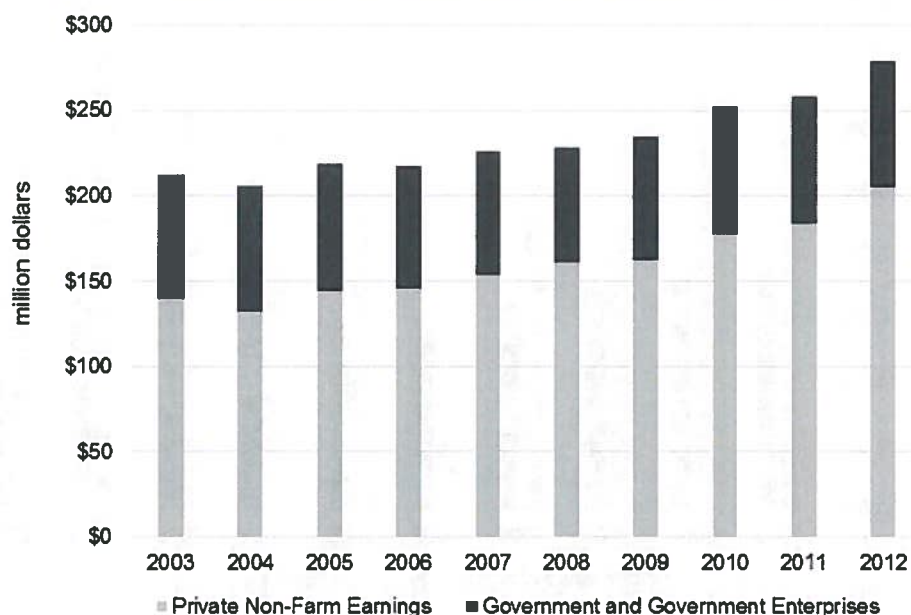
Table 5. NWAB Earnings by Place of Work (2012 \$millions)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wages and Salaries	\$157.5	\$150.4	\$159.4	\$160.4	\$167.4	\$168.5	\$173.6	\$186.6	\$189.9	\$206.5
Supplements to Wages and Salaries	52.1	52.5	56.2	53.5	55.2	52.6	52.4	55.9	58.8	61.8
Proprietors' Income	2.7	2.8	3.1	3.8	3.5	7.1	9.1	10.0	9.9	10.6

Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

An alternative way to disaggregate earnings is by industries such as private sector earnings and earnings in government and government enterprises. Private earnings totaled \$205.1 million in 2012, while earnings from government and government enterprises totaled \$73.8 million. Private sector earnings increased from 66 percent of the total in 2003 to 74 percent of the total in 2012, while government represented 34 percent of the total in 2003 and 26 percent of the total in 2012.

Figure 9. NWAB Earnings by Industry (2012 \$million)



Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

Table 6. NWAB Earnings by Industry (2012 \$million)

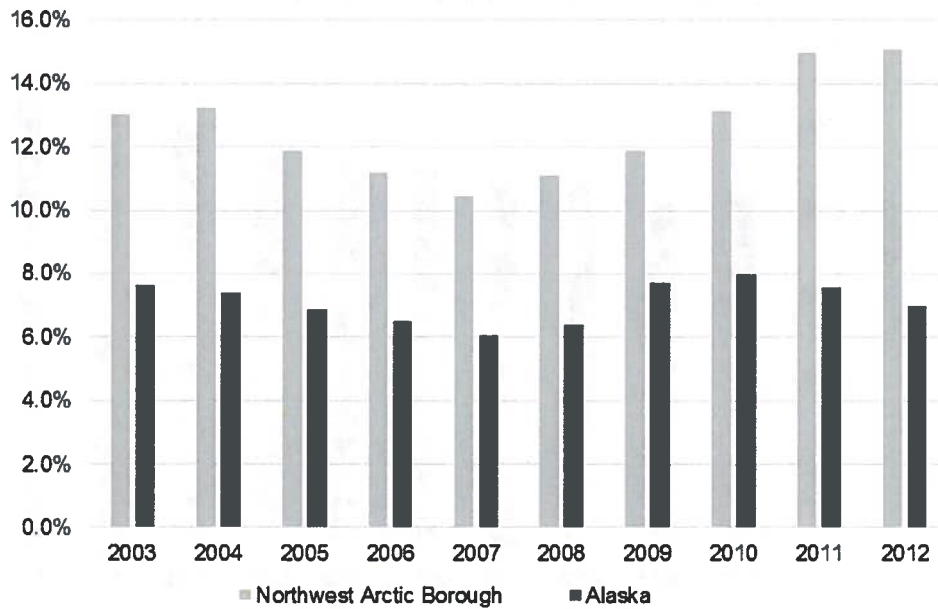
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Private Non-Farm Earnings	\$145.9	\$139.6	\$132.6	\$144.5	\$145.6	\$153.4	\$161.1	\$162.8	\$177.8	\$184.1
Government and Government Enterprises	72.7	72.7	73.1	74.2	72.0	72.7	67.1	72.3	74.6	74.4

Source: Nominal values from BEA. Inflation adjustment based on the BLS Anchorage CPI.

The unemployment rate in the NWAB averaged 15.1 percent in 2012, about double the Alaska average of 7 percent. The NWAB unemployment rate has been generally trending up over the past several years; it averaged 10.4 percent in 2007.

The NWAB unemployment rate averaged 12.6 percent between 2003 and 2012, while the statewide average was 7.1 percent over the same period. The lowest unemployment rate for NWAB over the past ten years was in 2007 (10.4 percent) and the highest occurred in 2012 (15.1 percent). These relatively high unemployment rates are common for the region. For instance, Yukon-Koyukuk Census Area had an average unemployment rate of 13.6 percent from 2003 to 2012, with a low of 11.7 percent in 2005 and a high of 15.7 percent in 2011.

Figure 10. NWAB and Alaska Unemployment Rates, Percentage, 2003 to 2012



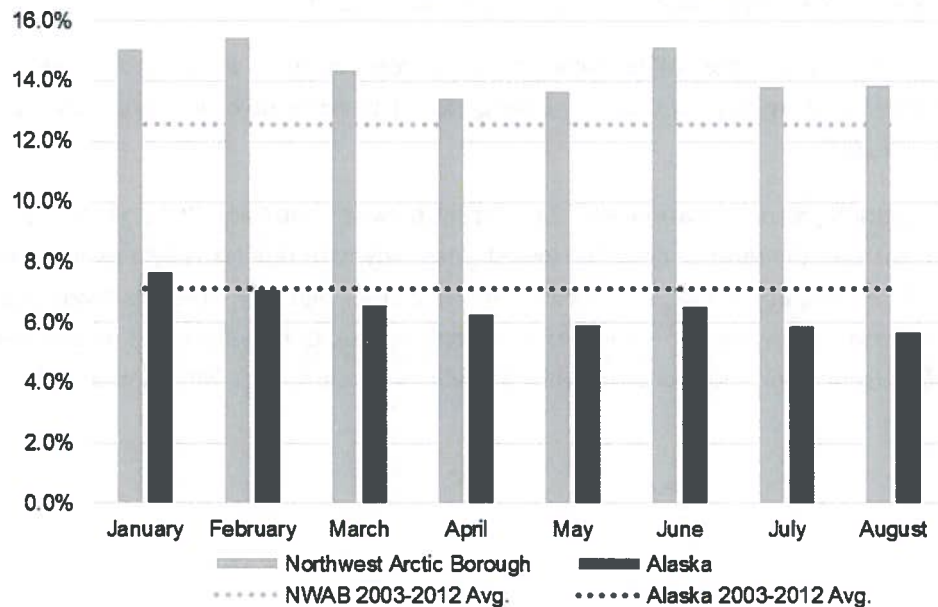
Source: DOLWD.

Table 7. NWAB and Alaska Unemployment Rate, Percentage, 2003 to 2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
NWAB	13.0%	13.2%	11.9%	11.2%	10.4%	11.1%	11.9%	13.1%	15.0%	15.1%
Alaska	7.7	7.4	6.9	6.5	6.1	6.4	7.7	8.0	7.6	7.0

Source: DOLWD.

Figure 11. Unemployment Rate, Percentage, 2013



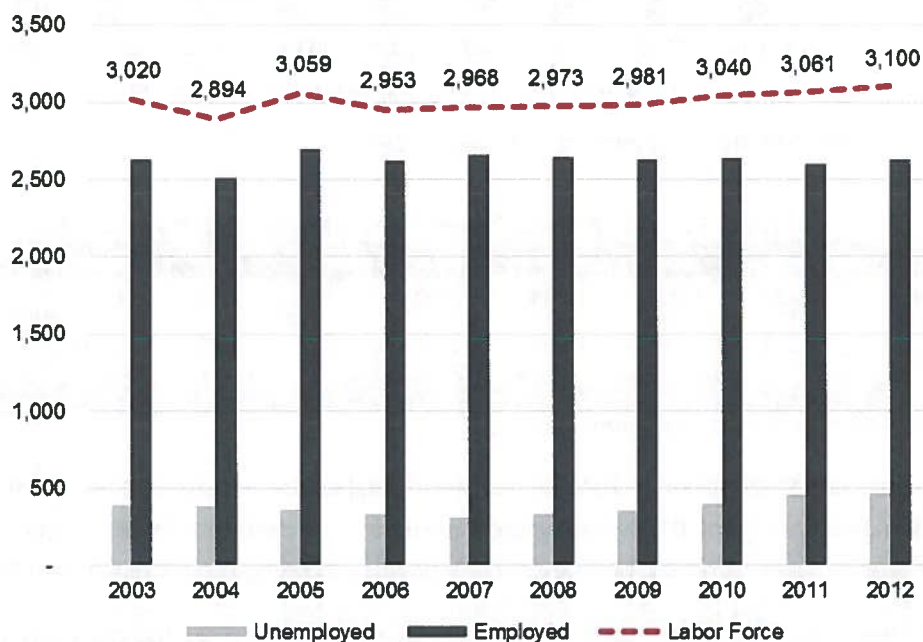
Source: DOLWD.

Table 8. NWAB and Alaska Monthly Unemployment Rates, Percentage, January-August 2013

	January	February	March	April	May	June	July	August
NWAB	15.1%	15.4%	14.4%	13.4%	13.7%	15.1%	13.8%	13.9%
Alaska	7.7	7.1	6.6	6.2	5.9	6.5	5.9	5.7

Source: DOLWD.

The NWAB labor force totaled approximately 3,100 workers in 2012. The labor force is comprised of individuals aged 16 years and older who were employed or unemployed (including those who do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work). The labor force has remained stable in NWAB from 2003 to 2012, with an annual average increase of 0.1 percent and a range of 2,894 to 3,100 individuals. However, the labor force did experience a few years of higher than average variability from 2003 to 2004 (4.2 percent decrease), 2004 to 2005 (5.7 percent increase), and 2005 to 2006 (3.5 percent decrease).

Figure 12. NWAB Labor Force, 2003 to 2012

Source: DOLWD.

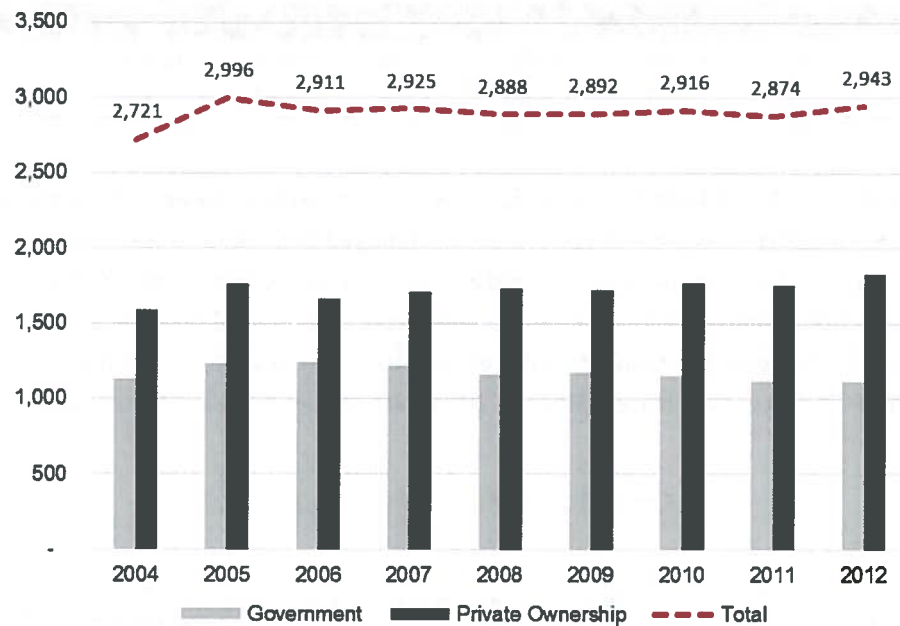
Table 9. NWAB Labor Force, 2003 to 2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Unemployed	393	383	363	330	310	330	354	399	458	467
Employed	2,627	2,511	2,696	2,623	2,658	2,643	2,627	2,641	2,603	2,633
Labor Force	3,020	2,894	3,059	2,953	2,968	2,973	2,981	3,040	3,061	3,100

Source: DOLWD.

According to DOLWD's Quarterly Census of Employment and Wages, NWAB employment averaged 2,943 in 2012, including 1,828 private sector jobs and 1,114 government sector jobs. Private sector employment in the NWAB in 2012 was about 15 percent above the 2004 level, while government employment in 2012 was 17 jobs below the 2004 mark.

Figure 13. NWAB Annual Average Employment, 2004 to 2012



Source: DOLWD quarterly census of employment and wages.

Table 10. NWAB Annual Average Employment, 2004 to 2012

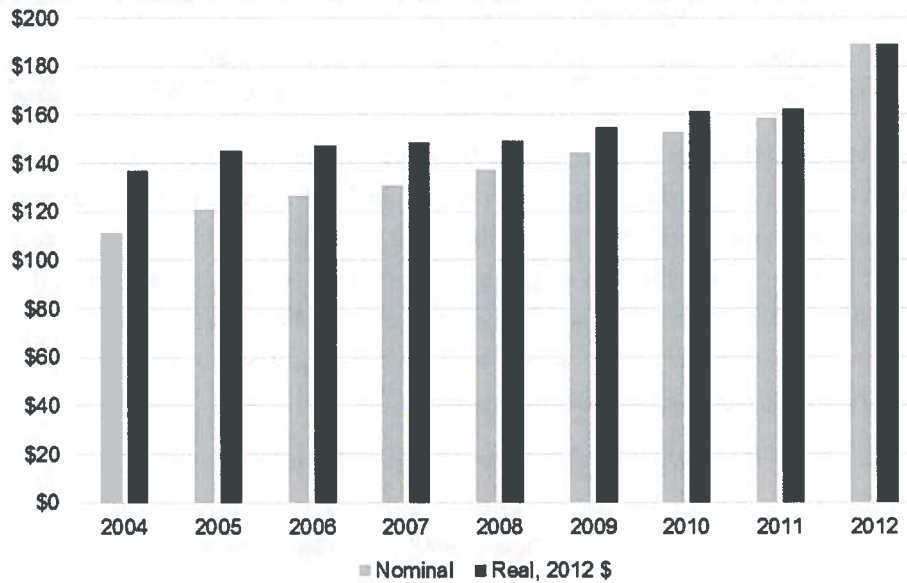
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Government	1,131	1,235	1,244	1,220	1,156	1,171	1,152	1,118	1,114
Private Ownership	1,591	1,761	1,667	1,705	1,732	1,721	1,764	1,756	1,828
Total	2,721	2,996	2,911	2,925	2,888	2,892	2,916	2,874	2,943

Source: DOLWD quarterly census of employment and wages.

