



The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Prepared for:

THE PEBBLE LIMITED PARTNERSHIP

Submitted by:

IHS
15 Inverness Way East
Englewood, CO 80112

May 2013

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

About IHS (www.ihs.com)

IHS Inc. (NYSE: IHS) is a leading source of information and insight in critical areas that shape today's business landscape, including energy and power; design and supply chain; defense, risk, and security; environmental, health and safety, and sustainability; country and industry forecasting; and commodities, pricing, and cost. IHS has been in business since 1959 and became a publicly traded company on the New York Stock Exchange in 2005. Headquartered in Englewood, Colorado, USA, IHS employs more than 5,100 people in more than 30 countries around the world.

About IHS Global Insight

IHS Global Insight is one of the leading economic analysis and forecasting firms in the world. With over 600 economists, statisticians, and industry specialists in 25 offices worldwide, IHS Global Insight has an established track record for providing rigorous, objective forecast analysis and data to governments and businesses around the world.

Among our areas of expertise are the economic impact, tax implications, and job-creation dynamics within multiple sectors core to national, state, and local economies. It helps governments and companies at all levels interpret the impact of proposed investments, policies, programs, and projects.

IHS Global Insight was formed by the merger of DRI and WEFA. Still active in an advisory capacity to the firm is the original founder of WEFA, Lawrence R. Klein, the 1980 winner of the Nobel Prize in Economics.

For more information, contact:

Brendan O'Neil
Managing Director, Public Sector, IHS
Brendan.ONeil@ihs.com

Mohsen Bonakdarpour
Director, Economic Analysis and Planning, IHS
Mohsen.Bonakdarpour@ihs.com

For press information, contact:

Jim Dorsey
Senior Manager, Media Relations, IHS Global Insight
Jim.Dorsey@ihsglobalinsight.com

IHS
15 Inverness Way East
Englewood, CO 80112

© 2013 IHS. All information contained herein is obtained by IHS Inc. from sources believed by it to be accurate and reliable. All forecasts and predictions contained herein are believed by IHS, Inc. to be as accurate as the data and methodologies will allow. However, because of the possibilities of human and mechanical error, as well as other factors such as unforeseen and unforeseeable changes in political and economic circumstances beyond IHS's control, the information herein is provided "as is" without warranty of any kind and IHS Inc., AND ALL THIRD PARTY PROVIDERS MAKE NO REPRESENTATIONS OR WARRANTIES EXPRESS OR IMPLIED TO ANY SUBSCRIBER OR ANY OTHER PERSON OR ENTITY AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY OF THE INFORMATION OR FORECASTS CONTAINED HEREIN.

Project team

Authors

Mohsen Bonakdarpour, Director, Economic Analysis and Planning, IHS

Bob Flanagan, Director, Economic Analysis and Planning, IHS

John Larson, Vice President, Public Sector, IHS

John Mothersole, Senior Principal Economist, Pricing and Purchasing Service, IHS

Brendan O’Neil, Managing Director, Public Sector, IHS

Elizabeth Redman, Senior Consultant, Economic Strategy Solutions, IHS

Contributors

Tabitha M. Bailey, Project Manager; Senior Associate, Public Sector, IHS

Acknowledgments

We would like to acknowledge the McDowell Group, with which we have collaborated on this report, for their knowledge, expertise, and analysis on the state of Alaska. McDowell Group is an Alaska-based research and consulting firm with extensive mining industry experience. In particular, we are grateful to Donna Logan and Jim Calvin for their assistance with analysis of in-state spending related to mine development and operations. We would also like to acknowledge and thank the subject matter experts, technical experts, industry experts, and analysts that have contributed to this study. They are Shane Norton, Yanni He, Scott Fleming, and Tasmina Ahmed.

IHS Global Insight offers an independent assessment of the potential contribution of a “conceptual” Pebble Mine to Alaska and the Lower 48 economies. This study, which was commissioned by the Pebble Limited Partnership, was conducted between June and December 2012. The analysis and metrics developed during the course of this research are intended to contribute to a dialogue on the potential contribution of the Pebble Mine in terms of production, employment, and economic growth. IHS Global Insight is exclusively responsible for all of the analysis and content contained herein.

All of the value added, labor income, and tax contributions throughout this report are expressed in terms of constant 2011 dollars.

Sustaining capital expenditures are defined as alterations, additions, and maintenance of capital goods during the Production Phases.

Executive summary

The Pebble Limited Partnership (also referred to as “PLP” or “Pebble” in this report) has the potential to develop one of the most significant discoveries of copper, gold, molybdenum, and silver in the world. The poly-metallic prospect, located 200 miles southwest of Anchorage, Alaska, and over 120 miles from Bristol Bay, is principally a copper deposit. The Pebble deposit’s 5.9 billion tonnes of measured and indicated mineral resources contain an estimated 55 billion pounds of copper, 3.3 billion pounds of molybdenum, and 67 million ounces of gold. Its 4.84 billion tonnes of inferred resources contain an estimated 26 billion pounds of copper, 2.3 billion pounds of molybdenum, and 40 million ounces of gold. The Pebble deposit also contains significant amounts of silver, rhenium and palladium¹. IHS was commissioned to conduct a benchmark assessment of the potential economic contributions to Alaska and the Lower 48 states of a “conceptual” Pebble Mine (also referred to as “the mine” in this report), comparable in size and scale to the plans PLP will ultimately submit for approval. Although IHS Global Insight utilized preliminary planning information provided by PLP as key inputs for the models used to assess the potential long term economic contributions of the “conceptual” Pebble Mine, IHS Global Insight is exclusively responsible for all of the analysis and content within this report. Additional comprehensive economic studies will be needed as the development plan is further refined and finalized.

