2019

Economic Impacts of Ambler Mining District Industrial Access Project and Mine Development

PREPARED BY THE UNIVERSITY OF ALASKA CENTER FOR ECONOMIC DEVELOPMENT FOR THE U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

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I. Executive Summary

The Alaska Industrial Development and Export Authority (AIDEA) has proposed building a controlled-access industrial road from the Dalton Highway to the Ambler Mining District in Northwest Alaska to facilitate mineral exploration and development in the District. The Ambler Mining District Industrial Access Project (AMDIAP) would function as a Public-Private Partnership (P3) infrastructure project primarily for commercial traffic supporting mineral exploration, development, and mine operation in the region, similar to AIDEA's DeLong Mountain Transportation System (DMTS). Community-related commercial transport of goods may also be permitted. The District is rich in ores containing copper, zinc, lead, silver, gold, and cobalt. To date, there are four major mineral prospects in various stages of exploration and development: Arctic, Bornite, Sun, and Smucker.

As part of the permitting process for the road, AIDEA is required to assess the economic impact of the construction and operation of AMDIAP, as well as the impacts of mine development. In response to specific information requests from the Bureau of Land Management (BLM) for additional information, the University of Alaska Center for Economic Development (CED) was asked to assess the impacts of AMDIAP's development, as well as the construction and operation of the four mines.

Major findings include:

- Construction of all three phases of AMDIAP will create 3,064 total jobs over a four-year period, or an annual average of 766 jobs. Operations of the road will create an annual average of 141 jobs. These estimates include direct employment and additional jobs resulting from a multiplier effect.
- Arctic Mine is expected to create 799 total jobs during each year of its three-year construction phase and 1,663 total jobs each year of operation. These figures include the multiplier effect.
- Bornite, the second most advanced prospect, is projected to create 3,104 jobs during each year of construction and 1,453 during each year of operation (including multiplier effects).
- Other, less advanced, mining prospects are expected to have smaller, but still significant, impacts.
- Preliminary estimates suggest lifetime operations of the four mines may result in additional direct payments of $193 million to local municipalities and $1,145 million to the State of Alaska.

Summary of Construction Impacts (2020 dollars)

		Labor Income		Employment	
		Direct	Total	Direct	Total
AMDIAP	Lifetime	$140,059,419	$230,906,075	1,441	3,063
	Annual	$35,014,855	$57,726,519	360	766
Arctic	Lifetime	$142,671,364	$196,250,853	1,384	2,397
	Annual	$47,557,121	$65,416,951	461	799
Bornite	Lifetime	$369,401,024	$508,127,656	3,583	6,207
	Annual	$184,700,512	$254,063,828	1,792	3,104
Sun	Lifetime	$71,434,355	$98,261,154	693	1,200
	Annual	$35,717,177	$49,130,577	346	600
Smucker	Lifetime	$36,687,752	$50,465,646	356	616
	Annual	$18,343,876	$25,232,823	178	308
Total Lifetime		$760,253,914	$1,084,011,384	7,456	13,484

Table 1: Summary of Construction Impacts
Source: CED Calculations

Summary of Operations Impacts (2020 dollars)

		Labor Income		Employment	
		Direct	Total	Direct	Total
AMDIAP	Lifetime[1]	-	-	-	-
	Annual	$6,321,561	$9,500,488	81	141
Arctic	Lifetime	$379,758,275	$1,528,753,380	2,604	19,961
	Annual	$31,646,523	$127,396,115	217	1,663
Bornite	Lifetime	$480,545,100	$2,310,427,602	3,295	30,509
	Annual	$22,883,100	$110,020,362	157	1,453
Sun	Lifetime	$57,314,232	$214,992,432	393	2,816
	Annual	$9,552,372	$35,832,072	66	469
Smucker	Lifetime	$39,963,675	$131,803,465	274	1,728
	Annual	$7,992,735	$26,360,693	55	346
Total Lifetime		$957,581,282	$4,185,976,879	6,566	55,014

Table 2: Summary of Operations Impacts
Source: CED Calculations

[1] The lifetime operations costs for AMDIAP were not modeled because the duration of operations is not known.