NWAB wages totaled \$189 million in 2012. In real terms, total wages increased 38 percent from 2004 to 2012, with an especially big jump in 2012, when wages increased 17 percent from the 2011 total. The cause for that large single year increase is unclear, but is most likely due to increasing total wages at Red Dog.

The average monthly wage also jumped in 2012, increasing from about \$4,700 (in real terms) to \$5,385, an increase of 14 percent in a single year. The average real monthly wage in NWAB increased 28 percent between 2004 and 2012.

Figure 14. NWAB Total Nominal and Real Wages (million \$), 2004 to 2012



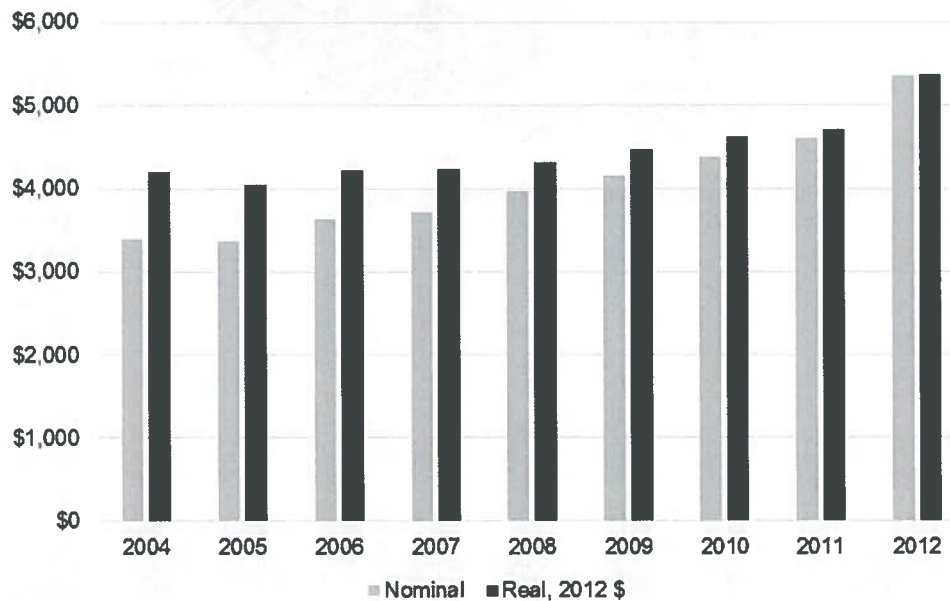
Source: DOLWD quarterly census of employment and wages. Inflation adjustment based on the BLS Anchorage CPI.

Table 11. NWAB Total Nominal and Real Wages (million \$), 2004 to 2012

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nominal	\$111	\$121	\$127	\$131	\$137	\$144	\$153	\$159	\$189
Real, 2012 \$	137	145	147	149	149	155	161	162	189

Source: DOLWD quarterly census of employment and wages. Inflation adjustment based on the BLS Anchorage CPI.

Figure 15. NWAB Average Monthly Wage, 2004 to 2012



Source: DOLWD quarterly census of employment and wages. Inflation adjustment based on the BLS Anchorage CPI.

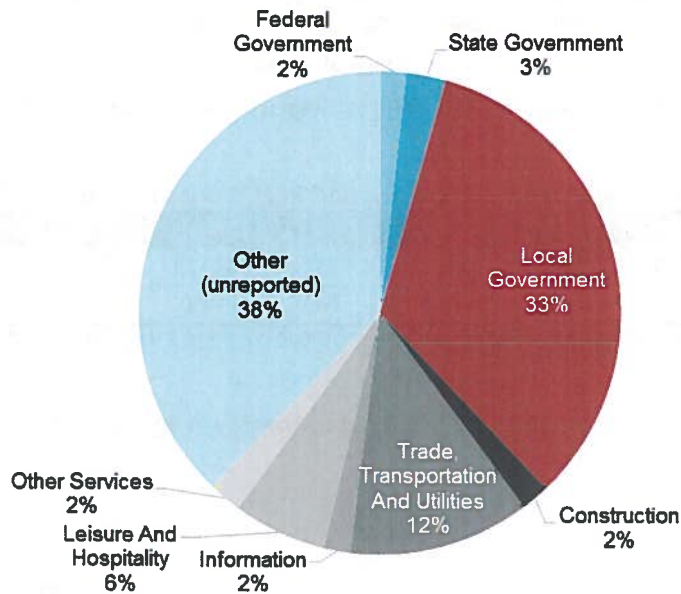
Table 12. NWAB Average Monthly Wage, 2004 to 2012

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nominal	\$3,401	\$3,372	\$3,629	\$3,724	\$3,966	\$4,158	\$4,373	\$4,602	\$5,358
Real, 2012 \$	4,201	4,042	4,214	4,231	4,310	4,465	4,614	4,705	5,358

Source: DOLWD quarterly census of employment and wages. Inflation adjustment based on the BLS Anchorage CPI.

Local government (including local government, tribal government, and school district employment) is the largest sector in terms of reported employment in NWAB. In 2012, local government accounted for an average of 985 jobs, representing 33 percent of all jobs in NWAB. Included in the unreported category are. Maniilaq Association and Red Dog Mine, the two largest employers in the borough. Data for both of these employers are not reported by DOLWD's publicly available data due to confidentiality restrictions (data for sectors with fewer than three establishments and/or where a single firm accounts for more than 80 percent of sector employment is nondisclosable, under federal regulation).

Figure 16. NWAB Annual Average Employment by Major Industry, 2012



Source: DOLWD quarterly census of employment and wages.

Table 13. NWAB Annual Average Employment by Major Sector, 2004 to 2012

Industry	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total Industries	2,721	2,996	2,911	2,925	2,888	2,892	2,916	2,874	2,943
Total Government	1,131	1,235	1,244	1,220	1,156	1,171	1,152	1,118	1,114
Federal Government	55	57	54	50	47	46	51	48	50
State Government	69	68	67	68	69	67	71	75	79
Local Government	1,007	1,111	1,123	1,102	1,040	1,058	1,030	995	985
Private Ownership	1,591	1,761	1,667	1,705	1,732	1,721	1,764	1,756	1,828
Goods-Producing	388	457	465	476	-	-	-	-	-
Natural Resources and Mining	365	405	438	421	-	-	-	-	-
Construction	23	47	26	56	63	73	62	43	56
Service-Providing	1,202	1,305	1,202	1,229	-	-	-	-	-
Trade, Transportation And Utilities	304	273	265	284	304	356	337	346	358
Information	56	58	55	48	55	55	58	52	53
Financial Activities	87	111	114	130	135	-	-	-	-
Professional And Business Services	7	8	3	3	-	-	-	17	-
Educational And Health Services	567	547	543	537	-	-	-	-	-
Leisure And Hospitality	133	264	167	169	174	179	172	176	185
Other Services	50	43	56	59	44	40	44	59	66
Unclassified Establishments	-	-	-	-	-	-	-	1	-
Manufacturing	-	5	-	-	-	-	-	-	-

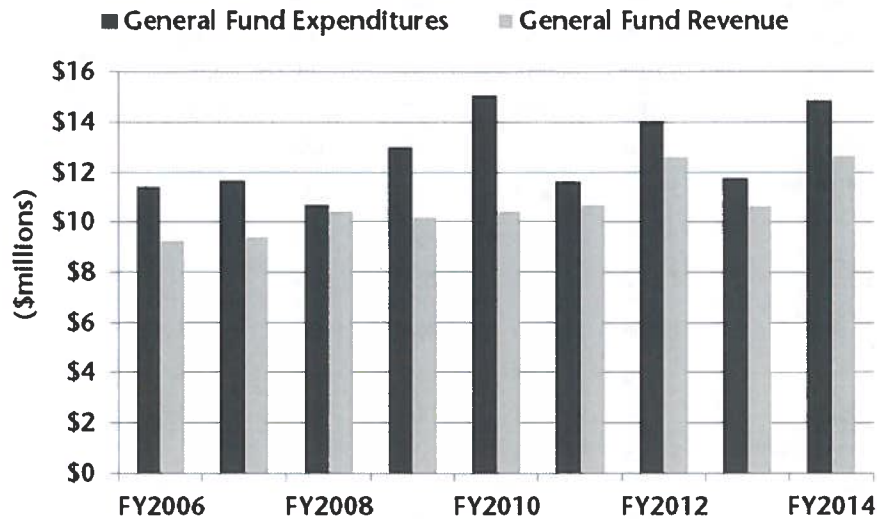
Source: DOLWD quarterly census of employment and wages.

Other NWAB Economic Indicators

NWAB GENERAL FUND REVENUES AND EXPENDITURES

According to NWAB budget documents, general funds expenditures and revenues have been trending up since FY2006. In FY2006, general fund expenditures were approved at \$11.4 million, compared to \$14.9 million in FY2014. General fund revenues were \$9.2 million in FY2006 and \$12.7 million in FY2014.

Figure 17. NWAB General Fund Expenditures and Revenues, FY2006-FY2014



Source: NWAB budget documents.

The Community Revenue Sharing (CRS) Program provides Alaska's boroughs, cities, and unincorporated communities with non-locally generated operating revenue. These funds are dispersed from the State of Alaska General Fund and communities can use the funds at their discretion for any public purpose. Over the past 15 fiscal years the program for administering general funds from the State of Alaska to communities has varied from year to year. From 2000 to 2009, revenue sharing was accomplished through the Safe Communities Program and the State Revenue Sharing Program. In 2004, the Temporary Fiscal Relief Program was used. From 2005 to 2008, the Small Municipality Energy Assistance Program served as a means to share state revenues with communities. The current CRS Program began in 2009.

After increasing steadily from 2010, State of Alaska CRS decreased sharply in FY2014. FY2013 shared revenues totaled \$1.08 million for eight study area communities. The total dropped to \$763,000 in FY2014, a 29 percent, single year decline.

Table 14. Study Area Community Revenue Sharing (nominal \$), FY2009 to FY2014

FY	Ambler	Kobuk	Shungnak	Alatna	Allakaket	Bettles	Evansville	Hughes	Huslia
2009	\$110,327	\$102,133	\$109,863	\$33,676	\$100,896	\$97,443	-	\$99,917	\$109,141
2010	109,213	101,561	109,876	33,570	100,897	97,122	-	100,132	110,131
2011	109,090	102,118	109,541	33,842	101,015	96,953	-	100,163	109,290
2012	145,102	138,009	145,367	45,341	134,960	128,795	-	133,104	146,229
2013	155,078	146,230	154,041	48,073	143,120	136,968	-	141,392	156,668
2014	108,893	102,708	108,798	33,392	101,043	96,714	-	100,139	110,987

Source: DCCED.

Local and Regional Population Trends

NWAB experienced a steady upward trend in population from 1990 to 2012—increasing by 1,603 from 6,113 to 7,716 (26 percent). Kotzebue, Red Dog Mine CDP, Selawik, and Noatak have contributed the most to this increase in population by increasing in size by 486, 309, 260, and 235 people, respectively. Red Dog Mine CDP saw the largest percent increase in population, rising from 32 people in 2000 (when it was first reported by the DOLWD) to 309 people in 2012. Only three out of 12 places listed in NWAB by DOLWD decreased in population from 1990 to 2012. Ambler decreased in population from 311 to 271 (-13 percent), Deering decreased from 157 to 142 (-10 percent), and Kiana decreased from 385 to 383 (1 percent).

Yukon Koyukok Census Area (YKCA) experienced a steady downward trend in population from 1990 to 2012—decreasing by 1,032 from 6,714 to 5,682 (18 percent). In 2012 there were 39 places listed in YKCA, according to DOLWD population estimates. The largest population in YKCA in 1990 was Galena, with 833 people, but the population has decreased by 349 people (-42 percent) to 484 people in 2012. In addition to Galena, McGrath and Tanana also experienced a decrease in population by at least 100 from 1990 to 2012—McGrath decreased by 185 from 528 to 343 (-35 percent) and Tanana decreased by 112 from 345 to 233 (-32 percent). Huslia was the only place in YKCA to increase by at least 100 people from 1990 to 2012, increasing by 108 people, from 207 to 315 (52 percent). By 2012, Fort Yukon had the largest population in YKCA with 586 people, the community has maintained a stable population since 1990, when it totaled 580 people.

Table 15. Total Population, NWAB and YKCA, 1990 to 2012

	NWAB	YKCA
1990	6,113	6,714
1995	6,591	6,390
2000	7,208	6,510
2001	7,135	6,481
2002	7,245	6,347
2003	7,303	6,290
2004	7,360	6,261
2005	7,360	6,042
2006	7,372	5,825
2007	7,421	5,721
2008	7,445	5,642
2009	7,444	5,590
2010	7,523	5,588
2011	7,634	5,662
2012	7,716	5,682

Source: DOLWD population estimates.

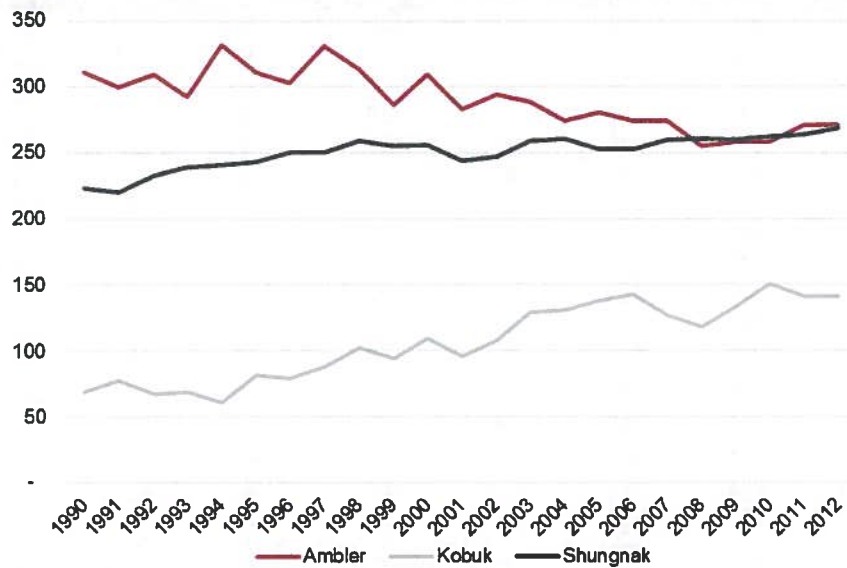
Table 16. Population Annual Rate of Change, NWAB and YKCA, 1990-1991 to 2011-2012

	NWAB	YKCA
1990-1991	1.3%	-0.6%
1991-1992	5.6	2.2
1992-1993	0.1	-1.8
1993-1994	1.0	-3.6
1994-1995	-0.3	-1.2
1995-1996	-0.7	-0.3
1996-1997	2.6	-0.2
1997-1998	1.6	0.9
1998-1999	0.8	-0.6
1999-2000	4.9	2.2
2000-2001	-1.0	-0.4
2001-2002	1.5	-2.1
2002-2003	0.8	-0.9
2003-2004	0.8	-0.5
2004-2005	0.0	-3.5
2005-2006	0.2	-3.6
2006-2007	0.7	-1.8
2007-2008	0.3	-1.4
2008-2009	0.0	-0.9
2009-2010	1.1	0.0
2010-2011	1.5	1.3
2011-2012	1.1	0.4

Source: DOLWD population estimates.