Potential average annual economic contribution of the Pebble Mine²



		Alaska	Lower 48	Total
Construction Phase (years 1-5)	Jobs supported	4,725	11,450	16,175
	Contribution to GSP/GDP	\$400m	\$1,175m	\$1,575m
	Government revenues (federal and state & local)	Federal: \$54m S&L: \$27m	Federal: \$128m S&L: \$114m	\$ 323m
Initial Production Phase (years 5-29)	Jobs supported	2,890	11,825	14,715
	Contribution to GSP/GDP	\$1,140m to \$1,435m	\$1,290m	\$2,430m to \$2,725m
	Government revenues (federal and state & local)	Federal: \$164m to \$218m S&L: \$165m to \$213m	Federal: \$176m S&L: \$165m	\$670m to \$772m
Potential Subsequent Development Phase (20-year period)	Jobs supported	2,750	13,900	16,650
	Contribution to GSP/GDP	\$2,140m to \$2,360m	\$1,520m	\$3,660m to \$3,880m
	Government revenues (federal and state & local)	Federal: \$410m to \$460m S&L: \$351m to \$396m	Federal: \$200m S&L: \$195m	\$1,156m to \$1,251m

¹ ‘Mar. 18th, 2010 SEDAR filing of NI 43-101 Technical Report by Northern Dynasty Minerals,’
<http://www.sedar.com/DisplayCompanyDocuments.do?lang=EN&issuerNo=00003151>

² The direct contributions to GDP and government revenues will be affected by the value of production of the Pebble Mine. For this study two refined-metal price forecasts, one from IHS and one from mining, metal, and fertilizer industry analysis firm CRU, were used to establish a range for the value of production of the Pebble Mine. To approximate the value of the ore concentrates, the price forecasts were discounted 12% to remove estimated refining and transportation costs. As such, the contribution to GDP and government revenues attributable to the direct operations of the Pebble Mine are presented as ranges in the above table and elsewhere in this study.

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

While more detailed results are presented throughout this report, the table above captures the salient top-line average annual impacts of the Pebble Mine³. For each year of the Construction Phase (CP), the mine will, on average, support over 16,000 jobs across Alaska and the Lower 48, contribute \$400 million to Alaska's gross state product (GSP) and \$1.6 billion to US gross domestic product (GDP), and generate total government revenues of \$323 million. The average annual contributions over the 25-year Initial Production Phase (IPP) will include supporting nearly 15,000 workers. Additional annual contributions of the IPP include: increasing Alaska's GSP by more than \$1.1 billion, contributing more than \$2.4 billion to US GDP, and generating over \$670 million in government revenues. IHS also estimates that approximately 17% of the measured, indicated, and inferred resources in the Pebble Mine will be extracted by the end of the Initial Production Phase; therefore, IHS developed a high-level assessment of the potentially significant economic contributions the Pebble Mine could make during Potential Subsequent Development Phases (PSDPs). Any potential subsequent development of that resource will be dependent on the technology developments and economics at that time, as well as the issuance of new project permits and National Environmental Policy Act (NEPA) review.

Presently, PLP does not have a definitive, approved, and permitted development plan in place. Therefore, IHS selected a snapshot of PLP's ongoing engineering plans to serve as a proxy for the construction, operating, and production schedules necessary to develop the economic contribution assessment. Then, IHS segmented the Pebble engineering plans into three distinct phases with the following characteristics and modeled the potential economic impacts of each phase.

Construction Phase (years 1–5): The first phase is characterized by significant capital expenditures for equipment, structures, and other capital inputs required to develop the infrastructure that supports resource mining activities. During this phase, Alaska, in particular, and the Lower 48 states will experience an increase in economic and employment activity from the capital-intensive outlays driven by the infrastructure build-out and the preparation of the mine for resource extraction. PLP will spend approximately \$1.2 billion per year on direct capital investment and wages during the Construction Phase.

Initial Production Phase (years 5–29): This anticipated 25-year period is inclusive of the ramp-up and “steady-state” production levels of the mining operations and is limited by the duration of the first mining permit. Production is entirely dependent on the length of the initial permit as approved through the regulatory review process. Direct spending will shift to expenditures associated with the day-to-day staffing, maintenance, and operation of the Pebble Mine.

- PLP's annual operating expenses, sustaining capital expenditures, and direct labor costs will exceed \$1 billion in the IPP.
- The mine's cumulative production of copper in concentrate during the IPP is expected to be almost 5.6 million metric tons, valued between \$29.5 billion and \$30.6 billion⁴ (2011 US dollars). Annual production, which will range from about 148,000 to 314,000 metric tons, is valued between \$726.7 million and \$1.7 billion.
- With an average annual copper ore production of 222.3 thousand metric tons, the Pebble Mine would expand total US copper production by 20% above the 2011 production level of 1.1 million metric tons.⁵
- The cumulative value of mineral concentrates produced during the Initial Production Phase will reach between \$47.8 billion and \$55.1 billion, with a peak annual production value between \$2.9 billion and \$3.3 billion (in 2011 US dollars).

³ Appendix B contains an overview of methodologies used to model the economic contributions and tax implications of the Pebble Mine. Appendix D provides detail on the metal price forecasts and the valuation of Pebble Mine output.

⁴ IHS Global Insight's metal forecast produced a lower valuation; the CRU's metal forecasts produced a higher valuation.

⁵ US Geological Survey, Mineral Commodities Summary, January 2012

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Potential Subsequent Development Phases (years 30+): Under the production assumptions used in this study, only 17% of the mine's measured, indicated, and inferred mineral resources will be extracted by the end of year 29 and, if the same mining rate is maintained in subsequent years, some 42% will be extracted by year 50. The volume and grade of the ore extracted from the Pebble Mine is expected to rise beyond year 29, potentially driving the average annual valuation of the concentrates to over \$3 billion (a 50% increase over the valuations during the IPP). Based on these assumptions, IHS developed top-line estimates of the potential ongoing annual economic contributions during a 20-year Potential Subsequent Development Phase (years 30 through 49): almost 2,800 jobs in Alaska and 14,000 jobs in the Lower 48, while contributing over \$3.6 billion to US GDP.

Barring any financial, permitting, or physical limitations that may curtail assumed production levels of the Pebble Mine, IHS estimates three such 20-year PSDPs could be possible before exhaustion of the mineral resources. Given the degree of uncertainty, this estimation is not a prediction by IHS; instead, it is intended to underscore that the Pebble Mine could have a viable life that extends well beyond the IPP. Potential Subsequent Development Phases are not certain and would be contingent on many factors, including undergoing an extensive multi-agency regulatory review process and separate permit authorization.

Each phase will result in broad levels of economic contributions for Alaska and the Lower 48 states. To accurately quantify the corresponding economic and employment effects associated with the Pebble Mine, IHS developed methodological approaches to capture the unique economic contributions of the Construction, Initial Production, and Potential Subsequent Development Phases⁶. The dimensions of economic contribution assessed for each phase included: employment; value added [contribution to Alaska's GSP and US GDP]; and labor income. These dimensions were quantified on three distinct sublevels:

- **Direct contribution**, which is the effect of a core industrial sector (in this case mining);
- **Indirect contribution**, which is the impact on the supplier industries; and
- **Induced contribution**, which captures the effects triggered by workers employed in the direct and indirect industries spending portions of their income in the general economy.

Finally, government revenues were modeled on the federal and state levels, including state mining licensing taxes and royalty payments as well as severance tax payments to the Lake and Peninsula Borough (where the Pebble Mine would be located).