Definitions of Key Terms

Direct Effects: Activity occurring as an immediate result of the activity.

Impact Analysis: The process of estimating how spending associated with a particular event, project, or activity flows through a regional economy.

Indirect Effects: Activity occurring within firms that supply the development or project.

Induced Effects: Activity resulting from households spending income received through direct or indirect effects.

Multiplier: A way of summarizing the total impact of a development to the local economy. Example: If a particular project has an employment multiplier of 2.0, it will create one indirect or induced job for every direct job generated.

Employment: Includes total jobs (direct, indirect, and induced) created because of investment or project implementation.

EPCM: A services-only contract, under which the contractor performs engineering, procurement and construction management services

Labor Income: An increase in earned income throughout the region because of the activity.

Value Added: The total value added to the regional economy because of the investment or project implementation. Value added includes wages, business income, other income, and indirect business taxes.

Output: The value of goods and services produced is referred to as "economic output," which represents all sales of goods or services, either at the intermediate or final product (retail) level. Output is comparable to business revenues and is sometimes referred to as such in this report.

Life of Mine (LOM): The total length of operations at a mining site or group of sites.

II. Economic Impacts

Methodology and Data Sources

Economists use input-output models to estimate the economic effects of a particular activity or event. Models such as those generated within IMPLAN, a commercially available input-output modeling software, estimate economic effects in terms of employment, labor income, and other measures. Economic impacts in each of these categories can be further broken down as direct, indirect, and induced. Direct effects are the immediate result of the activity, with indirect and induced effects being secondary and tertiary results as money circulates through multiplier effects (see definitions). For AMDIAP, the primary subject of concern is estimating the employment and income effects.

CED used IMPLAN to estimate the economic impacts of the development and operation of AMDIAP and four mines: Arctic, Bornite, Sun, and Smucker. IMPLAN uses over 500 distinct codes to classify different types of economic activity, and these translate into North American Industry Classification System (NAICS) codes. Like other input-output models, IMPLAN tracks spending patterns between private firms, governments, and households. When an activity of interest generates new spending, IMPLAN uses these linkages to estimate impacts within a geographic area of interest—in this case, the state of Alaska.

There are other potential economic benefits at statewide and local levels that come about following both mine and road development. These include additional state revenues and decreased fuel prices. However, those impacts are not the subject of the impact analysis, which is confined to the economic effects of expenditures on construction and operations. These topics are discussed in Section III of this report.

Road Construction and Operations

Understanding the nature of the expenditures associated with a project is the starting point for an impact analysis. In February 2015 (most of the analysis and results are dated 2014), engineering services firm Cardno, published an impact analysis for the AMDIAP in the *Ambler Mining Region Economic Impact Analysis* (Cardno EIA) based on construction cost estimates provided by DOWL HKM . However, these estimates are out-of-date, as the proposed route has changed. New cost estimates generated by DOWL in 2017 reflect the new proposed route, and are used as the basis of the present analysis. For consistency, all dollars have been converted to 2020 dollars. Estimates of impacts are based on the assumption that all three phases of construction are completed before mine operations begin.

AMDIAP Phase 3 Road Construction Cost Estimates (2020 dollars)

Item	Capital Cost
Clearing	$10,710,882
Excavation (Cut)	$75,108,754
Embankment (Fill)	$113,244,535
Aggregate Surface	$8,237,468
Turnouts	$189,092
Bridges	$44,777,919
Culverts	$75,828,174
Landing Strips	$2,458,200
Maintenance Stations	$43,856,366
Subtotal	$374,411,390
Contingency (10%)	$37,441,139
Total	$411,852,528

Table 3: AMDIAP road construction estimates
Source: DOWL cost estimates

The items listed above blend labor costs, supplies, materials, and other expenses. Some of the materials needed to complete these items must be purchased outside of Alaska, meaning a portion of the economic impacts will occur out of state. Using the same assumptions as Cardno EIA, CED assumes that none of the steel, cement, and piping materials will be sourced in Alaska. Labor, aggregate, and embankment materials will be sourced in-state, however.