The NWAB communities of Ambler, Kobuk, and Shungnak are three of the closest communities to the Ambler Mining Region and are located near the western end of the proposed AMDIAR. Since 1990, Ambler has experienced a decline in population of 13 percent—decreasing slowly from 311 in 1990 to 271 in 2012. Shungnak, on the other hand, experienced an upward trend of 21 percent—gradually growing from 223 to 269 from 1990 to 2012. Kobuk has also experienced a steady upward trend, more than doubling over the 2-year period, from 69 in 1990 to 141 in 2012.

Figure 18. Population Trends in Ambler, Kobuk and Shungnak, 1999 to 2012



Source: DOLWD population estimates.

YKCA communities studied in this report that experienced population growth over the 1990 to 2012 period include Hughes and Huslia. Hughes grew from a population of 54 in 1990 to 87 in 2012 (up 61 percent) and Huslia's population increased from 207 to 315 (up 52 percent) over the same period. The combined population of the adjacent communities of Alatna¹, Allakaket², and New Allakaket increased from 170 to 200 between 1990 and 2012, an 18 percent increase. Neighboring communities of Bettles and Evansville have both experienced population declines. Bettles' population dropped from 36 to 15 (a 58 percent decline) and Evansville's population decreased from 33 to 5 (down 85 percent).

More detail information about these study area communities is provided in Appendix 2.

¹ Alatna was part of Allakaket City prior to the flood in September of 1994. In DOLWD's publicly available data sets Alatna's population is not included until the 2000 Census. However, there is a DOLWD publication titled [1999 Alaska Population Overview](#) (page 46) that disaggregates population data for Alatna and Allakaket from 1990 to 1999.

² Population estimates published by DOLWD include Alatna, Allakaket, and New Allakaket as "Allakaket" from 1990 to 1999. For New Allakaket prior to 2000 (though Alatna and New Allakaket populations moved outside Allakaket city boundaries following the 1994 flood).

Table 17. Population Trends in Study Area Communities, 1990 to 2012

	Ambler	Kobuk	Shungnak	Alatna	Allakaket	New Allakaket	Bettles	Evansville	Hughes	Huslia
1990	311	69	223	31	139	0	36	33	54	207
1991	300	77	220	31	140	0	28	26	51	198
1992	309	67	233	31	141	0	26	23	60	207
1993	293	69	239	31	139	0	26	23	58	219
1994	332	61	241	31	139	0	29	27	60	240
1995	311	81	243	27	119	0	31	29	61	245
1996	303	79	250	32	144	0	27	25	54	239
1997	331	88	250	33	148	0	23	21	53	232
1998	313	102	259	32	142	0	26	24	53	247
1999	286	94	255	34	152	0	26	24	61	272
2000	309	109	256	35	97	36	43	28	78	293
2001	283	96	244	37	100	39	39	28	74	282
2002	294	108	247	37	92	39	28	22	66	283
2003	289	129	259	38	97	44	28	23	62	285
2004	274	131	261	35	94	44	25	22	69	271
2005	281	138	253	35	96	46	24	24	65	262
2006	274	143	253	40	95	50	19	21	63	259
2007	274	127	260	34	96	53	21	21	71	254
2008	255	118	261	33	100	56	16	17	72	278
2009	258	133	260	25	105	63	13	16	71	267
2010	258	151	262	37	105	66	12	15	77	275
2011	271	141	264	34	104	67	14	8	78	302
2012	271	141	269	27	106	67	15	5	87	315

Source: DOLWD.

Table 18. Annual Rate of Population Change in Study Area Communities, 1990 to 2012

	Ambler	Kobuk	Shungnak	Alatna	Allakaket	New Allakaket	Bettles	Evansville	Hughes	Huslia
1990-1991	-3.5%	11.6%	-1.3%	0.0%	0.7%	N/A%	-22.2%	-21.2%	-5.6%	-4.3%
1991-1992	3.0	-13.0	5.9	0.0	0.7	N/A	-7.1	-11.5	17.6	4.5
1991-1993	-5.2	3.0	2.6	0.0	-1.4	N/A	0.0	0.0	-3.3	5.8
1991-1994	13.3	-11.6	0.8	0.0	0.0	N/A	11.5	17.4	3.4	9.6
1994-1995	-6.3	32.8	0.8	-12.9	-14.4	N/A	6.9	7.4	1.7	2.1
1995-1996	-2.6	-2.5	2.9	18.5	21.0	N/A	-12.9	-13.8	-11.5	-2.4
1996-1997	9.2	11.4	0.0	3.1	2.8	N/A	-14.8	-16.0	-1.9	-2.9
1997-1998	-5.4	15.9	3.6	-3.0	-4.1	N/A	13.0	14.3	0.0	6.5
1998-1999	-8.6	-7.8	-1.5	6.3	7.0	N/A	0.0	0.0	15.1	10.1
1999-2000	8.0	16.0	0.4	2.9	-36.2	N/A	65.4	16.7	27.9	7.7
2000-2001	-8.4	-11.9	-4.7	5.7	3.1	8.3	-9.3	0.0	-5.1	-3.8
2001-2002	3.9	12.5	1.2	0.0	-8.0	0.0	-28.2	-21.4	-10.8	0.4
2002-2003	-1.7	19.4	4.9	2.7	5.4	12.8	0.0	4.5	-6.1	0.7
2003-2004	-5.2	1.6	0.8	-7.9	-3.1	0.0	-10.7	-4.3	11.3	-4.9
2004-2005	2.6	5.3	-3.1	0.0	2.1	4.5	-4.0	9.1	-5.8	-3.3
2005-2006	-2.5	3.6	0.0	14.3	-1.0	8.7	-20.8	-12.5	-3.1	-1.1
2006-2007	0.0	-11.2	2.8	-15.0	1.1	6.0	10.5	0.0	12.7	-1.9
2007-2008	-6.9	-7.1	0.4	-2.9	4.2	5.7	-23.8	-19.0	1.4	9.4
2008-2009	1.2	12.7	-0.4	-24.2	5.0	12.5	-18.8	-5.9	-1.4	-4.0
2009-2010	0.0	13.5	0.8	48.0	0.0	4.8	-7.7	-6.3	8.5	3.0
2010-2011	5.0	-6.6	0.8	-8.1	-1.0	1.5	16.7	-46.7	1.3	9.8
2011-2012	0.0	0.0	1.9	-20.6	1.9	0.0	7.1	-37.5	11.5	4.3

Source: DOLWD.

Appendix 2: Economic and Demographic Profiles of Study Area Communities

This appendix provides descriptions of the communities located in general proximity to the proposed road corridor. Other communities in the NWAB and elsewhere in Alaska could experience economic effects associated with road and mine development in the Ambler Mining District; however, the communities described here were deemed by the study team and DCCED as most appropriate for this initial analysis.

Ambler

History

The Ambler area is the historic homeland of Kowagniat Inupiat Eskimos. The modern community of Ambler is named after Dr. James Ambler, a U.S. navy surgeon who died while on an Arctic expedition in 1881. The community was permanently settled in 1958 when residents from Shungnak and Kobuk moved upstream due in pursuit of fish and game, and to a better location in general. A post office was established in 1963, and the city was incorporated in 1971.

Geography and Governance

Located on the north bank of the Kobuk River, Ambler lies near the confluence of the Ambler and Kobuk Rivers, roughly 45 miles north of the Arctic Circle. Its neighbors include Kotzebue (138 miles west), Kobuk (30 miles upriver), and Shungnak (35 miles upriver). The ANCSA regional corporation is NANA. The tribal government for Ambler is the Native Village of Ambler.

Table 19. Ambler Overview

Distance in miles to:	
Proposed road corridor	Approx. 25 miles
Kotzebue, by air	140 miles
Nearest neighbor	Shungnak, upriver
City status	2 nd class city (incorporated 1971)
Census area	Northwest Arctic Borough
ANCSA regional corporation	NANA
ANCSA village corporation	--
Tribal government	Native Village of Ambler

LOCAL REVENUE AND EXPENSES

The City of Ambler's expenditures for FY2014 totaled \$468,000, primarily for administrative costs (33 percent) and fuel (27 percent). Revenue was budgeted at \$469,479. Ambler has a 3 percent sales tax.

Transportation and Power Infrastructure

Access to Ambler includes boat, plane, and snowmachine. There are no roads connecting the community to any other community. The state owns a 3,000-feet by 60-feet lighted gravel airstrip, with a 2,400-feet by 60-feet gravel crosswind airstrip located one and a half miles from the city. There is daily flight service to Kotzebue. Barge service for fuel and supplies is available in the summer, provided by Crowley Marine Services. Riverboats are used by residents for intra-village travel during the summer, and ATVs and snowmachines are used in the winter.

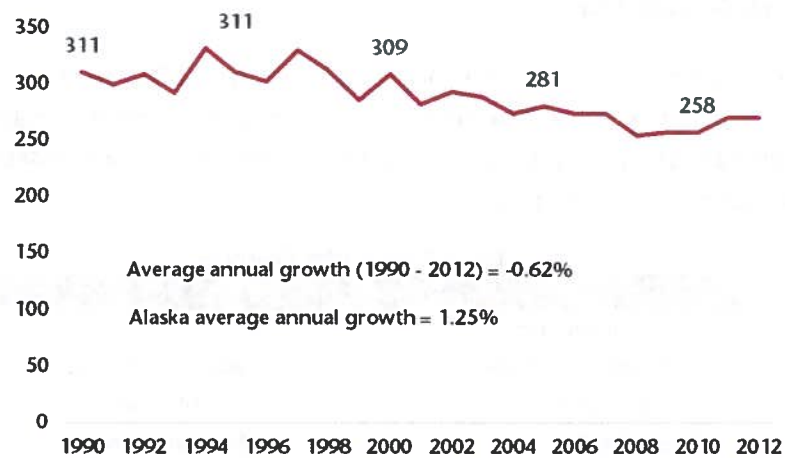
Alaska Village Electric Cooperative (AVEC) provides power to the community using diesel generators with a total capacity of 1,115 kW (annual generation of about 1,300 MWh).

Demographics

POPULATION

Ambler's population has been slowly declining since 1990, with an average annual rate of decline of -0.6 percent. While generally trending down, there was a recent uptick in population. In 2012, DOWLWD estimated the population to be 271 residents, an increase of 13 residents since 2010.

Figure 19. Population of Ambler, 1990 – 2012

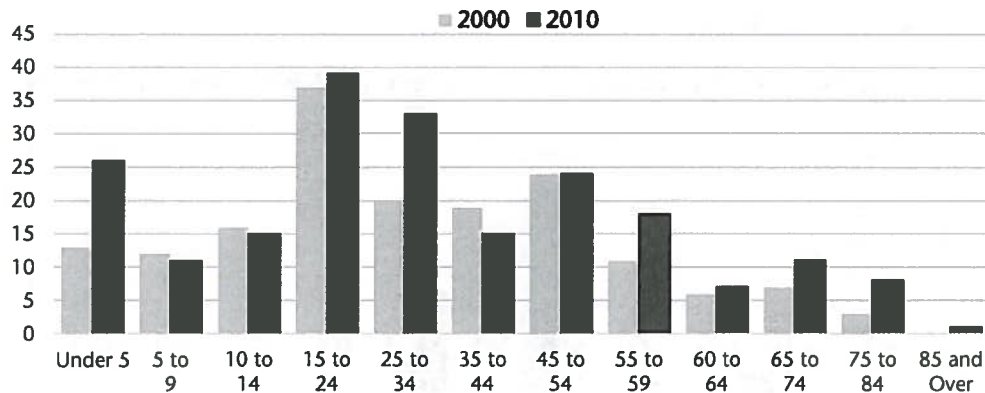


Source: DOWLWD.

AGE

In 2010, the median age in Ambler was 28.7 years, an increase from 21.8 years in 2000, but below the 2000 Alaska median age of 33.8 years.

Figure 20. Population of Ambler, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

GENDER

In 2010, there were an equal number of men and women in the community, which is similar to Alaska's gender distribution of 52 percent male and 48 percent female.

RACE

According to the 2010 U.S. Census, 84 percent of Ambler residents identify themselves as Alaska Native/American Indian, similar to 2000. Also in 2010, approximately 1 of 10 residents identify as white, also similar to 2000.

HOUSEHOLD SIZE AND FAMILY SIZE

Based on the 2010 U.S. Census, there are approximately 75 households in Ambler, with an average household size of 3.4 people and an average family size of 3.9 people.

EDUCATION

Ambler School is a pre-kindergarten through 12th grade school with 8 teachers and 67 students in 2012. Over the last five years, enrollment has been steady, with approximately 60 to 70 students enrolled each year.

Table 20. Ambler School Enrollment, by Grade Level, 2008 to 2012

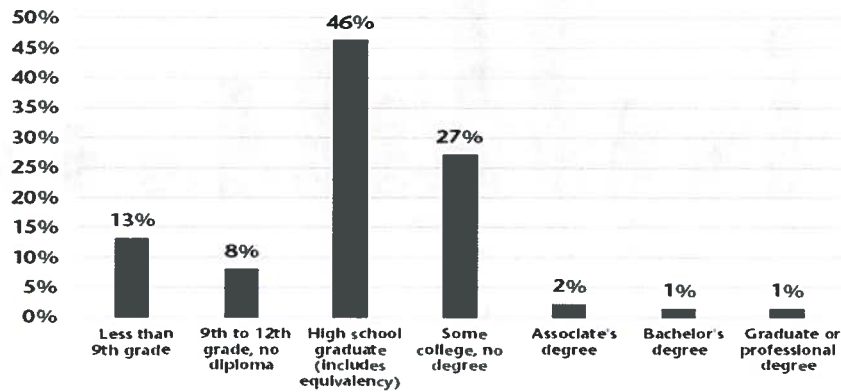
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	9	6	6	5	5	4	6	8	3	4	1	2	3	4	66
2009	5	8	6	5	4	5	3	6	7	3	1	3	2	3	61
2010	6	5	9	6	6	4	5	5	5	8	4	1	1	3	68
2011	5	5	5	9	5	4	4	6	4	6	10	1	1	2	67
2012	4	6	5	6	7	6	5	5	4	5	8	4	3	1	69

Source: Alaska Department of Education and Early Development (ADEED).

EDUCATIONAL ATTAINMENT

The ACS reports 46 percent of residents over age 25 have at least a high school graduate degree and 27 percent have some college, but no degree.

Figure 21. Ambler Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Ambler was \$14,767 (margin of error +/- \$5,004). The average household income was \$61,444 (margin of error +/- \$14,874), less than Alaska's average household income of \$84,767.

Table 21. Ambler and Alaska Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Ambler	Alaska
2000		
Per capita income	\$13,712	\$22,660
Average household income	\$43,500	\$57,171
2007-2011 Five Year Average		
Per capita income	\$14,767	\$31,944
Average household income	\$61,444	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

According to the ACS 2007-2011 Five-Year Average, one-quarter of households in Ambler have household income of less than \$25,000.

Table 22. Household Income of Ambler, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	3	5
\$10,000 to \$14,999	0	0
\$15,000 to \$24,999	14	22
\$25,000 to \$34,999	5	8
\$35,000 to \$49,999	9	14
\$50,000 to \$74,999	11	17
\$75,000 to \$99,999	7	11
\$100,000 to \$149,999	14	22
\$150,000 to \$199,999	0	0
\$200,000 or more	0	0
Total households	63	100%

Source: ACS, 2007-2011 Five-Year Average.