IHS enhanced the economic contribution assessment with a qualitative perspective based on a review of supplementary social research and interviews with stakeholders in the region. A limited number of interviews were conducted to provide further context into the region's demographics, industry composition, and expected economic impacts. While the region's residents cannot fully envision how the proposed mine's operations will affect their communities and businesses, many have already witnessed opportunities related to Pebble's exploratory work in the area. As the mine moves to the operating phase, stakeholders expect the region would benefit from diversified job opportunities, increases in disposable income, improved transportation and shipping infrastructure, and other capital improvements funded through local taxes paid by PLP. Stakeholders in the immediate area acknowledge that the mine's development is politically divisive, both in the state and in their communities, but are generally optimistic that this project will lead to new economic opportunities in the nearby villages.

⁶More detail on the methodologies used to model the potential economic contributions and government revenues of the proposed Pebble Mine are presented in Appendix B.

The Economic and Employment Contributions of a Conceptual Pebble Mine
to the Alaska and United States Economies

Average economic contributions of the Pebble Mine to Alaska and the Lower 48



Construction Phase	Direct	Indirect	Induced	Total
Jobs Supported	2,525	925	1,275	4,725
Average Wage (\$)	\$75,000	\$65,000	\$39,000	\$63,500
Contribution to GSP/GDP	\$210m	\$90m	\$100m	\$400m
Value Added/worker (\$)	\$83,000	\$97,500	\$78,500	\$84,500
Government Revenues			<u>Average Annual</u>	<u>5-Year Cumulative</u>
Federal			\$54m	\$270m
State			\$27m	\$135m
Initial Production Phase	Direct	Indirect	Induced	Total
Jobs Supported	915	1,175	800	2,890
Average Wage (\$)	\$109,500	\$68,000	\$37,500	\$72,500
Contribution to GSP/GDP*	\$970m to \$1,265m	\$110m	\$60m	\$1,140m to \$1,435m
Value Added/worker (\$)*	\$1,060,000 to \$1,382,500	\$93,500	\$75,000	\$394,500 to \$496,500
Government Revenues*			<u>Average Annual</u>	<u>25-Year Cumulative</u>
Federal			\$164m to \$218m	\$4,100m to \$5,450m
State Taxes			\$115m to \$151m	\$2,875m to \$3,775m
State Royalty Payments			\$21m to \$29m	\$525m to \$725m
Severance Taxes Paid to L&P Borough			\$29m to \$33m	\$725m to \$825m
Potential Subsequent Dev. Phase	Direct	Indirect	Induced	Total
Jobs Supported	1,050	800	900	2,750
Average Wage (\$)	\$114,500	\$75,000	\$44,500	\$80,000
Contribution to GSP/GDP*	\$1,990m to \$2,210m	\$80m	\$70m	\$2,140m to \$2,360m
Value Added/worker (\$)*	\$1,895,000 to \$2,105,000	\$100,000	\$78,000	\$778,000 to \$858,000
Government Revenues*			<u>Average Annual</u>	<u>20-Year Cumulative</u>
Federal			\$410m to \$460m	\$8,200m to \$9,200m
State Taxes			\$261m to \$291m	\$5,220m to \$5,820m
State Royalty Payments			\$45m to \$55m	\$900m to \$1,100m
Severance Taxes Paid to L&P Borough			\$45m to \$50m	\$900m to \$1,000m

* a). Ranges derived by merging model results of IHS and CRU metal price forecast scenarios.

b). The increase in GSP/GDP contribution and Taxes in the IPP and PSDP relative to the CP reflect the high value-added of the ore concentrates produced by the Pebble Mine.



Construction Phase	Direct	Indirect	Induced	Total
Jobs Supported	--	6,250	5,200	11,450
Average Wage (\$)		\$68,000	\$48,000	\$59,000
Contribution to GSP/GDP	--	\$725m	\$450m	\$1,175m
Value Added/worker (\$)		\$116,000	\$86,500	\$102,500
Government Revenues			<u>Average Annual</u>	<u>5-Year Cumulative</u>
Federal			\$128m	\$640m
State			\$114m	\$570m
Initial Production Phase	Direct	Indirect	Induced	Total
Jobs Supported	305	6,070	5,450	11,825
Average Wage (\$)	\$109,500	\$75,500	\$47,500	\$63,500
Contribution to GSP/GDP	--	\$820m	\$470m	\$1,290m
Value Added/worker (\$)		\$135,000	\$86,000	\$109,000
Government Revenues			<u>Average Annual</u>	<u>25-Year Cumulative</u>
Federal			\$176m	\$4,400m
State Taxes			\$165m	\$4,125m
Potential Subsequent Dev. Phase	Direct	Indirect	Induced	Total
Jobs Supported	350	7,150	6,400	13,900
Average Wage (\$)	\$114,500	\$79,500	\$48,500	\$66,000
Contribution to GSP/GDP	--	\$970m	\$550m	\$1,520m
Value Added/worker (\$)		\$135,500	\$86,000	\$109,500
Government Revenues			<u>Average Annual</u>	<u>20-Year Cumulative</u>
Federal			\$200m	\$4,000m
State Taxes			\$195m	\$3,900m