AMDIAP Road Construction Costs by Labor and Non-Labor Costs (2020 dollars)

Item	Total Expenditures	In-State Expenditures
Excavation and Embankment Materials	$145,232,253	$145,232,253
Aggregate	$5,930,977	$5,930,977
Bridge (Steel and Cement)	$32,240,102	-
Culverts (Piping and Cement)	$54,596,285	-
Maintenance Station Materials	$31,576,583	-
Contract Labor Costs	$104,835,189	$104,835,189
Total	$374,411,390	$255,998,419

Table 4: AMDIAP Road Construction Costs by Labor and Non-Labor Costs
Source: CED calculations from DOWL cost estimates

The table above estimates the breakdown between labor and non-labor costs, and goods that are purchased in-state or out-of-state. Cardno estimates that labor accounts for approximately 28% of each item. CED used this coefficient to separate out labor costs, and then applied Cardno's assumptions regarding out-of-state purchases. About 74% of the total expenditure (excluding the 10% contingency) is estimated to occur in Alaska. These are the inputs for the IMPLAN model.

Cardno estimates that the majority, if not all, of the excavation and embankment materials as well as aggregate for road construction would be sourced from in-state sources – including Native Corporations

and State of Alaska sites. Cardno also assumes that all of the construction labor would be sourced from in-state. All expense categories were applied as inputs into the IMPLAN model, generating employment and payroll numbers that update the 2014 Cardno estimates.

CED uses an estimate of $13,000,000 for the cost of operations and maintenance on the road. These costs are assumed to be shouldered by the mine operators under a future agreement with AIDEA. This maintenance will provide some annual employment as well.

Mine Construction and Operations

The assessment of the economic impacts of AMDIAP and the four mines relies on a number of data sources and assumptions. The primary sources of information for the model are Trilogy Metal Inc.'s (Trilogy) *2018 NI 43-101 Technical Report on Pre-Feasibility Study* (PFA) for Arctic mine and the aforementioned *Ambler Mining Region Economic Impact Analysis* by Cardno (2015). The PFA provides the most up-to-date mineral production, construction cost, and operation cost estimates for the Arctic mine and the Alaska mining industry. The Cardno EIA provides estimates for the percentage of construction costs for the mine that are expected to be sourced in-state. Those percentages were applied to the Trilogy PFA's construction costs and adjusted to 2020 dollars to estimate the total in-state effects. Trilogy expects that Arctic's construction will be spread across three years; therefore, construction costs were divided by three to estimate the annual impact.

Cardno's report provided preliminary cost estimates for the other three mining prospects discussed in this report. However, no detailed cost information was available for mines other than Arctic. Therefore, the total construction cost for each mine was divided into the expense categories seen in Table 3 in a manner proportional to Arctic. This method does not account for differences in mine design that would change the amount of capital consumed in one category or another.

Construction Cost Estimates for the Bornite and Arctic Mines (2020 dollars)

	Arctic		Bornite	
	Total Expenditures	**In-State Expenditures**	**Total Expenditures**	**In-State Expenditures**
Direct Labor Costs	$152,816,951	$115,487,619	$395,669,717	$299,017,572
Indirect Labor	$2,333,083	-	$6,040,759	-
Materials	$262,471,862	$61,826,705	$679,585,392	$160,080,115
Construction Equipment	$47,828,206	-	$123,835,560	-
Mechanical Equipment	$152,816,951	-	$395,669,717	-
Freight and Logistics	$25,663,915	$22,164,291	$66,448,349	$57,387,211
EPCM	$54,827,456	-	$141,957,837	-
Contingency and Owner's Costs	$128,319,577	-	$332,241,747	-
Total	$827,078,000	$199,478,615	$2,141,449,079	$516,484,898

Table 5: Construction Cost Estimates for the Bornite and Arctic Mines
Source: CED calculations based on Cardno and Trilogy estimates

Arctic is the most advanced prospect, followed by Bornite. The other two advanced prospects—Sun and Smucker—have not been studied as thoroughly and recent mine development plans are not available. The estimated resource value is lower at Sun and Smucker than Arctic and Bornite. Cardno's preliminary estimates are the basis of the following tables of projected construction costs.