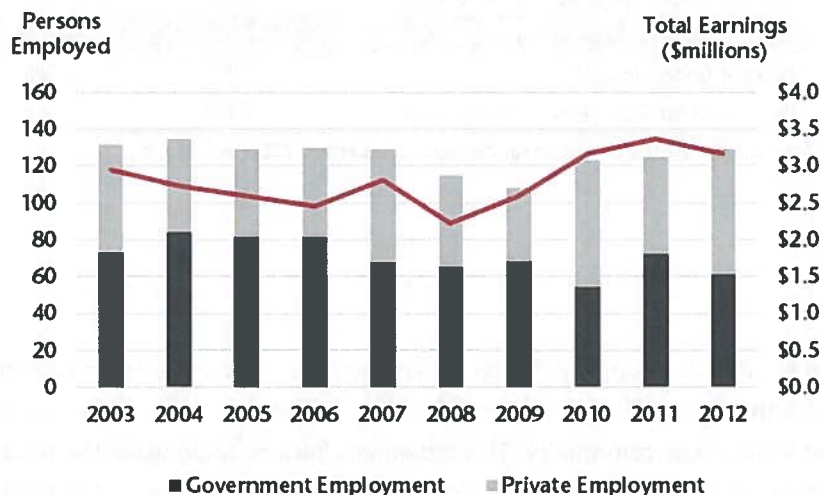
Subsistence

According to Alaska Department of Fish and Game(ADF&G), in 2009, Ambler had a per capita subsistence harvest of 272 pounds.

EMPLOYMENT

In 2012, there were 129 residents employed in Ambler, split evenly between private and government sectors. Employment has been fairly stable over the past ten years. The lowest annual employment occurred in 2009 with only 108 residents employed, with a high of 135 residents employed in 2004.

Figure 22. Ambler Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, nearly half of residents were employed in local government (47 percent), which is similar to 2001. There have been no significant shifts in employment sources with the exception of the "Other" category, which increased from 14 percent to 32 percent.

Table 23. Ambler Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local Government	62	47%	60	47%
Natural Resources and Mining	21	16	12	9
Trade, Transportation and Utilities	18	14	6	5
Educational and Health Services	14	11	10	8
Other	16	14	41	32
Total	133	100%	129	100%

Source: DOLWD.

Top Employers

The largest employers within the community are the NWAB School District (20 to 49 employees in 2010), Maniilaq Association (10 to 19 workers), City of Ambler (10 to 19), and Ambler Traditional Council (5 to 9). Data provided by NovaCopper indicates that 15 Ambler residents worked at the company's Upper Kobuk Mineral Project in 2013.

POVERTY AND UNEMPLOYMENT STATUS

For the ACS 2007-2011 Five-Year Average, 40 percent (margin of error +/-19 percent) of the Ambler labor force was unemployed, and 25 percent (margin of error +/-17 percent) of families lived below the poverty line. Both of these percentages are higher than the Alaska percentages.

Table 24. Ambler Poverty and Unemployment Percentages, 2000, 2007-2011 Five-Year Average

	Ambler	Alaska
2000		
Percent unemployed	28%	9%
Percent of families below poverty level	19%	7%
2007-2011 Five Year Average		
Percent unemployed	40%	8%
Percent of families below poverty level	25%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Kobuk

History

Though founded in 1899 as a supply point for mining activities, Kobuk lies in an area historically occupied by Inupiat Eskimos. In the 1920s, river erosion and flooding forced the majority of residents to relocate 10 miles downstream and build a new community. This settlement became Shungnak. The residents who remained at the original location renamed the community Kobuk. The city was incorporated in 1973.

Geography and Governance

The community is located on the right bank of the Kobuk River, 7 miles northeast (10 river miles) of Shungnak, and 128 air miles from Kotzebue. It is a second-class city, located in NWAB. The tribal entity is the Native Village of Kobuk, and the ANCSA regional corporation is NANA.

Table 25. Kobuk Overview

Distance in miles to:	
Proposed road corridor	Approx. 20 miles
Kotzebue, by air	128 miles
Nearest neighbor	Shungnak, downriver
City status	2 nd class city (incorporated 1973)
Census area	Northwest Arctic Borough
ANCSA regional corporation	NANA
ANCSA village corporation	--
Tribal government	--

LOCAL REVENUE AND EXPENSES

The City of Kobuk's expenditures for FY 2014 total \$419,601, primarily for fuel (48 percent) and administrative and finance (37 percent). Revenue is budgeted at \$419,569, with most revenue coming from oil and gas sales (52 percent combined) and state revenue sharing (24 percent). Kobuk does not have a sales tax.

Transportation and Power Infrastructure

Transportation to and from Kobuk is by boat, plane, and ATVs and snowmachine. There is a state-owned 4,000 feet by 75 feet lighted, gravel airstrip with regularly scheduled service. Float planes can also land on the river. Barge service is provided by Crowley Marine Services, which provides fuel and supplies when the river is ice-free. There is also an ATV and snowmachine accessible road leading to Shungnak.

Power comes from the Shungnak Plant (located in Shungnak) and is operated by AVEC. The diesel generators have a total capacity of 1,200 kW.

Demographics

POPULATION

Kobuk's population has seen steady growth since 1990, with an average annual growth rate of 3.3 percent, higher than the Alaska rate of 1.3 percent. In 2012, Kobuk's population was estimated to be 141 residents, a decrease of 10 residents since 2010, but the same level as 2011.

Figure 23. Population of Kobuk, 1990 – 2012

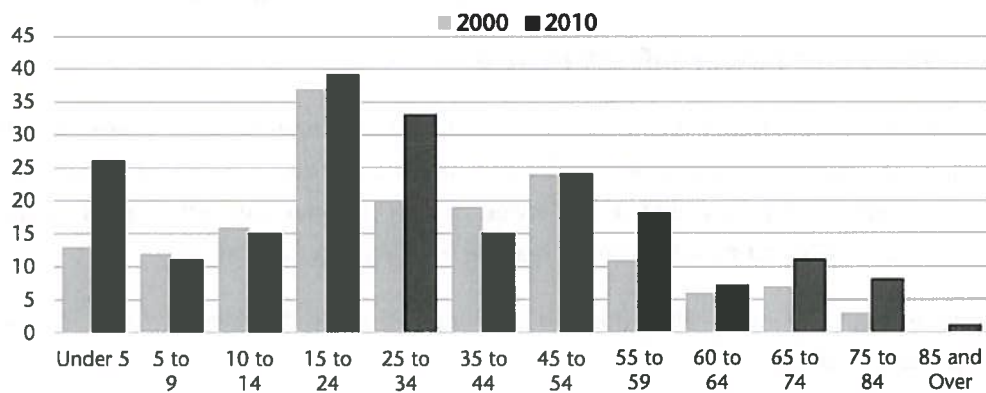


Source: DOLWD.

AGE

In 2010, Kobuk's median age was 20.6 years, which is more than 13 years below the Alaska median age, but an increase of over 3 years since 2000.

Figure 24. Population of Kobuk, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

GENDER

In 2010, there were an equal number of men and women in the community, which is similar to the statewide gender distribution of 52 percent male and 48 percent female.

RACE

In the 2010 U.S. Census, 90 percent of Kobuk residents identify as Alaska Native/American Indian, and 8 percent identified as white. This is similar to 2000, when 94 percent identified as Alaska Native/American Indian and 5 percent identified as white.

HOUSEHOLD SIZE AND FAMILY SIZE

For the 2010 U.S. Census, there were 36 households in the community, with an average household size of 4.2 people, and an average family size of 4.7 people.

EDUCATION

The Kobuk School provides services to children pre-kindergarten through 12th grade. In 2012, there were six teachers and 43 students. Enrollment has been increasing over the last five years, with 37 students enrolled in 2008-2009 school year and 45 students enrolled in the 2012-2013 school year.

Table 26. Kobuk School Enrollment, by Grade Level, 2008 to 2012

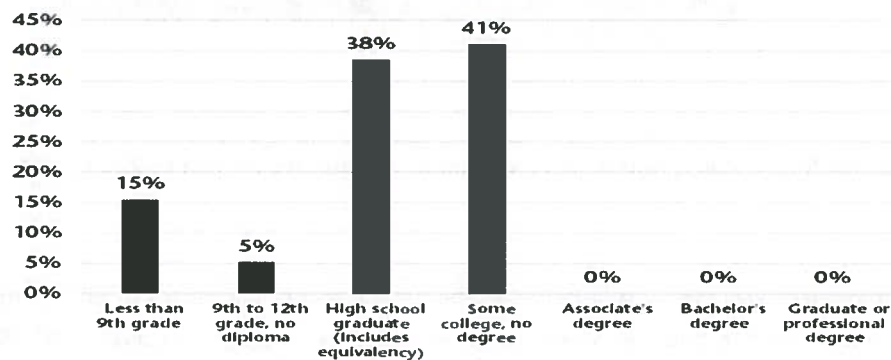
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	2	5	2	4	4	2	3	3	4	2	1	1	3	1	37
2009	4	1	5	2	4	5	3	4	4	6	3	1	2	2	46
2010	2	4	1	6	2	4	4	3	4	3	2	3	1	0	39
2011	6	3	4	1	5	2	4	3	2	3	4	2	4	0	43
2012	4	4	3	5	1	6	3	4	4	1	2	3	3	2	45

Source: ADEED.

EDUCATIONAL ATTAINMENT

According to the ACS 2007-2011 Five-Year Average, 38 percent of residents over the age of 25 have at least a high school education, and 41 percent have some college, but no degree.

Figure 25. Kobuk Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Kobuk was \$11,184 (margin of error +/- \$8,037), approximately one-fifth of Alaska's 2012 per capita income of \$49,436. During that same time period, the average household income was \$49,517 (margin of error +/- \$29,227), 58 percent of Alaska's average household income of \$84,767.

Table 27. Kobuk and Alaska Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Kobuk	Alaska
2000		
Per capita income	\$9,844	\$22,660
Average household income	\$30,750	\$57,171
2007-2011 Five Year Average		
Per capita income	\$11,184	\$31,944
Average household income	\$49,517	\$84,767

Source: ACS, 2007-2011 Five-Year Average, U.S. Census 2000, and BEA.

According to the ACS 2007-2011 Five-Year Average, one-third of households in Kobuk have household income of less than \$25,000.

Table 28. Household Income of Kobuk, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	2	8%
\$10,000 to \$14,999	2	8%
\$15,000 to \$24,999	4	17%
\$25,000 to \$34,999	6	25%
\$35,000 to \$49,999	2	8%
\$50,000 to \$74,999	2	8%
\$75,000 to \$99,999	2	8%
\$100,000 to \$149,999	4	17%
\$150,000 to \$199,999	0	0%
\$200,000 or more	0	0%
Total households	24	100%

Source: ACS, 2007-2011 Five-Year Average.

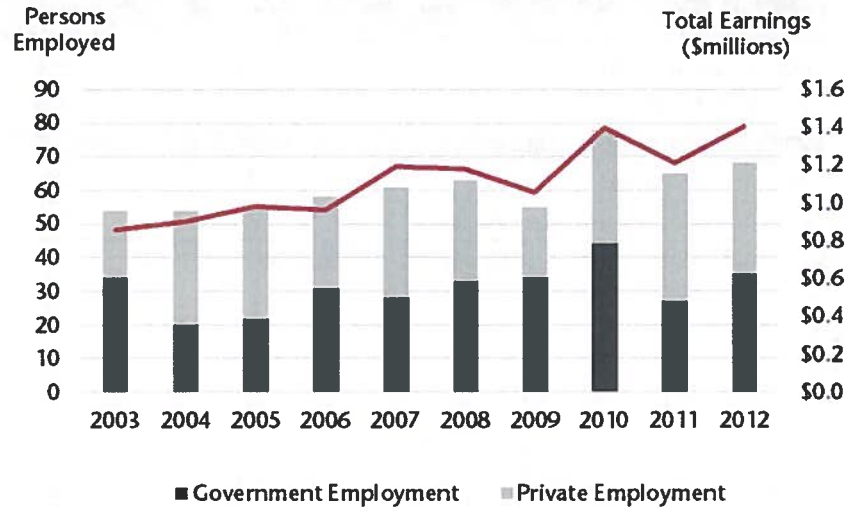
Subsistence

According to ADF&G, in 2009, Kobuk had a per capita subsistence harvest of 220 pounds.

EMPLOYMENT

Resident employment was evenly split between the private and public sector in 2012. Employment has been slowly increasing over the past ten years, from 54 residents employed in 2003 and 2004 to 68 residents employed in 2012, and a high of 78 residents employed in 2010.

Figure 26. Kobuk Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, half of residents were employed in local government (50 percent), a decrease since 2001 when 65 percent of residents were employed in local government.

Table 29. Kobuk Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local Government	28	65%	34	50%
Financial Activities	5	12	0	0
Trade, Transportation and Utilities	4	9	6	9
Natural Resources and Mining	2	5	8	12
Other	4	9	20	29
Total	43	100%	68	100%

Source: DOLWD.

Top Employers

The largest employers in Kobuk include the NWAB School District (10 to 19 employees in 2010), Maniilaq Association (5 to 9 workers), and City of Kobuk (5 to 9). In 2013, seven Kobuk residents were employed in the NovaCopper's Upper Kobuk Mineral Projects.

POVERTY AND UNEMPLOYMENT STATUS

Kobuk had 15 percent (margin of error +/-19 percent) of its labor force unemployed, and 0 percent (margin of error +/-61 percent) of its families living below the poverty line. The former percentage is twice the percentage of Alaska's 2007-2011 Five-Year Average unemployment rate, while the latter is lower than Alaska's percentage of 7 percent (margin of error +/-0.4 percent) of families living below the poverty line.

**Table 30. Kobuk Poverty and Unemployment Percentages,
2000, 2007-2007 Five-Year Average**

	Kobuk	Alaska
2000		
Percent unemployed	na	9%
Percent of families below poverty level	32%	7%
2007-2011 Five Year Average		
Percent unemployed	15%	8%
Percent of families below poverty level	0%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Shungnak

History

The history of Shungnak and Kobuk are tied together. As previously mentioned, Kobuk was founded in 1899 as a supply point for mining activities, though the community lies in an area historically occupied by Inupiat Eskimos. In the 1920s, river erosion and flooding forced the majority of residents to relocate 10 miles downstream and build a new community. This settlement became Shungnak. The city was incorporated in 1967.

Geography and Governance

The community is located on the west bank of the Kobuk River, 10 miles downriver from Kobuk and 150 air miles from Kotzebue. It is a second-class city, located in the NWAB. The local tribal entity is the Native Village of Shungnak, and the ANCSA regional corporation is NANA.

Table 31. Shungnak Overview

Distance in miles to:	
Proposed road corridor	30 miles
Kotzebue, by air	150 miles
Nearest neighbor	Kobuk, upriver
City status	2 nd class city (incorporated in 1967)
Census area	Northwest Arctic Borough
ANCSA regional corporation	NANA
ANCSA village corporation	--
Tribal government	Native Village of Shungnak

LOCAL REVENUE AND EXPENSES

The City of Shungnak's expenditures for FY 2013 (no FY 2014 documents were available) totaled \$422,646, primarily for administrative costs and water and sewer expenses. Revenue is budgeted at \$422,646, with most revenue coming from revenue sharing. Shungnak has a 2 percent sales tax.

Transportation and Power Infrastructure

Shungnak is accessible by boat, plane, ATV, and snowmachine. There is a state-owned 4,000-feet by 60-feet lighted, gravel airstrip with regularly scheduled service. Barge service is provided by Crowley Marine Services, which provide fuel and supplies when the river is ice-free. There is also a road accessible by ATV and snowmachine leading to Kobuk.