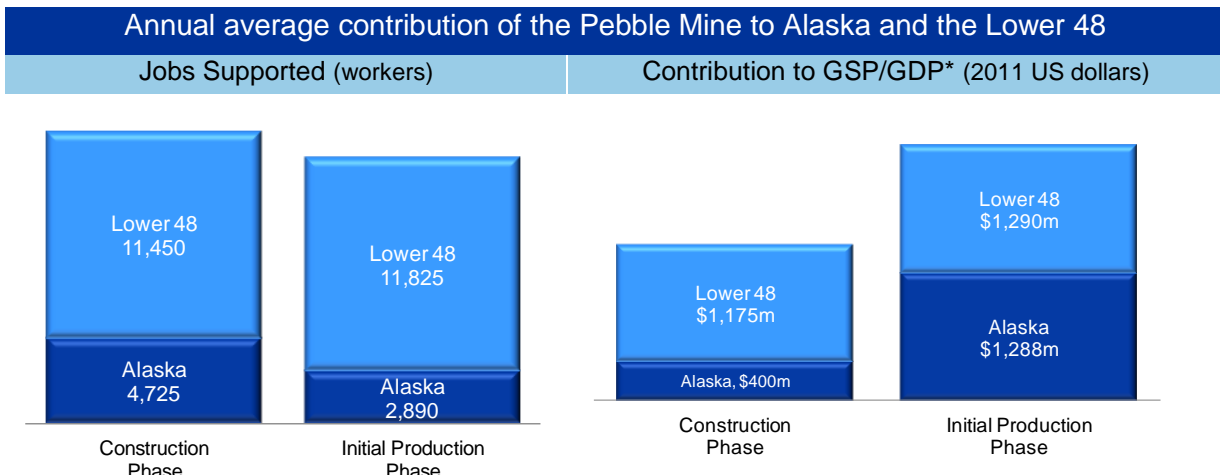
Source: IHS Global Insight

TABLE OF CONTENTS

Executive summary	iii
1. Introduction	1
The structure of this report	3
How economic contributions are reported	3
2. Overview of the Pebble Mine	4
3. Economic contribution to the Alaska economy	7
Employment contribution.....	8
Value-added contribution to GDP and labor income	9
Government revenue and taxes	10
4. Economic contribution to the Lower 48 state economies	11
Employment contribution.....	12
Value-added contribution to GDP and labor income	13
Government revenue and taxes	14
5. Potential Subsequent Development Phases	15
6. Qualitative economic impact analysis	17
Conclusion	25
Appendix A: Economic contribution of the Pebble Mine: summary tables	27
Appendix B: Modeling approach and methodology	32
Modeling the economic contribution of the Construction Phase	35
Modeling the economic contribution of the Initial Production Phase	37
IMPLAN model	42
Appendix C: Data requirements and assumptions	47
Appendix D: Price assumptions and valuation of Pebble Mine output	54
Pebble Mine production forecasts and valuation of output	57

1. Introduction

The Pebble Limited Partnership has the potential to develop one of the most significant discoveries of copper, gold, molybdenum, and silver in the world. The poly-metallic prospect, located 200 miles southwest of Anchorage, Alaska, and over 120 miles from Bristol Bay, is principally a copper deposit. The Pebble deposit's 5.9 billion tonnes of measured and indicated mineral resources contain an estimated 55 billion pounds of copper, 3.3 billion pounds of molybdenum, and 67 million ounces of gold. Its 4.84 billion tonnes of inferred resources contain an estimated 26 billion pounds of copper, 2.3 billion pounds of molybdenum, and 40 million ounces of gold. The Pebble deposit also contains significant amounts of silver, rhenium and palladium. IHS was commissioned to conduct a benchmark assessment of the potential economic contributions to Alaska and the Lower 48 states of a "conceptual" Pebble Mine, comparable in size and scale to the plans PLP will ultimately submit for approval. Although IHS Global Insight utilized preliminary planning information provided by PLP as key inputs for the models used to assess the potential long term economic contributions of the "conceptual" Pebble Mine, IHS Global Insight is exclusively responsible for all of the analysis and content within this report. Any proposed mining plan will be subject to an exhaustive, multi-year regulatory review process involving multiple state and federal agencies, and an extensive public comment period. Thus, additional comprehensive economic studies will be needed as the development plan becomes more refined and finalized.



Source: IHS Global Insight

*Alaska's GDP contribution during the Initial Production Phase shown above is the average of the IHS and CRU metals pricing scenario results

The activities associated with building and operating the Pebble Mine have the potential to create significant economic benefits in terms of employment, government revenues, and value-added contributions to GDP. During the Construction Phase (CP), the project will require various mining-related machinery and equipment, trucks, and other equipment and crews to develop the required infrastructure and commence the mining activities. The Construction Phase is expected to start in year 1 and continue for five years. The Initial Production Phase (IPP) is expected to extend from year 5 to year 29. Potential Subsequent Development Phases (PSDPs) are assumed to continue beyond year 29, with extraction continuing until the economic and technical exhaustion of the resource. The project will require billions of dollars in capital investment and thousands of employees working directly in the mining industry, working for companies that

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

supply services and materials to the mine, and working in ancillary industries throughout Alaska and the Lower 48 economies. The contributions of these activities to Alaska and the Lower 48 economies include:

- **Employment:** During the Construction Phase (years 1–5), activities as a result of the Pebble Mine are expected to contribute on average over 4,700 jobs to the Alaskan economy and almost 11,500 to the Lower 48. During the Initial Production Phase (years 5–29) the average number of jobs contributed in Alaska is expected to approach 2,900 while the Lower 48 will gain almost 12,000.
- **GDP:** Annual average value-added contribution in Alaska during the Construction Phase is expected to approach \$400 million per year and grow to between \$1.1 and \$1.4 billion during the IPP. Annual average value-added (GDP) contribution to the Lower 48 during the Construction Phase is estimated at \$1.2 billion per year and is expected to modestly increase to \$1.3 billion during the IPP.
- **Government Revenue:** During the IPP, the Pebble Mine will generate between \$16.8 and \$19.3 billion in federal, state, and local taxes. Alaska will realize between \$136 and \$180 million in annual state taxes and royalty payments. The cumulative 25-year total for Alaska will range from \$3.4 to \$4.5 billion.

The Lake and Peninsula Borough will collect from \$29 million to \$33 million each year in severance taxes, adding up to \$725–825 million over the Initial Production Phase.

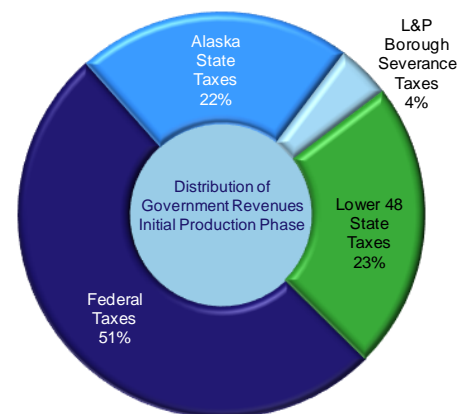
The Lower 48 states will collect a total of \$4.1 billion in state taxes (averaging \$165 million annually) during the IPP.

The federal government will reap a cumulative total of \$8.5–9.9 billion, equivalent to about \$340–395 million for each year of the Initial Production Phase.

Pebble Mine development would also include various infrastructure investment options that may enhance the local economy, including a multi-modal port, power plant, and a transportation corridor. It is anticipated the development of this infrastructure would create additional value for the local communities, including potentially lower power expenses, easier access to transportation, and lower shipping costs, as well as opportunities for economic growth and diversification.

This study separately examines the economic contributions of: capital expenditure requirements during the CP; and the operating expenditures and revenues associated with the Pebble Mine's potential production levels of copper, gold, silver, and molybdenum during the IPP. Also, a high-level assessment of a 20-year Potential Subsequent Development Phase was developed. The economic contributions of these phases were calculated using IHS Global Insight's economic impact assessment models, which generate estimates of the resultant jobs, value-added contribution to GDP, labor income, and government revenues in the State of Alaska and the Lower 48.