Construction Cost Estimates for the Sun and Smucker Mines (2020 dollars)

	Sun		Smucker	
	Total Expenditures	**In-State Expenditures**	**Total Expenditures**	**In-State Expenditures**
Direct Labor Costs	$76,514,165	$57,823,682	$39,296,677	$29,697,489
Indirect Labor	$1,168,155	-	$599,949	-
Materials	$131,417,459	$30,956,113	$67,494,293	$15,898,656
Construction Equipment	$23,947,181	-	$12,298,960	-
Mechanical Equipment	$76,514,165	-	$39,296,677	-
Freight and Logistics	$12,849,707	$11,097,474	$6,599,442	$5,699,518
EPCM	$27,451,647	-	$14,098,808	-
Contingency and Owner's Costs	$64,248,535	-	$32,997,210	-
Total	$414,111,015	$99,877,269	$212,682,016	$51,295,663

Table 6: Construction Cost Estimates for the Sun and Smucker Mines
Source: CED calculations based on Cardno and Trilogy estimates

The primary inputs for projecting economic impacts from mine operations are annual revenues, employment, and labor costs. The PFA provides these labor estimates for the Arctic mine, which CED adjusted for inflation. Annual revenue estimates for each mine are based on the life-of-mine (LOM) resource value and operating life of each mine.[2]

[2] Resource estimate for Arctic comes from *Arctic Project, Northwest Alaska, USA NI 43-101 Technical Report on Pre-Feasibility Study* from 2018. Resource estimated for Bornite comes from *NI 43-101 Technical Report on the Bornite Project, Northwest Alaska, USA* from 2018. Resource estimate for Sun comes from *Technical Report on the Sun Project Brooks Range, Alaska, USA* from 2018. Resource estimate for Smucker come from the historical resource estimates cited in Cardno's 2015 report titled *Ambler Mining Region Economic Impact Analysis*.

Economic Inputs for the Operations of the Four Prospective Mines (2020 dollars)

Item	Operating Life (Years)	Annual Revenues	Annual Direct Labor Costs	Annual Direct Ops. Employment	LOM Resource Value[3]
Arctic	12	$866,454,417	$31,646,523	217	$10,397,453,000
Bornite	21	$626,519,511	$22,883,101	157	$13,156,909,731
Sun	6	$261,535,679	$9,552,372	66	$1,569,214,074
Smucker	5	$218,834,200	$7,992,736	55	$1,094,171,000
Total[4]	-	$1,973,343,807	$72,074,732	440	$26,217,748,146

Table 7: Economic Inputs for the Four Prospective Mines
Source: CED calculations

CED calculated labor as a percentage of gross revenue for Arctic and applied this percentage (3.65%) to estimate the labor costs for the other three mines: Bornite, Sun and Smucker. CED used Arctic's payroll cost per employee to determine the number of jobs at each mine based on their payroll as a percentage of gross revenue. Annual revenues, labor costs, and number of jobs are the inputs used to estimate the annual operating impacts in the IMPLAN model.

Results

The proposed construction and operation of AMDIAP and the four mines are large-scale infrastructure projects, associated with high levels of expenditure by AIDEA and the mine operators. As those expenditures flow out from the originating organization, they have both immediate and multiplier effects on Alaska's economy. This section estimates four categories of effects, derived from the input-output model described earlier:

- **Direct:** activity occurring as an immediate result of the expenditure or activity.
- **Indirect:** activity occurring within firms that supply the development or project.
- **Induced:** activity resulting from households spending income received through direct or indirect effects.
- **Total**: the sum of direct, indirect, and induced effects.

AMDIAP Construction and Operations

With roughly $256 million in costs accruing in Alaska over the four-year construction period, building the AMDIAP road will create an estimated 3,064 total jobs during this phase. On an annual basis, this amounts to 360 direct jobs and 766 total jobs per year during the construction period. The total average annual payroll associated with these jobs would be $57.7 million.