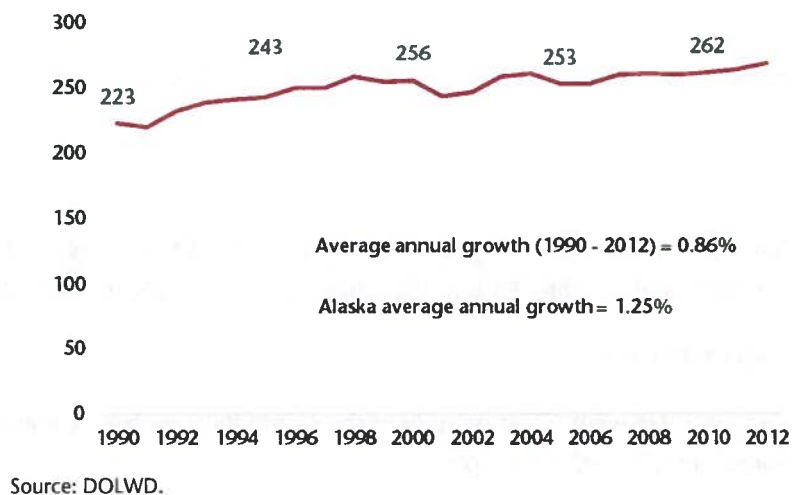
Power comes from the Shungnak Plant and is operated by AVEC. The diesel generators have a total capacity of 1,200 kW.

Demographics

POPULATION

Shungnak's population has been increasing at an average annual growth of 0.8 percent since 1990, with a 2012 estimated population of 269 residents.

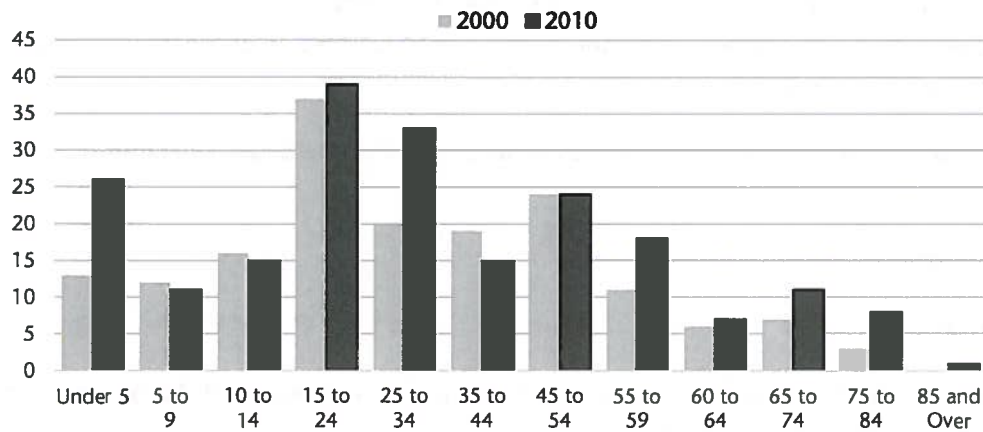
Figure 27. Population of Shungnak, 1990-2012



AGE

In 2010, Shungnak's median age was 23 years, well below Alaska's 2010 median age of 33.8 years, but an increase of over 4 years since 2000.

Figure 28. Population of Shungnak, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

GENDER

In 2010, there were an equal number of men and women in the community, which is similar to statewide gender distribution.

RACE

In the 2010 U.S. Census, 94 percent of Shungnak's residents identified themselves as Alaska Native/American Indian, and 5 percent identified as white. Both of these have remained the same since 2000.

HOUSEHOLD SIZE AND FAMILY SIZE

For the 2010 U.S. Census, there were 62 households in the community, with an average household size of 4.2 people, and an average family size of 4.7 people.

EDUCATION

The Shungnak School is for children pre-kindergarten through 12th grade school. In 2012, there were 8 teachers and 89 students. There were 45 students enrolled in the 2012-2013 school year.

Table 32. Shungnak School Enrollment, by Grade Level, 2008 to 2012

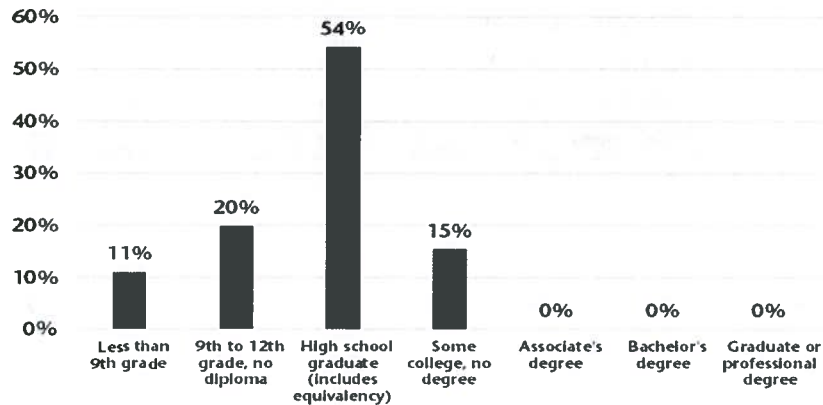
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	2	4	4	4	7	8	7	1	6	6	5	4	6	11	75
2009	7	10	3	6	4	7	9	8	1	5	2	4	4	6	76
2010	9	7	8	2	6	4	7	9	6	2	5	2	3	3	73
2011	12	9	7	10	2	6	4	8	9	7	5	5	3	2	89
2012	7	11	8	7	10	2	5	4	6	9	6	1	4	3	83

Source: ADEED.

EDUCATIONAL ATTAINMENT

According to the ACS 2007-2011 Five-Year average, over half of residents over the age of 25 have at least a high school degree, and 15 percent have some college, but no degree. Approximately one-third of residents do not have a high school degree.

Figure 29. Shungnak Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

Based on the ACS 2007-2011 Five-Year Average, per capita income for Shungnak was \$10,261 (margin of error +/- \$2,320). During that same time period, the average household income was \$51,684 (margin of error +/- \$10,513), 39 percent less than Alaska's average household income of \$84,767 (margin of error +/- \$1,067).

Table 33. Shungnak and Alaska Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Shungnak	Alaska
2000		
Per capita income	\$10,377	\$22,660
Average household income	\$44,375	\$57,171
2007-2011 Five Year Average		
Per capita income	\$10,261	\$31,944
Average household income	\$51,684	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

According to the ACS 2007-2011 Five-Year Average, 16 percent of households in Shungnak have household income of less than \$25,000.

Table 34. Household Income of Shungnak, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	5	6%
\$10,000 to \$14,999	4	5
\$15,000 to \$24,999	4	5
\$25,000 to \$34,999	2	3
\$35,000 to \$49,999	31	40
\$50,000 to \$74,999	22	29
\$75,000 to \$99,999	3	4
\$100,000 to \$149,999	2	3
\$150,000 to \$199,999	4	5
\$200,000 or more	0	0
Total households	77	100%

Source: ACS, 2007-2011 Five-Year Average.

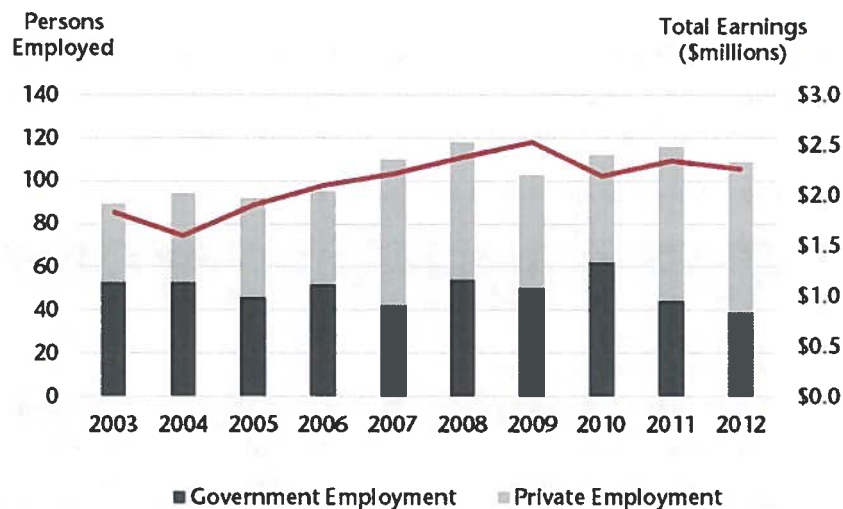
Subsistence

According to ADF&G, in 2008, Shungnak had a per capita subsistence harvest of 610 pounds.

EMPLOYMENT

According to DOLWD, there were 109 residents employed in 2012. Roughly one-third of these residents were employed in government. Employment has increased since 2003 when there were 89 residents employed.

Figure 30. Shungnak Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, 36 percent of residents were employed in the local government, a decrease since 2001 when 42 percent of residents were employed in the local government.

Table 35. Shungnak Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local Government	38	42%	39	36%
Financial Activities	17	19	2	2
Trade, Transportation and Utilities	11	12	7	6
Natural Resources and Mining	11	12	2	2
Other	13	14	59	54
Total	90	100%	109	100%

Source: DOLWD.

Top Employers

The largest employers in Shungnak are the NWAB School District (20 to 49 employees in 2010), Maniilaq Association (10 to 19 workers), Native Village of Shungnak (10 to 19), Shungnak City Council (10 to 19), and Shungnak Store (5 to 9). According to NovaCopper data, 22 Shungnak residents were employed on the UKMP in 2013.

POVERTY AND UNEMPLOYMENT STATUS

From the ACS 2007-2011 Five-Year Average, Shungnak had 38 percent (margin of error +/-16 percent) of its civilian population unemployed, and 28 percent (margin of error +/-15 percent) of its families living below the poverty line. Both of these percentages are significantly higher than the Alaska percentages.

Table 36. Shungnak Poverty and Unemployment Percentages, 2000, 2007-2011 Five-Year Average

	Shungnak	Alaska
2000		
Percent unemployed	28%	9%
Percent of families below poverty level	22%	7%
2007-2011 Five Year Average		
Percent unemployed	38%	8%
Percent of families below poverty level	28%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Bettles and Evansville

History

The area that now includes Bettles and Evansville is the historic homeland of Koyukon Athabascans and Kobuk, Selawik, and Nunamiut Eskimos from the north and northwest. Evansville was named for Wilford Evans, Sr., who owned a trading post and river barge business in Allakaket. Evans opened a sawmill at the community's current location, and he built the Bettles Lodge and General Store, thus helping establish the current community of Evansville.

Bettles current location was not always the location of the community. What is now known as “Old Bettles” was named after Gordon Bettles, who owned a trading post during the 1899 gold rush. In 1945, the U.S. Navy built Bettles Runway, roughly six miles away from Old Bettles location, and, in 1948, this establishment became Bettles Field when the FAA took over maintenance and established a communications installation. In 1950 a post office opened, and in 1956 a school opened. The city of Bettles was incorporated in 1985.

Geography and Governance

Both Bettles and Evansville are located roughly 180 air miles and 250 road miles northwest of Fairbanks. Bettles lies just north of the Kanuti National Wildlife Refuge, and is located on the southeast bank of the Koyukuk River. Evansville is located adjacent to Bettles.

Bettles is a Second-Class City, and Evansville is unincorporated. Both communities lie in the YKCA. Evansville, Inc. is the ANCSA village corporation for Evansville, while Bettles does not have an ANCSA village corporation. Doyon, Limited is the ANCSA regional corporation for both communities.

Table 37. Bettles and Evansville Overview

Distance in miles to:	
Proposed road corridor	Adjacent
Fairbanks, by air	180 miles
Nearest neighbor	Alatna and Allakaket, downriver
Bettles city status	2 nd Class City (incorporated 1985)
Evansville city status	Unincorporated
Census area	Yukon-Koyukuk
ANCSA regional corporation	Doyon, Limited
ANCSA village corporation	Evansville, Inc. (Evansville only)
Tribal government	Evansville Village

LOCAL REVENUE AND EXPENSES

City of Bettles expenditures for FY2014 are budgeted at \$151,254, mainly for roads (46 percent) and administration and finance (28 percent). Revenue is budgeted at \$247,690, with the majority coming from revenue sharing (56 percent). Bettles has a 2 percent fuel transfer tax that generated \$3,592 in 2012. There are no available financial documents for Evansville.

Transportation and Power Infrastructure

During the winter months, the Hickel Trail/Bettles Winter Road, a 30-mile winter road, gives residents of both communities access to the Dalton Highway, and to Fairbanks. During the summer months, the Koyukuk River is used for transportation by boat, but no barge service is available due to shallow waters. Bettles has a state-owned airport with a gravel runway 5,190 feet by 150 feet. It is classified as a transport center, and has a flight service station, manned FAA contract weather station, and float pond. Trucks, cars, snowmachines, and ATVs are used for local transportation.

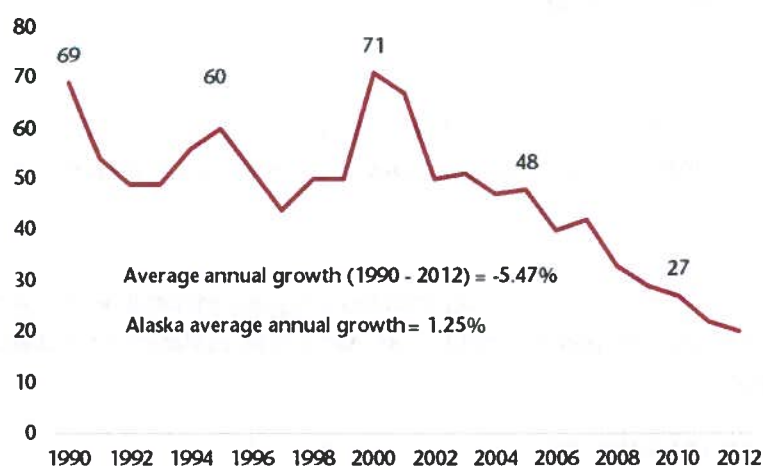
Power is provided for both communities by the Evansville-Bettles Power Plant, operated by Alaska Power and Telephone, which provides power by diesel generator. Annual fuel consumption in 2011 was 58,000 gallons at a cost of \$4.24 per gallon.³

Demographics

POPULATION

In 2012, DOWLD estimated the combined population of both communities to be 20 residents, with Bettles having an estimated 15 residents and Evansville an estimated 5 residents. Population has been declining since 1990, with an annual average rate of -5.5 percent.

Figure 31. Population of Bettles and Evansville, 1990 – 2012



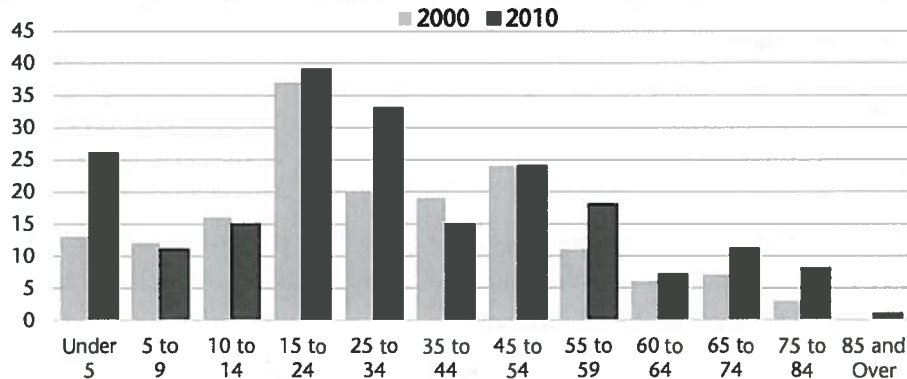
Source: DOLWD.