Government revenue distribution
(based on an averaging of IHS and CRU pricing scenarios)



Source: IHS Global Insight

The structure of this report

The main body of this report is divided into six sections and a conclusion. Four appendices provide detail on the methodologies, research, and data relied upon for our analysis.

- **Section 1** serves as an introduction to the study and its key findings.
- **Section 2** provides an overview and background of the Pebble Mine.
- **Section 3** presents the anticipated contribution of the Pebble Mine to the Alaska economy.
- **Section 4** presents the anticipated contribution of the Pebble Mine to the Lower 48 economies.
- **Section 5** provides insight into the potential contribution to Alaska and the Lower 48 economies from Potential Subsequent Development Phases.
- **Section 6** presents a qualitative impact analysis in the state of Alaska.
- **Conclusion** summarizes the main findings and conclusion of the economic contribution assessment.
- **Appendix A** includes summary tables of the economic contribution results presented in the main body of this report.
- **Appendix B** presents the modeling approach underlying the economic contribution analysis.
- **Appendix C** provides an overview of the study's data requirements.
- **Appendix D** includes details on the potential Pebble Mine production schedules as well as the IHS and CRU commodity price outlooks used to determine valuations of the Pebble Mine production.

How economic contributions are reported

Employment contribution

This study focused on the economic contribution during two distinct phases of the Pebble Mine. The first is the Construction Phase (years 1–5) during which many construction and manufacturing jobs will be supported. The Initial Production Phase (years 5–29) will see many of these jobs change in focus as infrastructure build-out ends, leaving jobs mainly in the direct core industry (mining) and indirect supplier industries. These phases were separately analyzed and results for each phase are presented in this report. In addition, summary estimates of the potential impacts of a representative 20-year Potential Subsequent Development Phase were developed.

Value-added contribution to GDP/GSP

Value added is the difference between the sales price and the production cost of products or services (i.e., total value added is revenue less external purchases of intermediate goods and services). The frequently cited US GDP is simply the sum of value added across all products and services produced in the United States. The corresponding measure for a state is gross state product, or GSP. Both GDP and GSP are generally considered the broadest measure of the health of a national or state-level economy. Thus, assessing the value-added contribution of the Pebble Mine demonstrates the vital role it could play to Alaska, the Lower 48, and US economies.

Labor income contribution

A subcomponent of value added is labor income, which captures the compensation (wages and benefits) paid to workers. A common measure of the relative contribution of an industry to the overall economy is labor income per worker. The higher the ratio, the greater is each worker's quality and contribution to growth.

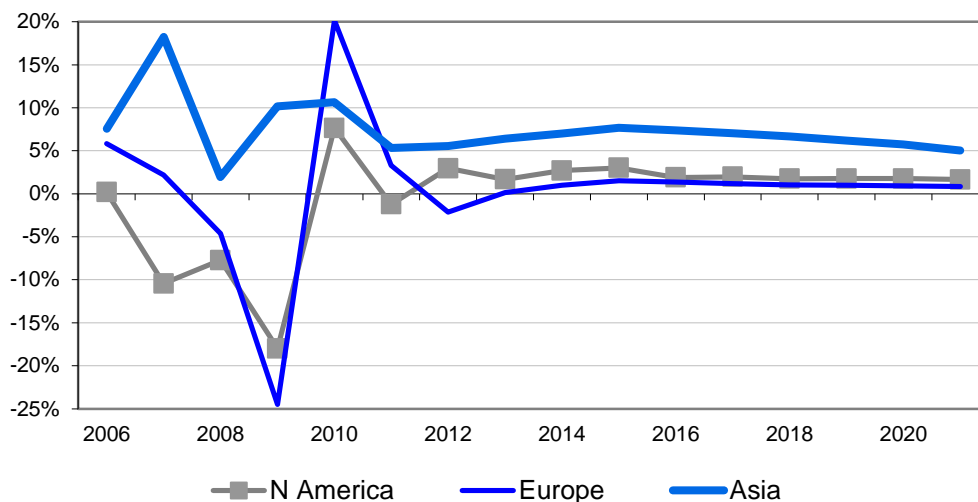
Government revenues

Increased activity in the mining industry will increase the federal, state and local government taxes paid by PLP, its employees, its extensive supply chain, companies in ancillary industries, and so on.

2. Overview of the Pebble Mine

Fueled by globalization trends and growing industrialization in emerging markets, the world has witnessed a commodities boom since 2004; despite recent sluggishness in the global economy, the consensus outlook for commodities broadly suggests long-term buoyancy in the market. Although short-term market drivers such as ultra-low interest rates will likely yield to tightening credit conditions, the underlying fundamentals of commodities demand are encouraging. Favorable mega-trends include underlying global population growth and the rise of a global middle class hungry for consumer goods. Additionally, as emerging economies endowed with abundant natural resources seek to diversify their economic structures to include downstream production of value-added goods, demand for raw material inputs will remain vigorous.

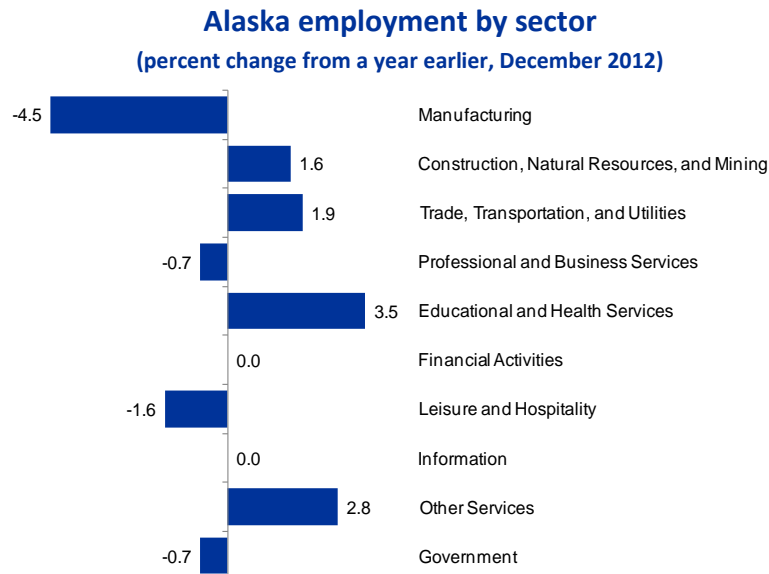
Long-term base metals consumption growth
(percent change from a year earlier)



Source: IHS Global Insight

As shown in the chart on the following page, for Alaska, construction, natural resources, and mining will continue to be a dominant driver of the state economy. Although oil production has experienced a decline from its peak of two million barrels per day to approximately 550,000 barrels per day today, the sector may experience resurgence during the new age of unconventional fuels. Natural resource exploration and development holds the greatest promise for above-trend employment and revenue growth. Against this backdrop, development of the Pebble Mine in southwest Alaska is moving to the forefront of a dialogue that spans jobs, regional economic development, environmental considerations, national resource strategy and, fundamentally, a sustainable way of life—economically, environmentally, and culturally.