AIDEA predicts that operations and maintenance on AMDIAP will cost $13 million the first year and slowly escalate. The operations expenditures shown are for the first year of operations. CED did not

[3] Includes indicated and inferred resources
[4] Annual totals represent a hypothetical year in which all four mines are operating. Currently, there is no year in which all four mines are scheduled to operate because only Arctic has a schedule for construction and operations.

evaluate the impacts of the gradual increase because the life of the road is not known. Maintaining the road is projected to create total of 141 jobs annually and result in payroll of approximately $9.5 million.

Average Annual Impacts for AMDIAP (2020 dollars)

	Labor Income			Employment		
Item	**Direct**	**Indirect and Induced**	**Total**	**Direct**	**Indirect and Induced**	**Total**
Construction	$35,014,855	$22,711,664	$57,726,519	360	406	766
Operations	$6,321,561	$3,178,927	$9,500,488	81	61	141

Table 8: Average Annual Impacts for AMDIAP
Source: CED calculations in IMPLAN.

State-level data from the Alaska Department of Labor and Workforce Development indicates that about 81% of construction laborers in Alaska are state residents.[5] Applied to the AMDIAP estimates for direct annual employment, CED estimates that Alaska residents from outside the region will hold 220 of the direct jobs per year. As a state agency, AIDEA cannot offer a hiring preference to residents of the Northwest Arctic Borough (NAB) and Yukon Koyukuk Census Area (YKCA), the two areas most affected. However, CED estimates that about 20% of the construction jobs would go to residents of these local areas[6], amounting to 72 direct jobs. Combined, CED assumes local and non-local Alaska residents will hold 81% of the direct jobs, with 19% going to non-residents.

Average Annual Employment for AMDIAP Construction

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	68	72	220	360
Indirect Effect			185	185
Induced Effect			221	221
Total Effect	68	72	625	766

Table 9: Average Annual Employment for AMDIAP Construction
Source: CED calculations in IMPLAN.

Annual operations and maintenance expenditures will provide some ongoing employment once construction is completed. The IMPLAN model predicts an annual average of 81 direct and 141 total jobs. CED assumes that these jobs would have the same percentage breakdown between non-residents, NAB/YKCA residents, and other Alaska residents as the construction jobs—19%, 20%, and 61% respectively. As a result, 16 local residents and 49 Alaska residents from other areas of the state are expected to be employed during each year of AMDIAP operations.

[5] http://live.laborstats.alaska.gov/reshire/nonres.pdf
[6] Red Dog Mine has a local hire of approximately 30%. In the interest of providing a conservative estimate, CED used a 20% estimate.

Average Annual Employment for AMDIAP Maintenance and Operations

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	15	16	49	81
Indirect Effect			24	24
Induced Effect			36	36
Total Effect	15	16	110	141

Table 10: Average Annual Employment for AMDIAP Maintenance and Operations
Source: CED calculations in IMPLAN.

Mine Construction and Operations

For all four prospective mines in the Ambler Mining District—Arctic, Bornite, Sun, and Smucker—economic impacts are broken out by construction and operations. All results shown are annual averages, assuming that the construction phase lasts three years for Arctic and two for Bornite, Sun, and Smucker. Arctic would have the largest operations employment effects, creating an average of 1663 jobs for each year of operations. Bornite, however, would have the largest construction employment impact and is projected to create 3,104 jobs annually during its construction.

As with road construction and operations, CED assumed an employment breakdown for non-residents, NAB/YKCA residents, and other Alaska residents for each mine. The mine construction impacts followed the same shares as for road construction, with non-residents filling 19% of jobs, NAB/YKCA residents 20%, and non-local Alaskans getting the remaining 61%. The resident mining jobs are estimated to be 30% held by NAB/YKCA residents and 70% other Alaska residents.

Average Annual Impacts for Construction of all Mines (2020 dollars)

	Labor Income			Employment		
	Direct	Indirect and Induced	Total	Direct	Indirect and Induced	Total
Arctic	$47,557,121	$17,859,830	$65,416,951	461	338	799
Bornite	$184,700,512	$69,363,316	$254,063,828	1,792	1,312	3,104
Sun	$35,717,177	$13,413,400	$49,130,577	346	254	600
Smucker	$18,343,876	$6,888,947	$25,232,823	178	130	308
Total[7]	$286,318,686	$107,525,493	$393,844,179	2,777	2,034	4,811

Table 11: Average Annual Impacts for Construction of all Mines
Source: CED calculations in IMPLAN

[7] Due to different mine development schedules, there are expected to be years where as few as one mine is operating.