AGE

In 2010, residents had a median age of 53.3 years, a large increase in median age compared to 34.1 years in 2000. For comparison, the Alaska median age for 2010 was 33.8 years (and 32.4 years in 2000).

³ <http://irha.dsys.ca/powerplant/evansville-bettles-powerplant>

Figure 32. Population for Bettles and Evansville, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

GENDER

In 2010, there were more men than women in the communities, with 59 percent of the population male and 41 percent female. In 2010, Alaska's population was 52 percent male and 48 percent female.

RACE

According to the 2010 U.S. Census, the communities are predominantly white, with 59 percent identifying themselves as white and 29 percent identify as Alaska Native/American Indian. These percentages are comparable to 2000.

HOUSEHOLD SIZE AND FAMILY SIZE

Based on the 2010 U.S. Census, there are approximately 21 households between the two communities. There were 12 households in Evansville, with an average household size of 1.3 people and average family size of 2.5 people. In Bettles, there were 9 households, with an average household size of 1.3 people and average family size of 2.0 people.

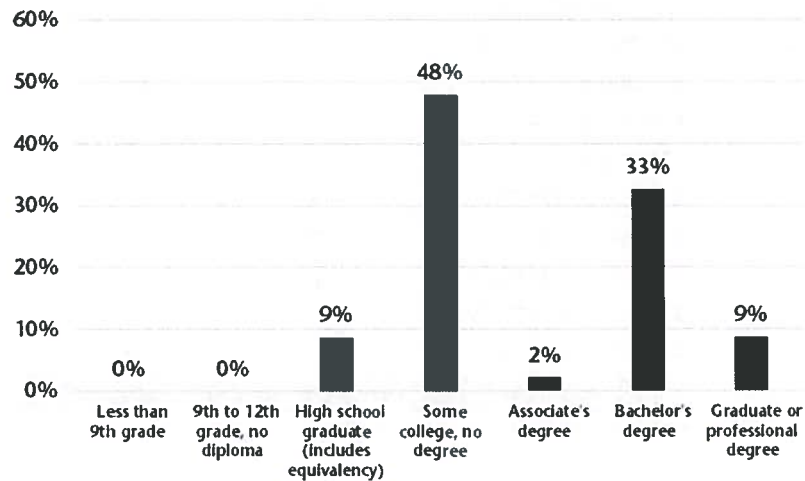
EDUCATION

As of 2013, there is no school in either community. The school in Evansville closed for the 2002-2003 school year due to low enrollment and has not reopened.

EDUCATIONAL ATTAINMENT

The ACS 2007-2011 Five-Year Average reports 48 percent of residents over age 25 have at least some college, but no degree, and 33 have at least a bachelor's degree.

Figure 33. Bettles and Evansville Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Bettles was \$47,560 (margin of error +/- \$7,938) and Evansville was \$53,057 (margin of error +/- \$23,864). The average household income from the 2007-2011 Five-Year Average for Bettles was \$106,189 (margin of error +/- \$45,287) and Evansville was \$64,000 (margin of error +/- \$27,854).

Table 38. Bettles and Evansville Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Bettles	Evansville	Alaska
2000			
Per capita income	\$19,585	\$15,746	\$22,660
Average household income	\$49,375	\$53,750	\$57,171
2007-2011 Five Year Average			
Per capita income	\$47,560	\$53,057	\$31,944
Average household income	\$106,189	\$64,000	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Based on ACS data, about one in ten households in Bettles and Evansville have household income of less than \$25,000.

Table 39. Household Income of Bettles and Evansville, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	0	0%
\$10,000 to \$14,999	0	0
\$15,000 to \$24,999	3	12
\$25,000 to \$34,999	5	19
\$35,000 to \$49,999	0	0
\$50,000 to \$74,999	3	12
\$75,000 to \$99,999	7	27
\$100,000 to \$149,999	8	31
\$150,000 to \$199,999	0	0
\$200,000 or more	0	0
Total households	26	100%

Source: ACS, 2007-2011 Five-Year Average.

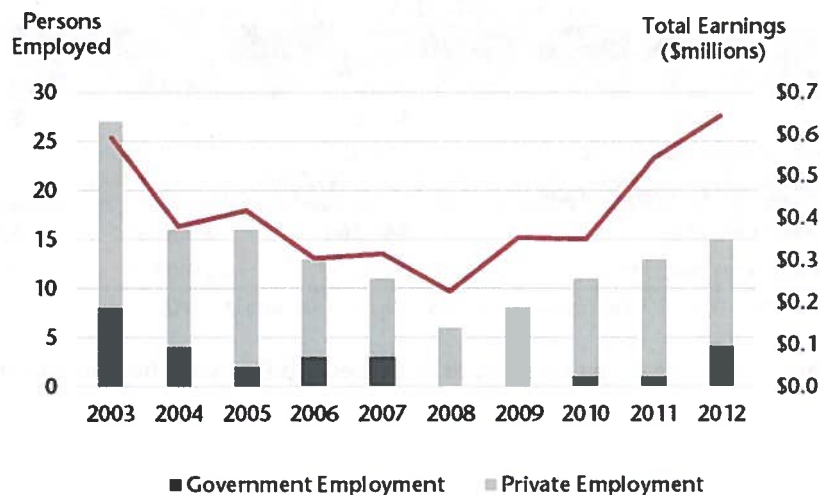
Subsistence

According to ADF&G, in 2011, Bettles had a subsistence harvest per capita of 175 pounds, and Evansville had a harvest of 53 pounds per capita.

EMPLOYMENT

The total number of Bettles and Evansville residents employed has ranged from a low of 6 in 2008 to a high of 27 in 2003. There were 15 people employed in 2012, with a quarter of them employed in the government sector.

Figure 34. Bettles and Evansville Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, most residents were employed in professional and business services (20 percent), followed by local government (16 percent), and leisure and hospitality and other (both 12 percent).

Table 40. Bettles and Evansville Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Professional and Business Services	7	28%	5	20%
Local Government	7	28	4	16
Leisure and Hospitality	7	28	3	12
Construction	2	8	0	0
Other	2	8	3	12
Total	25	100%	15	100%

Source: DOLWD.

Top Employers

While specific current data is not available, the largest employers within the community are believed to be Bettles Lodge (10 to 19 employees as of 2010) and Evansville Village Council (5 to 9). The City of Bettles and the post office also account for a few jobs in the area.

POVERTY AND UNEMPLOYMENT STATUS

Due to small populations, the data for Bettles and Evansville for the 2000 Census and the ACS 2007-2011 Five-Year Average is generally lacking.

Table 41. Bettles and Evansville Poverty and Unemployment Percentages, 2000, 2007-2011 Five-Year Average

	Bettles	Evansville	Alaska
2000			
Percent unemployed	-%	-%	9%
Percent of families below poverty level	10%	-%	7%
2007-2011 Five Year Average			
Percent unemployed	0%	0%	8%
Percent of families below poverty level	0%	0%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Alatna and Allakaket

History

A traditional trading location between Koyukon Athabascans and Kobuk, Selawik, and Nunamiut Eskimos, the first post office opened in Alatna in 1925. In 1938, the name of the community was changed to Allakaket, and the traditional Eskimo community across the river assumed the name Alatna. In 1975 the communities of Allakaket and Alatna were incorporated as the City of Allakaket. In September 1994 a flood destroyed most of the community with water levels exceeding 10 feet in depth.⁴ With financial assistance from the federal government, residents rebuilt on higher ground, but some of the homes and establishments of Alatna and New Allakaket are no longer within the incorporated city boundaries.

⁴Flooding in the Middle Koyukuk River Basin, Alaska, August 1994. U.S. Geological Survey (1995).

Geography and Governance

Alatna and Allakaket are neighboring communities at the junction of the Koyukuk River and Alatna River. Allakaket is located on the south bank of the Koyukuk River and Alatna is located opposite on the west bank. Allakaket is a Second-Class City, while Alatna is unincorporated. All three communities lie within the YKCA. K'oyitl'ots'ina, Limited is the ANCSA village corporation for Alatna, Allakaket, Hughes, and Huslia. Doyon, Limited is the ANCSA regional corporation for both communities.

Table 42. Alatna and Allakaket Overview

Distance in miles to:	
Proposed road corridor	Approximately 50 miles
Fairbanks, by air	190 miles
Nearest neighbor	Hughes, downriver Evansville and Bettles, upriver
Allakaket city status	2 nd Class City (incorporated 1975)
Alatna city status	Unincorporated
New Allakaket city status	Unincorporated
Census area	Yukon-Koyukuk
ANCSA regional corporation	Doyon, Limited
ANCSA village corporation	K'oyitl'ots'ina, Limited
Tribal government	Alatna Village, Allakaket Village

LOCAL REVENUE AND EXPENSES

City of Allakaket expenditures for 2014 are budgeted at \$447,360, primarily for supplies (68 percent, mainly related to fuel purchases) and personal services (17 percent). Revenue is budgeted at \$542,108, primarily from fuel sales (66 percent), community revenue sharing (19 percent), and PILT (8 percent).

Transportation and Power Infrastructure

Access to the communities is by plane, boat, ATV, and snowmachine. The Allakaket airport is a state-owned 4,000-feet by 100-feet gravel runway. Winter trails, both on the river and off, allow intra-village travel by snowmachine. The river is also used for transportation during the summer by boat, but there is no barge service due to shallow water levels. All cargo, including fuel, is delivered by aircraft, with a monthly delivery of 5,000 gallons of fuel.

Electric power infrastructure includes a diesel generator with 525 kW capacity (annual generation of about 700 MWh). Alaska Power and Telephone's Allakaket Power Plant provides power for Allakaket and Alatna. Annual fuel consumption in 2011 was 111,000 gallons at a cost of \$5.93 per gallon.⁵

⁵ <http://irha.dsys.ca/powerplant/allakaket-powerplant>

Demographics

POPULATION

According to DOLWD, the 2012 estimated combined population of Allakaket, New Allakaket, and Alatna was 200 residents. Allakaket's population has remained relatively stable over the last twenty years, and in 2012, had an estimated 106 residents. Also in 2012, Alatna had a population of 27, and New Allakaket had a population of 67. There was a marked decline in population among the communities in 1995, likely due to the 1994 flood. Since then, growth across the combined communities has been slow, with an average increase of just under 1 percent per year, slightly lower than Alaska's average annual growth rate of 1.3 percent.

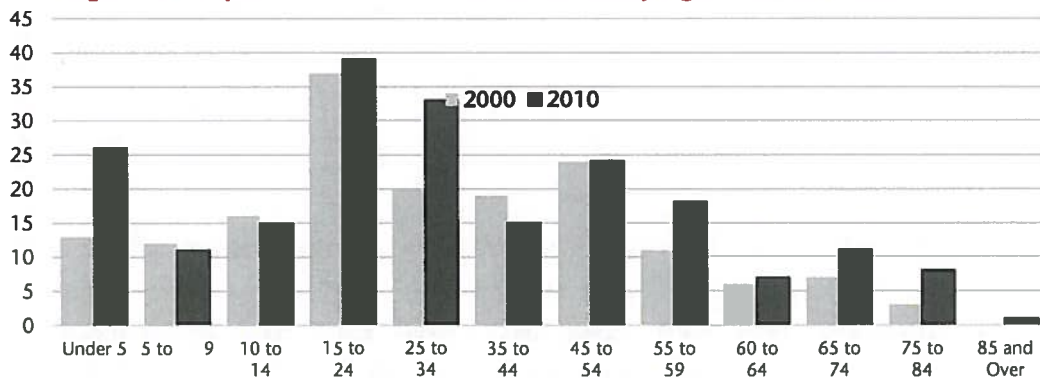
Figure 35. Population of Alatna and Allakaket, 1990 – 2012



AGE

In 2010, the communities' residents were relatively young, with a median age of 27.2 years. This is almost 15 months younger than 2000, when the median age was 28.4 years. For comparison, the Alaska median age in 2010 was 33.8 years (and 32.4 years in 2000).

Figure 36. Population of Alatna and Allakaket, by Age, 2000 and 2010



GENDER

In 2010, there were more men than women in the communities, with 57 percent of the population male and 43 percent female. For comparison, in 2010, Alaska's population was 52 percent male and 48 percent female.

RACE

According to the 2010 U.S. Census, the communities are predominantly Alaska Native with 97 percent identifying themselves as Alaska Native/American Indian. There were no major changes in racial composition between 2000 and 2010.

HOUSEHOLD SIZE AND FAMILY SIZE

Based on the 2010 census for Allakaket, Alatna, and New Allakaket, there are approximately 74 households with an average household size of 2.9 people. Family household size is estimated at 3.4 people.

EDUCATION

Allakaket School is a pre-kindergarten through 12th grade school with four teachers and 51 students in 2012. Over the last five years, enrollment has grown significantly, from 40 students to 51.

Table 43. Allakaket School Enrollment, by Grade Level, 2008 to 2012

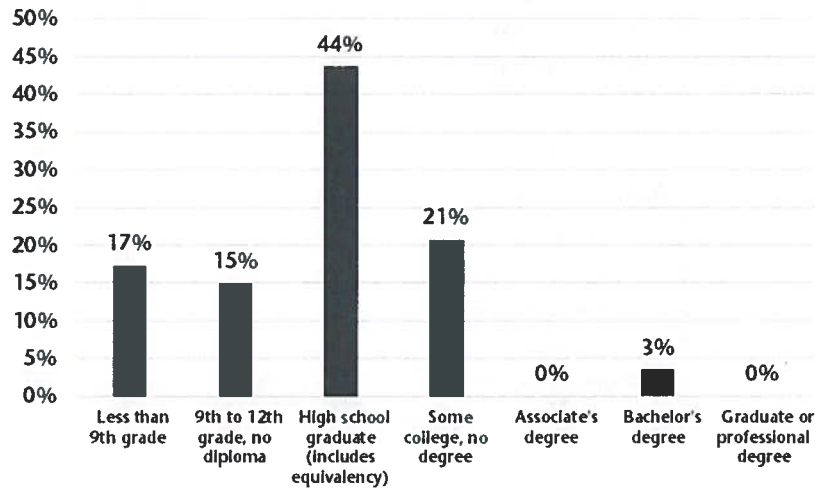
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	2	2	3	2	4	3	5	2	4	4	1	3	1	4	40
2009	1	4	1	4	2	3	3	5	1	4	2	2	4	2	38
2010	0	0	5	2	5	2	4	3	5	1	4	4	2	4	41
2011	9	6	0	3	1	4	2	3	3	4	0	4	3	2	44
2012	12	3	7	0	5	1	4	2	2	3	4	2	4	2	51

Source: ADEED.

EDUCATIONAL ATTAINMENT

The ACS 2007-2011 Five-Year Average reports 44 percent of residents of the three communities over age 25 are at least high school graduates, while 17 percent have less than a 9th grade education.

Figure 37. Alatna and Allakaket Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Allakaket was \$15,611 (margin of error +/- \$3,939) and New Allakaket was \$9,549 (margin of error +/- \$6,615), significantly lower than Alaska's 2012 per capita income of \$49,436. However, this is an increase for both communities since 2000.

The average household income from the ACS 2007-2011 Five-Year Average for Allakaket was \$23,797 (margin of error +/- \$8,923) and New Allakaket was \$57,647 (margin of error +/- \$40,428). These values are lower than the Alaska average household income of \$84,767 (margin of error +/- \$1,067).