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies



Source: IHS Global Insight, BLS

The Pebble Mine, to be located southwest of Anchorage, Alaska, would have Iliamna/Newhalen and Nondalton as its nearest communities. The Pebble deposit's 5.9 billion tonnes of measured and indicated mineral resources contain an estimated 55 billion pounds of copper, 3.3 billion pounds of molybdenum, and 67 million ounces of gold. Its 4.84 billion tonnes of inferred resources contain an estimated 26 billion pounds of copper, 2.3 billion pounds of molybdenum, and 40 million ounces of gold. The Pebble deposit also contains significant amounts of silver, rhenium and palladium. The measured, indicated, and inferred mineral resources would place the Pebble Mine among the largest mineral deposits in the world.

Advocates for mining the deposit highlight the tremendous potential for job and revenue creation for the Alaska economy. A 50:50 partnership between a subsidiary of Anglo American and a subsidiary of Northern Dynasty Minerals, the Pebble Limited Partnership continues to conduct an exploration drilling program to further ascertain the extent of mineral resources, as well as other technical, engineering, and environmental studies to facilitate mine planning and prepare for federal and state permitting under the National Environmental Policy Act (NEPA). Mineral extraction would require significant capital investment and would initially utilize open-pit mining methods, with opportunities for both open-pit and underground mining methods for deeper, higher-grade portions of the deposit after the IPP. PLP has not yet pursued the requisite development permits because a development project plan is in the formative stages. The focus of this study is to provide an objective understanding of the potential economic contributions to Alaska and the Lower 48.

The region of southwest Alaska in which the Pebble Mine would be located has already experienced new business and employment opportunities tied to PLP's exploration of the area. Those interviewed noted that local transportation businesses (helicopter, barge, and fixed-wing airplane) have already increased their customer base, and that PLP has also created business opportunities for catering, lodging, construction, field activities and consulting businesses. Stakeholders interviewed in the region anticipate significant economic benefits would occur during the IPP. Although hard for them to quantify at this time, the anticipated positive economic impacts include an increase in jobs, disposable income, new tax revenue for the nearby villages,

state, and country, access to lower-cost and diversified food products and goods, more affordable energy, improved education and health services, and overall increased choices for employment and spending.

To fully assess the broad-based economic impacts of the development of the Pebble Mine, PLP engaged IHS Global Insight to model the economy-wide contributions at the Alaska, Lower 48, and US national levels. The quantitative analysis is buttressed by a qualitative assessment that examines regional social impacts derived from stakeholder interviews. IHS Global Insight has also drawn from our nonferrous metals and mining experts to inform the modelling process and to provide important context with respect to the dynamics of the global commodities markets. The IHS economic impact analysis also integrates insights and knowledge from the McDowell Group, an Alaska-based economic consulting firm.

Project planning at the Pebble Limited Partnership is an ongoing process, such that a definitive mine plan has yet to be completed. To facilitate this study, PLP shared with IHS a planning iteration from its ongoing engineering work for a conceptual mine that is typical of the size and scale of operation that Pebble intends to permit, build and operate. This conceptual mine plan is indicative only, rather than determinative. Data from this planning iteration served as one of the input sources for IHS's economic impact assessment models.

PLP has requested that all of the physical and operating parameters associated with this conceptual mine plan not be presented in this study to avoid any confusion about the specific project design that will ultimately be proposed for permitting. Characteristics of the conceptual mine plan utilized in this study include:

- A conventional open pit mining operation for both the initial production period and possible subsequent development phases;
- Standard infrastructure required under any project design –including a port facility, self-generation power facilities and a transportation corridor to connect the port to the mine site;
- Capital costs, operating costs and production profiles as reported in subsequent sections of this report;
- Industry standard labor complements;
- Industry standard environmental management, including reclamation, closure and monitoring.

IHS initiated a three-stage process to translate the schedules into a set of input data for the IMPLAN⁷ and IHS-proprietary models utilized to assess the Pebble Mine's potential economic contribution to the Alaska and Lower 48 economies.

The first stage involved a series of working sessions between the Pebble Limited Partnership, the McDowell Group, and IHS to map spending levels in the preliminary capital, operating, and sustaining capital schedules to the primary industries that would provide the products and services specified in those schedules. North American Industry Classification System (NAICS) codes were used during this mapping exercise. This step was followed by a series of working meetings to determine the most likely sourcing region (Alaska, Lower 48, and Non-US) for each expenditure category. This stage was one of the most critical steps of the analysis because it determined the regional sourcing of the inputs, which are key drivers of economic contribution. Finally, IHS mapped separately the spending-by-NAICS code for Alaska and the Lower 48 to the IMPLAN industry scheme.

⁷ www.implan.com

3. Economic contribution to the Alaska economy

During the five-year Construction Phase, capital investment will be made to build the infrastructure required to sustain mining operation. Alaska will enjoy opportunities for job creation, economic growth, and increased government revenues. The Construction Phase of the Pebble Mine will be characterized by the following economic contributions:

- More than 4,700 jobs, on average, will be created across the direct, indirect, and induced categories in Alaska—specifically, 2,525 direct jobs, 925 indirect jobs, and 1,275 induced jobs will be created.
- Driven largely by the direct employment opportunities, Alaska will add high-value jobs that generate an average annual labor income of \$300 million or nearly \$63,500 per employee—which is 25% higher than the expected \$51,000 average annual earnings for all workers in Alaska during 2012.
- Average annual total value added—contributions to Alaska’s GSP—will be about \$400 million.
- The annual average of state personal and corporate tax revenues will be about \$27 million, but they will remain relatively small when compared with the Initial Production Phase (\$115–151 million). The reason is that the Construction Phase is characterized by capital expenditures rather than income-earning activities.