Average Annual Impacts for Operations of all Mines (2020 dollars)

	Labor Income			Employment		
	Direct	Indirect and Induced	Total	Direct	Indirect and Induced	Total
Arctic	$31,646,523	$95,749,592	$127,396,115	217	1,446	1,663
Bornite	$22,883,100	$87,137,262	$110,020,362	157	1,296	1,453
Sun	$9,552,372	$26,279,700	$35,832,072	66	404	469
Smucker	$7,992,735	$18,367,958	$26,360,693	55	291	346
Total[8]	$72,074,730	$227,534,512	$299,609,242	494	3,437	3,931

Table 12: Average Annual Impacts for Operations of all Mines
Source: CED calculations in IMPLAN

Arctic and Bornite are the two largest prospects, and naturally generate larger employment impacts than Sun and Smucker. They also have longer estimated lifespans at 12 and 21 years respectively. The development of these two mines would make Sun and Smucker more likely to be developed, since the larger mines justify the investment in AMDIAP and other infrastructure that benefits the mining district as a whole.

Average Annual Impacts of Arctic Construction

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	88	92	281	461
Indirect Effect			87	87
Induced Effect			250	250
Total Effect	88	92	619	799

Table 13: Average Annual Impacts of Arctic Construction
Source: CED calculations in IMPLAN

Average Annual Impacts of Arctic Operations

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	41	43	132	217
Indirect Effect			958	958
Induced Effect			489	489
Total Effect	41	43	1,579	1,663

Table 14: Average Annual Impacts of Arctic Operations
Source: CED calculations in IMPLAN

[8] Due to different mine development schedules, there are expected to be years where as few as one mine is operating.

Average Annual Impacts of Bornite Construction

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	340	358	1,093	1,792
Indirect Effect			340	340
Induced Effect			973	973
Total Effect	340	358	2,405	3,104

Table 15: Average Annual Impacts of Bornite Construction
Source: CED calculations in IMPLAN

Average Annual Impacts of Bornite Operations

	Non- Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	30	31	96	157
Indirect Effect			874	874
Induced Effect			422	422
Total Effect	30	31	1,392	1,453

Table 16: Average Annual Impacts of Bornite Operations
Source: CED calculations in IMPLAN

Average Annual Impacts of Sun Construction

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	66	69	211	346
Indirect Effect			66	66
Induced Effect			188	188
Total Effect	66	69	465	600

Table 17: Average Annual Impacts of Sun Construction
Source: CED calculations in IMPLAN

Average Annual Impacts of Sun Operations

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	12	13	40	66
Indirect Effect			266	266
Induced Effect			137	137
Total Effect	12	13	444	469

Table 18: Average Annual Impacts of Sun Operations
Source: CED calculations in IMPLAN

Average Annual Impacts of Smucker Construction

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	34	36	109	178
Indirect Effect			34	34
Induced Effect			97	97
Total Effect	34	36	239	308

Table 19: Average Annual Impacts of Smucker Construction
Source: CED calculations in IMPLAN

Average Annual Impacts of Smucker Operations

	Non-Residents	NAB/YKCA Residents	Other AK Residents	Total
Direct Effect	10	11	33	55
Indirect Effect			190	190
Induced Effect			101	101
Total Effect	10	11	324	346

Table 20: Average Annual Impacts of Smucker Operations
Source: CED calculations in IMPLAN

III. Other State and Local Revenues

While this study discusses the impacts of the development of the Ambler Mining District, other variables would potentially have impacts at the state, regional, and community levels. The State of Alaska will collect revenue through taxes and fees, while local governments will also gain new revenue. Using Red Dog Mine as a comparison, there are two interrelated local government revenue sources worth noting for their impacts to the Northwest region of Alaska. Primarily, the Payment In Lieu of Taxes (PILT) Red Dog pays to Northwest Arctic Borough, which also includes Red Dog's Village Improvement Fund (VIF).