Table 44. Alatna and Allakaket Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Alatna	Allakaket	New Allakaket	Alaska
2000				
Per capita income	\$14,109	\$10,912	\$5,578	\$22,660
Average household income	\$29,825	\$20,256	\$18,000	\$57,171
2007-2011 Five Year Average				
Per capita income	na	\$15,611	\$9,549	\$31,944
Average household income	na	\$23,797	\$57,647	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Based on ACS data, two-thirds of households in Alatna and Allakaket have a household income of less than \$25,000.

**Table 45. Household Income of Alatna and Allakaket,
2007-2011 Five-Year Average**

Income	Number	Percent
Less than \$10,000	17	31%
\$10,000 to \$14,999	1	2
\$15,000 to \$24,999	19	35
\$25,000 to \$34,999	3	5
\$35,000 to \$49,999	4	7
\$50,000 to \$74,999	4	7
\$75,000 to \$99,999	3	5
\$100,000 to \$149,999	4	7
\$150,000 to \$199,999	0	0
\$200,000 or more	0	0
Total households	55	100%

Source: ACS, 2007-2011 Five-Year Average.

Subsistence

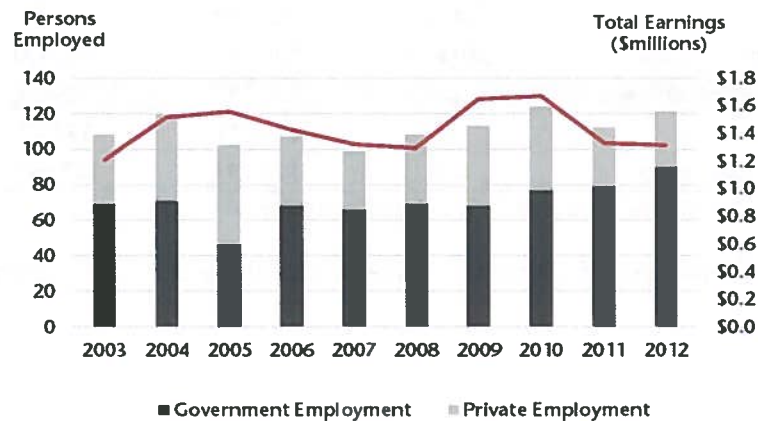
In addition to monetary income, residents of the communities lead a subsistence lifestyle. According to ADF&G, in 2011, Alatna had a per capita subsistence harvest of 299 pounds per capital, while Allakaket had 525 pounds per capita.

EMPLOYMENT

According to DOLWD, the total number of Allakaket and Alatna residents employed has ranged from a low of 99 in 2007 to a high of 124 in 2010. There were 121 people employed in 2012.

Caution is advised when looking at these data due to the large number of low wage earners included in the count. Since 2001, an average of 41 percent of wage earners had wages less than \$5,000 annually. If these people are excluded from the count, the number employed has ranged from a low of 58 in 2003 to a high of 76 in 2010.

**Figure 38. Alatna and Allakaket, Employment and Total Annual Earnings,
2003-2012**



Source: DOLWD.

Most residents are employed in the public sector and, in 2012, nearly three-quarters of all jobs were with the state or local government. The proportion of government jobs has increased in recent years from 48 percent in 2001 to 73 percent in 2012.

Table 46. Alatna and Allakaket, Resident Employment by Industry, 2001 & 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local government	52	48%	88	73%
Construction	13	12	2	2
Transportation, Trade and Utilities	6	6	8	7
Educational and Health Services	2	2	10	8
Other	35	32	13	11
Total	108	100%	121	100%

Source: DOLWD.

Top Employers

While specific current data is not available, the largest employers within the community are believed to be the Alatna Village Council (20 – 49 employees), Allakaket Village Council (10 – 19 employees), and the Yukon Koyukuk School District (10 – 19 employees). These figures are based on 2010 employment counts, which is the most recent data available. The Yukon Kuskokwim Health Corporation and the Post Office are other employers, though data is not available on the number of local workers.

POVERTY AND UNEMPLOYMENT STATUS

According to the ACS 2007-2011 Five-Year Average, unemployment rates in Alatna, Allakaket, and New Allakaket are all higher than Alaska's unemployment rate. Alatna had the highest unemployment rate at 60 percent (margin of error +/-34 percent), followed by Allakaket at 53 percent (margin of error +/-19 percent), and New Allakaket at 32 percent (margin of error +/-27 percent). For the 2007-2011 Five-Year Average, Alaska's unemployment rate was 8 percent (margin of error +/-0.3 percent), and in 2012, the unemployment rate was 7 percent.

In regards to the percent of families below the poverty line, New Allakaket and Allakaket both have rates higher than Alaska overall. New Allakaket had 50 percent (margin of error +/-36 percent) of families living below the poverty level, while Allakaket had 39 percent (margin of error +/-42 percent) of families living below the poverty level. Also according to the ACS, Alaska had an estimated 7 percent (margin of error +/-0.4 percent) of families living below the poverty line. (ACS data for Alatna shows no one living below the poverty line – though the sample size is very small.)

Table 47. Alatna and Allakaket Poverty and Unemployment Percentages, 2000, 2007-2011 Five-Year Average

	Alatna	Allakaket	New Allakaket	Alaska
2000				
Percent unemployed	14%	39%	39%	9%
Percent of families below poverty level	-%	12%	43%	7%
2007-2011 Five Year Average				
Percent unemployed	60%	53%	32%	8%
Percent of families below poverty level	0%	39%	50%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Hughes

History

Several Native groups have lived in the area now occupied by Hughes, including Koyukon Athabascans and Kobuk, Selawik, and Nunamiut Eskimos from the north and northwest. The location of Hughes was originally used as a trade center for various Alaska Native groups. According to the U.S. Geological Survey, in 1910, the current community received the name of Hughes after New York Governor Charles Hughes. A post office was established in 1942, followed by an airstrip in the 1950s. The city was incorporated in 1973. Major flooding occurred in 1994, destroying nearly the entire community, forcing residents to rebuild.

Geography and Governance

Located on the east bank of the Koyukuk River, Hughes is 115 air miles northeast of Galena and 210 air miles northwest of Fairbanks. It is a second-class city, located in the YKCA. The ANCSA village corporation is K'oyitl'ots'ina Limited, and the ANCSA regional corporation is Doyon, Limited.

Table 48. Hughes Overview

Distance in miles to:	
Proposed road corridor	50+ miles
Kotzebue, by air	210 air miles
Nearest neighbor	Alatna/Allakaket, upriver
City status	2 nd class city (incorporated 1973)
Census area	Yukon-Koyukuk Census Area
ANCSA regional corporation	Doyon, Limited
ANCSA village corporation	K'oyitl'ots'ina Limited
Tribal government	Hughes Village

LOCAL REVENUE AND EXPENSES

The City of Hughes' expenditures for FY 2014 totaled \$1,006,814, primarily for electricity (48 percent). Revenue is budgeted at \$1,006,814, with most revenue coming from locally generated revenue (66 percent). Hughes does not have a sales tax.

Transportation and Power Infrastructure

Transportation access to Hughes is by boat and plane. Due to shallow water, barge service is not always reliable, and most fuel and heavy freight is brought in by air. There is a state-owned 3,380-feet by 100-feet lighted, gravel runway. During the winter, the river is used as an ice road for ATVs and snowmachines between villages.

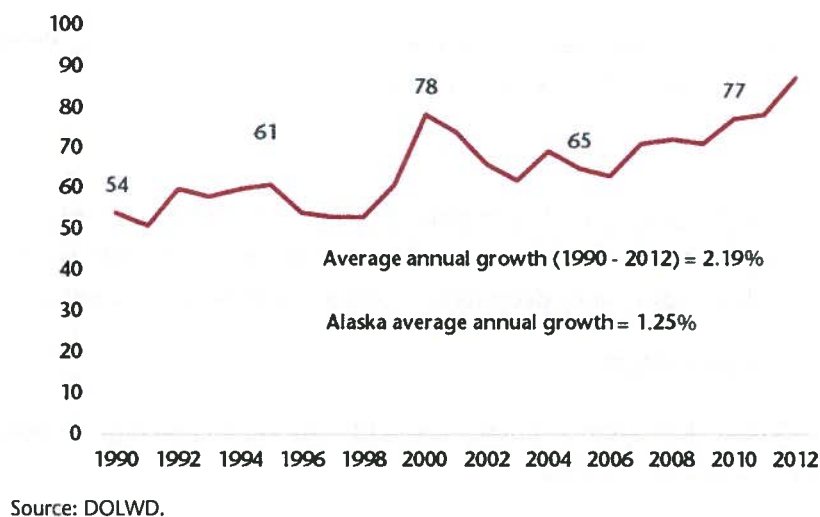
Hughes Power and Light provides power to the community via diesel generators with a total capacity of 230 kW.

Demographics

POPULATION

Hughes' population has been generally increasing since 1990, with an average annual growth rate of 2.2 percent, higher than the Alaska rate of 1.3 percent. In 2012, the population of Hughes was estimated to be 87 residents, an increase of 10 residents since 2010.

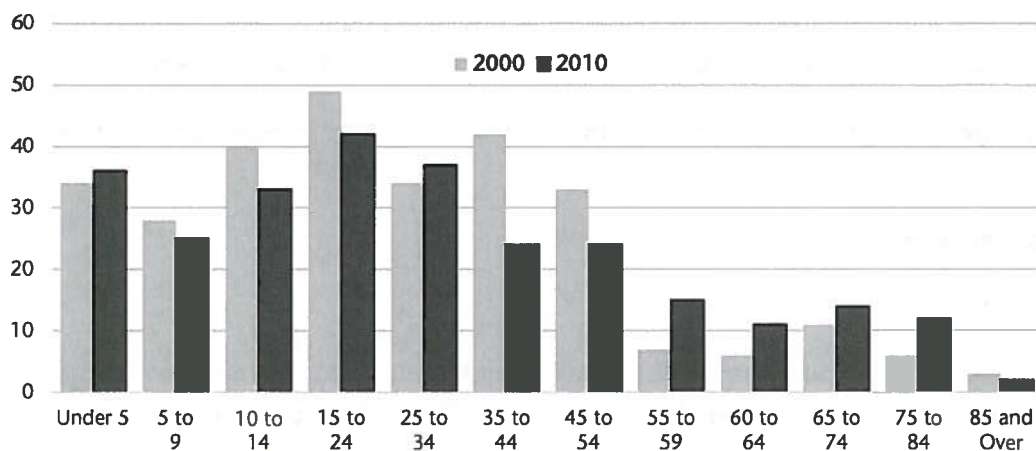
Figure 39. Population of Hughes, 1990 – 2012



AGE

In 2010, the median age was 32.8 years, similar to Alaska's median age of 33.8 years. This is an increase of nearly seven years in median age for the community since 2000.

Figure 40. Population of Hughes, by Age, 2000 and 2010



Source: U.S. Census, 2000 and 2010.

GENDER

In 2010, there were an equal number of men and women in the community, similar to Alaska's gender distribution of 52 percent male and 48 percent female.

RACE

In the 2010 U.S. Census, 96 percent of Hughes residents identify themselves as Alaska Native/American Indian, and only 1 percent identified as white. This is an increase for the former since 2000 when 78 percent identified as Alaska Native/American Indian and a decrease of 9 percent for those who identified as white.

HOUSEHOLD SIZE AND FAMILY SIZE

For the 2010 U.S. Census, there were 31 households in Hughes, with an average household size of 2.5 people, and an average family size of 3.2 people.

EDUCATION

The Johnny Oldman School in Hughes provides education to children pre-kindergarten through 12th grade. In 2012, there were 2 teachers and 15 students. Enrollment has been fairly steady over the past five years, with 12 students enrolled in the 2008-2009 school year and 12 students enrolled in the 2012-2013 school year.

Table 49. Johnny Oldman School Enrollment, by Grade Level, 2008 to 2012

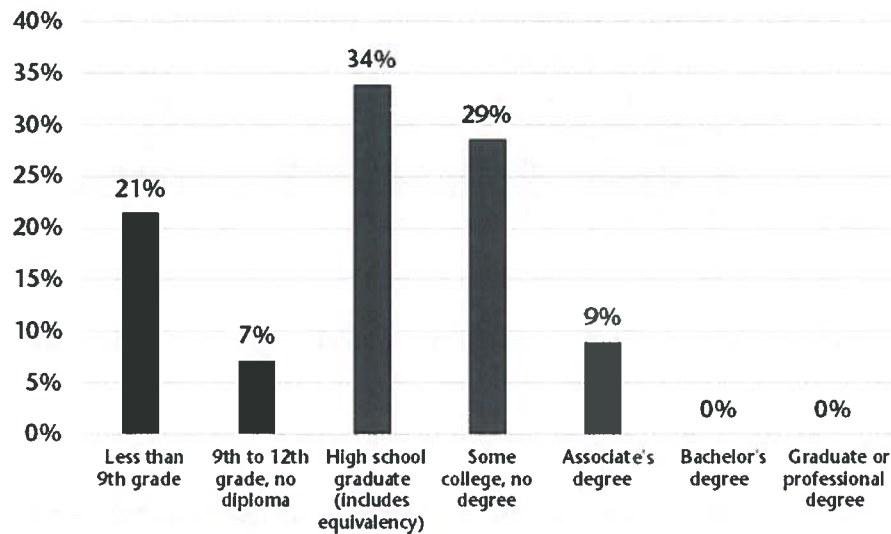
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	0	0	0	0	1	3	0	1	0	1	2	0	2	2	12
2009	0	0	0	0	0	2	2	0	2	1	3	0	0	2	12
2010	0	0	0	0	0	0	1	3	0	2	2	1	2	2	13
2011	0	1	0	0	0	0	0	1	3	1	2	3	2	2	15
2012	0	2	1	0	0	0	0	0	1	2	1	2	2	1	12

Source: ADEED.

EDUCATIONAL ATTAINMENT

According to the ACS 2007-2011 Five-Year average, 34 percent of residents over the age of 25 have at least a high school degree, and 29 percent have some college, but no degree. Roughly one-fifth of residents have less than a 9th grade education.

Figure 41. Hughes Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Hughes was \$17,396 (margin of error +/- \$4,103). During that same time period, the average household income was \$51,640 (margin of error +/- \$15,606), 61 percent of Alaska's average household income of \$84,767.

Table 50. Hughes and Alaska Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Hughes	Alaska
2000		
Per capita income	\$10,193	\$22,660
Average household income	\$24,375	\$57,171
2007-2011 Five Year Average		
Per capita income	\$17,396	\$31,944
Average household income	\$51,640	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

According to the ACS 2007-2011 Five-Year Average, one-third of households in Hughes have household income greater than \$50,000.

Table 51. Household Income of Hughes, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	0	0%
\$10,000 to \$14,999	0	0%
\$15,000 to \$24,999	1	4%
\$25,000 to \$34,999	9	36%
\$35,000 to \$49,999	6	24%
\$50,000 to \$74,999	3	12%
\$75,000 to \$99,999	4	16%
\$100,000 to \$149,999	2	8%
\$150,000 to \$199,999	0	0%
\$200,000 or more	0	0%
Total households	25	100%

Source: ACS, 2007-2011 Five-Year Average.