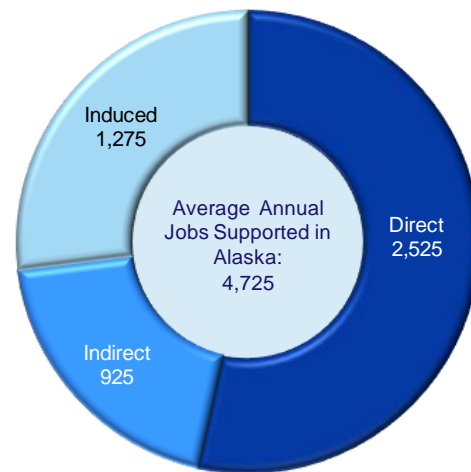
Turning to the Initial Production Phase, large-scale capital expenditures shift to operating expenditures. As a result, Alaska will experience a relative shift in the sources of opportunities for economic growth. The employment opportunities will moderate as construction jobs from the CP shift to mine production jobs. Average value added to Alaska’s gross state production and, more importantly, tax receipts become significantly larger, driven by the ongoing production activity and profitability of the mine. The economic contributions for this phase will include:

- Nearly 2,900 jobs, on average, created across the direct, indirect, and induced labor categories—915, 1,175, and 800, respectively. Under this phase, the composition of jobs shifts from direct employees to indirect employees as the broader supply chain is tapped to support ongoing operations.
- Despite the compositional shift and decline in average labor income to \$210 million, the jobs generated represent a higher average annual income per employee: direct workers in the Pebble Mine will average \$109,500 in annual compensation (more than double the state average) while the overall labor income (direct, indirect, and induced) will average \$72,500 per year.
- Average annual total value added—contributions to GSP—will reach between \$1.1 billion and \$1.4 billion or nearly 2.5–3.0% of Alaska’s 2011 state domestic product.
- Most importantly, during the IPP, the Pebble Mine will generate \$3.4–4.5 billion in additional tax receipts from mining licenses and royalty payments as well as from personal and corporate taxes for the state of Alaska (annual average of \$136–180 million). In addition, severance taxes flowing to the Lake and Peninsula Borough will average \$29–33 million each year (or \$725–825 million over the 25-year period).

Employment contribution

During the five-year Construction Phase, which encompasses the capital expenditures necessary to build the infrastructure required to sustain operations, Alaska will enjoy additional job creation opportunities, economic growth, and increased government revenues. Overall, the CP of the Pebble Mine will be characterized by an annual average of over 4,700 jobs (direct, indirect, and induced) supported across various industry sectors.

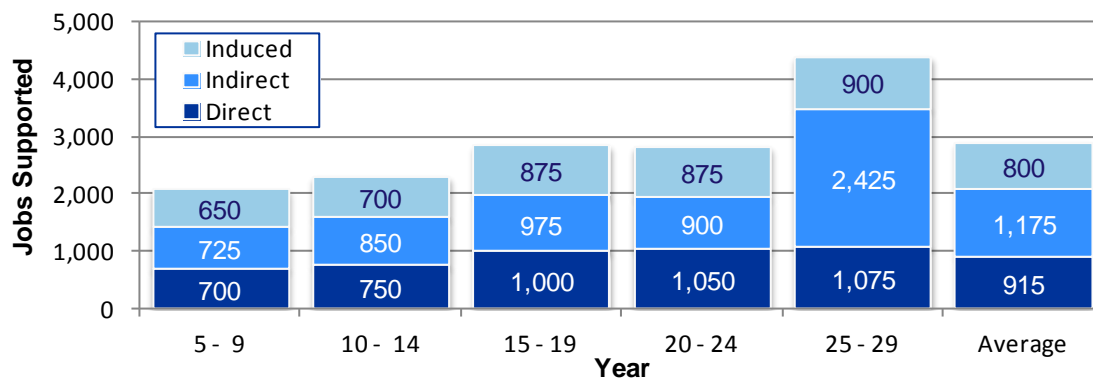
Average annual Alaska employment during the Construction Phase



Source: IHS Global Insight

Turning to the Initial Production Phase, large-scale capital expenditures will shift to operating expenses. As a result, Alaska will experience a relative shift in the sources of opportunities for economic growth. According to the Alaska Department of Labor and Workforce Development⁸, approximately 70% of metal mining workers in Alaska were Alaska residents in 2010. Based on primary research conducted by the McDowell Group and PLP's aggressive local hiring strategy, IHS assumed, on average, the mine will directly employ 1,220 workers, of which 915 (or 75%) were assumed to be Alaskan residents. The ramp-up of jobs is shown in the following chart. On average, approximately 2,900 total jobs per year will be created across the direct, indirect, and induced labor categories during the IPP in Alaska; however, under this phase, relative to the CP, the composition of jobs shifts from direct employees towards indirect employees as the broader supply chain is tapped to support ongoing operations.

Average annual Alaska employment during the Initial Production Phase



Note: A ramp-up in sustaining capital expenditures between Years 25 and 29 will drive large increases in indirect jobs.

Source: IHS Global Insight

⁸ "Nonresidents Working in Alaska, 2010" Alaska Department of Labor and Workforce Development, January 2012

Value-added contribution to GDP and labor income

During the Construction Phase, Alaska will enjoy an increase of \$400 million in its average annual gross state production. As mine production ramps up during the IPP, the annual contribution of the Pebble Mine to the Alaskan economy will more than triple: rising to over \$1.1 billion under the IHS metal price forecast scenario; \$1.4 billion under the CRU metal price forecast scenario. Most of that contribution will be derived from the value of the mineral concentrates produced by the mine.

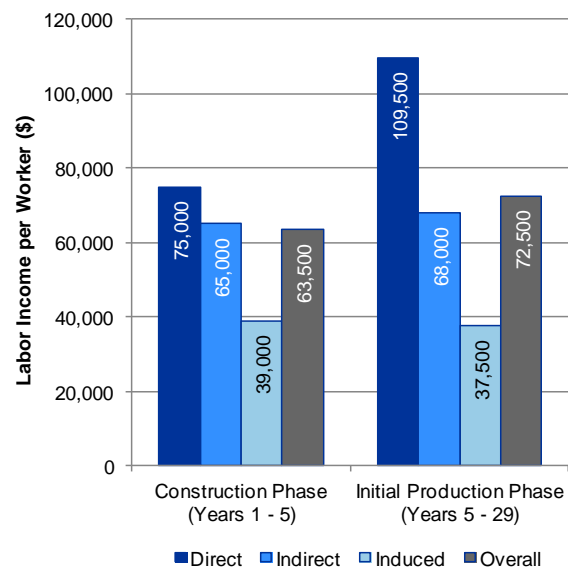
Economic contribution summary of the Pebble Mine: Alaska			
Average annual value added (2011 US dollars)			
	Construction Phase	Initial Production Phase	
		IHS Scenario	CRU Scenario
Direct	\$210m	\$970m	\$1,265m
Indirect	\$90m	\$110m	\$110m
Induced	\$100m	\$60m	\$60m
Total	\$400m	\$1,140m	\$1,435m

Source: IHS Global Insight

The average direct employee in Alaska during the CP will earn \$75,000. By comparison, the earnings of workers in indirect and induced jobs will be more subdued. For the Alaska economy, the average labor income per employee for 2012 is expected to be \$51,000, compared with \$63,500 for jobs associated with the Pebble Mine—nearly 25% higher than the state average.