Payment in Lieu of Taxes

Red Dog Mine, in the Northwest Arctic Borough (NAB), holds an agreement with the NAB government that includes annual payments to the borough as an alternative to taxes. This PILT is a system by which payments are made to local governments to help pay for local services. Red Dog's current PILT agreement includes two primary components: annual payments to NAB based on a percentage of Red Dog's fixed asset value and the creation of a Village Improvement Fund.

While it is unknown at this time if the proposed mines in the Ambler Mining District will include a PILT with the local regional government, there is some possibility of similar agreements occurring. The structure of those potential PILTs is undetermined, but whatever form those agreements take would cause a monetary infusion to the region.

To offer a basis for estimating PILT revenues, the 2015 Cardno report projected payments for mines in the Ambler Mining District (AMD) based on payments made by Red Dog Mine. CED inflated these numbers to 2020 dollars and used them as a baseline estimate of the PILT payments from mines in the AMD.

Village Improvement Fund

When Red Dog's PILT was revised in 2017, the agreement included the creation of a VIF for the eleven smaller communities in the NAB other than Kotzebue. Red Dog's VIF is structured as an initial lump sum investment, followed by subsequent annual funding infusions based on a percentage of Red Dog's annual profits. That fund is intended to be used to support community programs, services, infrastructure, and the long-term sustainability of rural communities in the region.

There has been some discussion of a similar fund being set up for the Ambler Mining District; however, it is too early to know if that will occur and the structure it will take if it does. This makes estimating the fund value its potential impacts difficult to undertake with any certainty. Preliminary estimates were constructed by CED based on the amount of money Red Dog contributes to a VIF based on their negotiations with the NAB. CED applied the percentage of gross revenue Red Dog pays into the existing VIF to the revenue estimates for all four mines.

Other State Revenues

Cardno's report on Arctic contained estimates of payments received by the State of Alaska. CED used the formulas from those calculations to update those estimates. Additionally, the same formulas were used to calculate payments to the State of Alaska by the other three advanced prospects in the region.

The State of Alaska is projected to receive approximately $1.1 billion over the lives of all four mines. Roughly 50% of that amount would come from Arctic, 40% from Bornite, and the remaining 10% from Sun and Smucker together.

LOM Total State and Local Payments for All Mines (2020 Dollars)

	Total Local and State Payments
Arctic	$608,507,138
Bornite	$571,333,042
Sun	$93,162,064
Smucker	$65,230,250
Total	$1,338,232,495

Table 21: LOM Total State and Local Payments for AMD Mining Prospects
Source: CED Calculations, Teck Financial Records, Mine Development Plans, Cardno

LOM Local Payments for All Mines (2020 Dollars)

	PILT	VIF	Total Local Payments
Arctic	$27,602,196	$28,284,693	$55,886,889
Bornite	$70,783,545	$40,057,657	$110,841,202
Sun	$10,555,441	$4,268,809	$14,824,250
Smucker	$8,918,501	$2,976,527	$11,895,027
Total	$117,859,683	$75,587,685	$193,447,368

Table 22: LOM Local Payments for All Mines
Source: CED Calculations, Teck Financial Records, Mine Development Plans, Cardno

LOM State Payments for All Mines (2020 Dollars)

	Arctic	Bornite	Sun	Smucker	Total
State Claim Rental	$10,200,165	-	$3,053,324	$123,299	$13,376,788
State Mining License Fee	$155,961,798	$197,353,646	$23,538,211	$16,412,568	$393,266,222
State Corporate Income Tax	$207,949,063	$263,138,195	$31,384,281	$21,883,423	$524,354,963
State Royalty	$178,509,223	-	$20,361,998	$14,915,933	$213,787,154
Fuel Tax	$264,000	$1,219,078	$71,721	$47,813	$1,602,612
Total	$552,620,250	$460,491,841	$78,337,815	$53,335,223	$1,144,785,127

Table 23: LOM State Payments for All Mines
Source: CED Calculations, Teck Financial Records, Mine Development Plans, Cardno