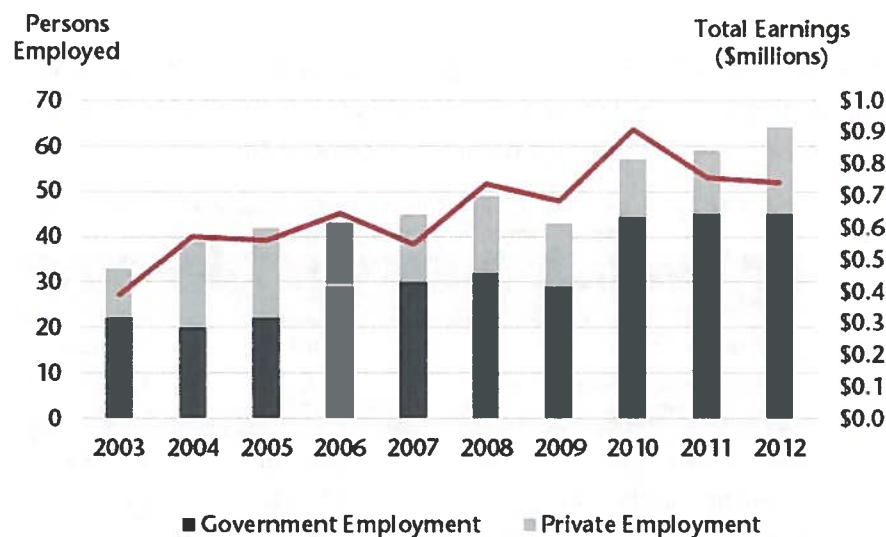
Subsistence

According to ADF&G, in 2002 (the most recent data available), Hughes had a per capita subsistence harvest of 411 pounds.

EMPLOYMENT

Employment has been increasing over the past ten years, from 33 residents employed in 2003 to 64 residents employed in 2012. Government employment accounted for 70 percent of employment in 2012, which is similar to the past ten years.

Figure 42. Hughes Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, seven of ten residents were employed in local government, an increase from 2001 when 55 percent of residents were employed in the local government.

Table 52. Hughes Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local Government	23	55%	45	70%
Financial Activities	3	7	0	0
Trade, Transportation and Utilities	2	5	7	11
Construction	2	5	1	2
Other	12	29	11	17
Total	42	100%	64	100%

Source: DOLWD.

Top Employers

The largest employers in Hughes include the City of Hughes (15 to 30 employees in 2010), Hughes Village Council (10 – 19), the Yukon Koyukuk School District (5 to 9), and the Hughes General Store (1 to 4). The Yukon Kuskokwim Health Corporation and the Post Office are other employers though data is not available on the number of local workers.

POVERTY AND UNEMPLOYMENT STATUS

Hughes had 33 percent (margin of error +/-17 percent) of its civilian population unemployed, and 0 percent (margin of error +/-61 percent) of its families living below the poverty line. The former percentage is almost four times the percentage of Alaska's 2007-2011 Five-Year Average unemployment rate, while the latter is lower than Alaska's percentage of 7 percent (margin of error +/-0.4 percent) of families living below the poverty line.

Table 53. Hughes Poverty and Unemployment Percentages, 2000, 2007-2007 Five-Year Average

	Hughes	Alaska
2000		
Percent unemployed	14%	9%
Percent of families below poverty level	21%	7%
2007-2011 Five Year Average		
Percent unemployed	33%	8%
Percent of families below poverty level	0%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Huslia

History

The village of Huslia is located in the historic homelands of the Koyukon Athabascans. European contact was made in 1843 by Russian explorers. In 1867, the Western Union Telegraph Company explored the Koyukuk River, which lead to increased missionary activity in the area. In the 1920s, the Cutoff Trading Post, also known as Old Town, was established, and is located roughly 16 river miles from modern Huslia. The Trading Post was moved due to the annual flooding of the river in 1949 to Huslia's current location. After the move, more modern infrastructure was established including a school, post office, airport, road, health clinic, and water wells. The city was incorporated in 1969.

Geography and Governance

Located on the north bank of the Koyukuk River, Huslia lies approximately 170 river miles northwest of Galena and 290 air miles west of Fairbanks. In addition, the village is located in the Koyukuk National Wildlife Refuge. The ANCSA regional corporation is Doyon, Limited, the ANCSA village corporation is K'oyitl'ots'ina, Limited, and the federally recognized tribal government for Huslia is Huslia Village.

Table 54. Huslia Overview

Distance in miles to:	
Proposed road corridor	Approx. 150 miles
Fairbanks, by air	290 miles
Nearest neighbor	Hughes, upriver
City status	2 nd class city (incorporated 1969)
Census area	Yukon-Koyukuk Census Area
ANCSA regional corporation	Doyon, Limited
ANCSA village corporation	K'oyitl'ots'ina, Limited
Tribal government	Huslia Village

LOCAL REVENUE AND EXPENSES

The City of Huslia's expenditures for FY2014 totaled \$287,812, primarily for the administration and financial departments (37 percent) and the council (20 percent). Revenue was budgeted at \$298,353.

Transportation and Power Infrastructure

Village access can be completed by boat, plane, and snowmachine. The state owns a 4,000-feet by 75-feet lighted gravel airstrip. A cargo barge visits the village twice each year. During the winter, snowmachines, dogsleds, and ATVs use the frozen river as an ice road. Riverboats are used by residents for intra-village travel during the summer.

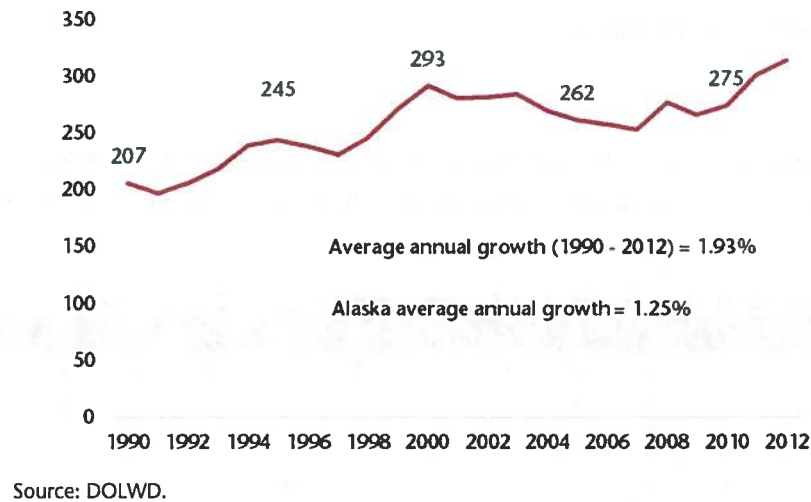
AVEC provides power to the community using diesel generators with a total capacity of 796 kW.

Demographics

POPULATION

Since 1990, Huslia's population has been steadily increasing, with an average annual rate of growth of 1.9 percent, higher than Alaska's average annual growth. In 2012, DOWLD estimated there were 315 residents in Huslia, an increase of 40 residents since the 2010 U.S. Census.

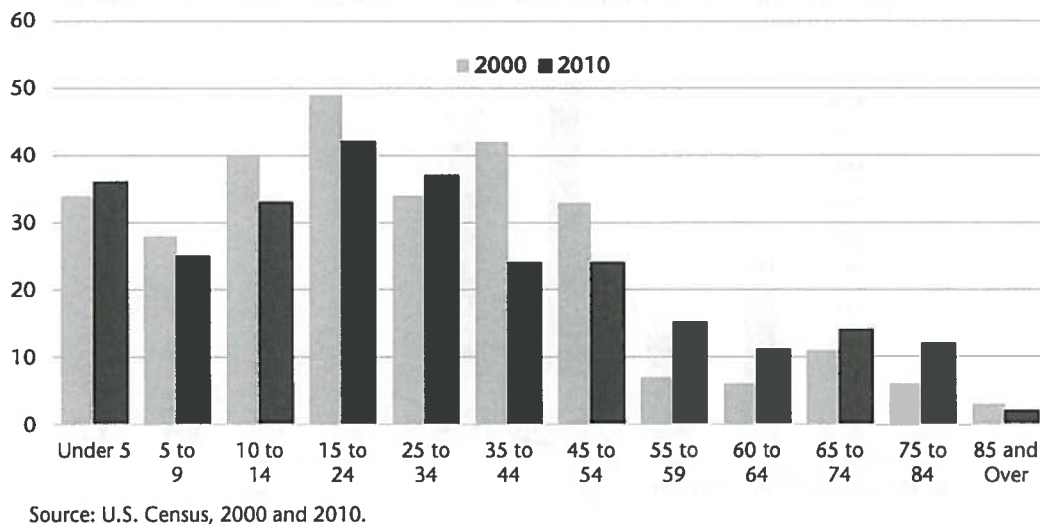
Figure 43. Population of Huslia, 1990 – 2012



AGE

In 2010, the median age in Huslia was 25.8 years, an increase of 1.4 years since 2000. This is well below the 2000 Alaska median age of 33.8 years.

Figure 44. Population of Huslia, by Age, 2000 and 2010



GENDER

In 2010, there were an equal number of men and women in the community, which is similar to Alaska's gender distribution of 52 percent male and 48 percent female.

RACE

According to the 2010 U.S. Census, 92 percent of Huslia residents identify themselves as Alaska Native/American Indian, similar to 2000.

HOUSEHOLD SIZE AND FAMILY SIZE

Based on the 2010 U.S. Census, there are 91 households in Huslia, with an average household size of 3.0 people and an average family size of 3.6 people.

EDUCATION

Jimmy Huntington School is a pre-kindergarten through 12th grade school with 9 teachers and 80 students in 2012. Over the last five years, enrollment has been fairly steady, with approximately 72 to 84 students enrolled each year.

Table 55. Jimmy Huntington School Enrollment, by Grade Level, 2008 to 2012

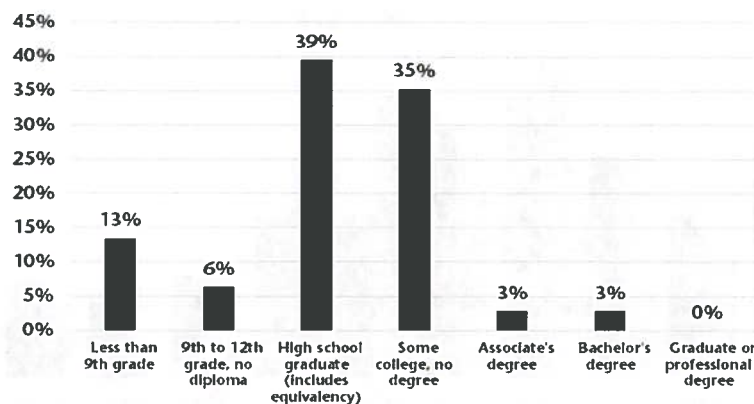
	PK	KG	1	2	3	4	5	6	7	8	9	10	11	12	Total
2008	0	4	5	6	10	8	9	6	6	4	5	5	4	6	78
2009	0	5	2	5	7	8	8	9	6	5	4	4	5	4	72
2010	0	3	6	2	5	7	8	8	11	6	5	4	7	6	78
2011	0	5	4	6	3	5	6	8	9	10	8	5	2	9	80
2012	0	7	5	4	7	3	5	7	9	9	9	9	5	5	84

Source: ADEED.

EDUCATIONAL ATTAINMENT

The ACS reports 39 percent of residents over age 25 have at least a high school graduate degree and 35 percent have some college, but no degree.

Figure 45. Huslia Educational Attainment, 2007-2011 Five-Year Average



Source: ACS, 2007-2011 Five-Year Average.

Income and Employment

INCOME

According to the ACS 2007-2011 Five-Year Average, per capita income for Huslia was \$10,332 (margin of error +/- \$2,272). The average household income was \$29,485 (margin of error +/- \$5,163), roughly a third of Alaska's average household income of \$84,767.

Table 56. Huslia and Alaska Per Capita and Average Household Income, 2000, 2007-2011 Five-Year Average

	Huslia	Alaska
2000		
Per capita income	\$10,983	\$22,660
Average household income	\$27,000	\$57,171
2007-2011 Five Year Average		
Per capita income	\$10,332	\$31,944
Average household income	\$29,485	\$84,767

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

Based on ACS data, half of households in Huslia have household income of less than \$25,000.

Table 57. Household Income of Huslia, 2007-2011 Five-Year Average

Income	Number	Percent
Less than \$10,000	14	16%
\$10,000 to \$14,999	17	19
\$15,000 to \$24,999	15	17
\$25,000 to \$34,999	7	8
\$35,000 to \$49,999	19	22
\$50,000 to \$74,999	13	15
\$75,000 to \$99,999	3	3
\$100,000 to \$149,999	0	0
\$150,000 to \$199,999	0	0
\$200,000 or more	0	0
Total households	88	100%

Source: ACS, 2007-2011 Five-Year Average.

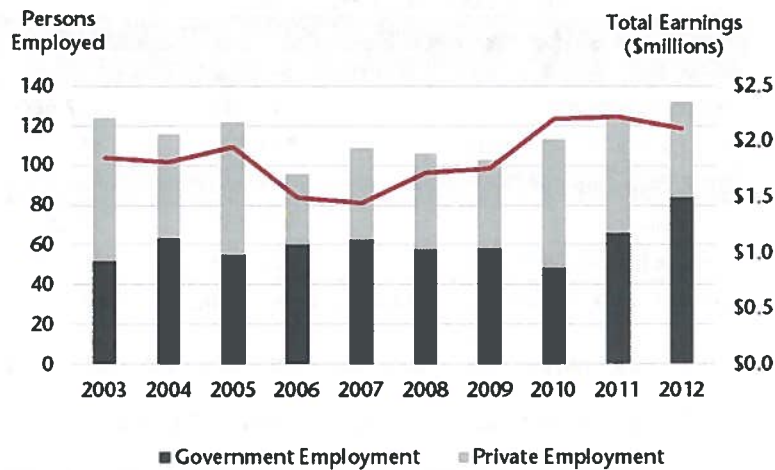
Subsistence

According to ADF&G, in 2002, Huslia had a per capita subsistence harvest of 134 pounds.

EMPLOYMENT

In 2012, there were 132 residents employed in Huslia, with nearly two-thirds of residents employed in government sectors. Employment has been fairly stable over the past ten years. The lowest annual employment occurred in 2006 with only 96 residents employed, with a high of 132 residents employed in 2012.

Figure 46. Huslia Employment and Total Annual Earnings, 2003-2012



Source: DOLWD.

In 2012, nearly two-thirds of residents were employed in government (63 percent). Natural resources and mining has decreased dramatically in terms of employment with 24 percent of the workforce working in the industry in 2001, and only 1 percent of the workforce working in the industry in 2012.

Table 58. Huslia Resident Employment by Industry, 2001 and 2012

Industry	2001		2012	
	Number	Percent	Number	Percent
Local Government	33	27%	84	64%
Natural Resources and Mining	29	24	1	1
Trade, Transportation and Utilities	8	7	6	5
Educational and Health Services	7	6	6	5
Other	44	36	35	27
Total	121	100%	132	100%

Source: DOLWD.

Top Employers

Local employers include the Huslia Tribal Council, Huslia City Council, Yukon Koyukuk School District, Yukon Kuskokwim Health Corporation, and the Post Office.

POVERTY AND UNEMPLOYMENT STATUS

For the ACS 2007-2011 Five-Year Average, 26 percent (margin of error +/-9 percent) of the Huslia civilian population was unemployed, and 43 percent (margin of error +/-13 percent) of families lived below the poverty line. Both of these percentages are higher than the Alaska percentages.

**Table 59. Huslia Poverty and Unemployment Percentages,
2000, 2007-2011 Five-Year Average**

	Huslia	Alaska
2000		
Percent unemployed	11%	9%
Percent of families below poverty level	25%	7%
2007-2011 Five Year Average		
Percent unemployed	26%	8%
Percent of families below poverty level	43%	7%

Source: ACS, 2007-2011 Five-Year Average; U.S. Census, 2000; and DOLWD.

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