This expectation is equally true for the Initial Production Phase when the average labor income for all jobs attributable to the Pebble Mine increases to \$72,500. There will be a dramatic increase in the average wages of direct employees as the construction jobs of the Construction Phase are replaced by higher-paying positions for mine workers during the Initial Production Phase. Average Labor Income per mine worker is expected to be \$109,500—more than double the state average. The higher average labor income for jobs attributable to the Pebble Mine indicates this sector is a potential growth engine for Alaska's economy over the forecast period.

**Average annual labor income
per Alaska worker**



Source: IHS Global Insight

Government revenue and taxes

As shown in the table below, IHS Global Insight estimates the average annual federal and state government revenues generated in Alaska will be \$81 million in the Construction Phase. The five-year total will be \$405 million.

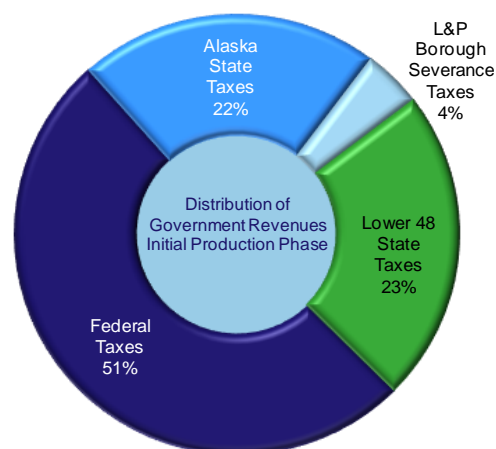
Government revenue generated in Alaska during the Construction and Initial Production Phases						
(2011 US dollars)						
	Construction Phase		Initial Production Phase IHS Scenario		Initial Production Phase CRU Scenario	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Federal Taxes	\$54m	\$270m	\$164m	\$4,100m	\$218m	\$5,450m
Personal Taxes	\$49m	\$245m	\$19m	\$475m	\$19m	\$475m
Corporate Taxes	\$5m	\$25m	\$145m	\$3,625m	\$199m	\$4,975m
State and Local Taxes and Royalty Payments	\$27m	\$135m	\$165m	\$4,125m	\$213m	\$5,325m
State Personal Taxes	\$4m	\$20m	\$2m	\$50m	\$2m	\$50m
State Corporate Taxes	\$23m	\$115m	\$69m	\$1,725m	\$90m	\$2,250m
State Mining License Tax			\$44m	\$1,100m	\$59m	\$1,475m
State Royalty Payments			\$21m	\$525m	\$29m	\$725m
Severance Taxes Paid to L&P Borough			\$29m	\$725m	\$33m	\$825m
Total Federal, State and Local Government Revenues	\$81m	\$405m	\$329m	\$8,225m	\$431m	\$10,775m

Source: IHS Global Insight

Production activity in the mine will increase the federal, state, and local government taxes paid by PLP, its employees, its extensive supply chain, companies in ancillary industries, and so on. Quantifying government revenues during the IPP will differ, depending on whether the IHS or the CRU metal price forecast is used as the basis for valuation of the ore concentrate. The IHS scenario results in an estimate of \$329 million annually and \$8.2 billion cumulatively. Using the CRU scenario will result in an estimate that is 30% higher: \$431 million per year and \$10.8 billion over the entire IPP. The chart at right shows that, under either scenario, approximately one-quarter of the government revenues will remain within Alaska. The graphic at the bottom of Page 14 shows the distribution of government revenues across Alaska, the Lower 48 and the federal government for the CP and IPP.

Government revenue distribution during IPP

(based on an averaging of IHS and CRU pricing scenarios)



Source: IHS Global Insight

4. Economic contribution to the Lower 48 state economies

The Construction and Initial Production Phases of the Pebble Mine will require a broad supply chain and a network of professional and business services. A significant portion of the supplies, equipment, and services will necessarily be sourced from the Lower 48. In addition, approximately one-quarter of the mine workers are expected to originate from the Lower 48.

PLP will spend approximately \$1.2 billion per year on capital investment and wages during the Construction Phase, generating economic opportunities in the Lower 48 states that include:

- Over 11,000 jobs, on average, created across the indirect and induced labor categories: 6,250 and 5,200, respectively.
- On balance, these jobs represent high-value opportunities that generate an average annual labor income of nearly \$675 million or nearly \$59,000 per employee—which is 28% higher than the national average annual earnings for workers of \$46,000 in 2012.
- Average annual total value added—contributions to the Lower 48 GSP and US GDP—would be nearly \$1.2 billion.
- The Lower 48 states will collect a total of \$570 million in taxes during the Construction Phase (\$114 annually). Activities in the Lower 48 during this phase will also generate federal taxes averaging \$128 million annually (\$640 million in total).

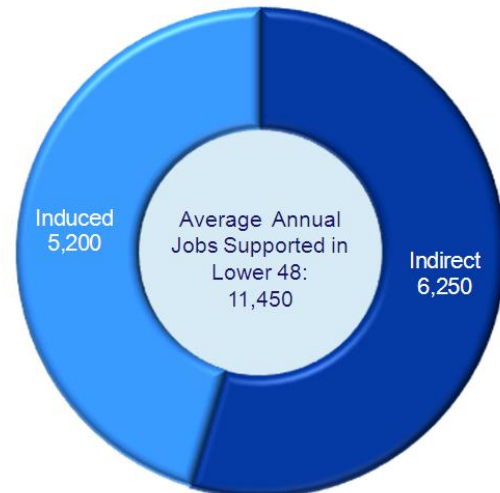
Across the Lower 48, the average annual economic contributions from the IPP will include:

- Almost 12,000 jobs created across the direct, indirect, and induced labor categories. Of these:
 - 305 non-Alaska residents are expected to work directly in the Pebble Mine. While they may work in Alaska, most of their income will flow back to their home states in the Lower 48.
 - 6,070 indirect jobs will be due to PLP's spending with suppliers in the Lower 48.
 - 5,450 induced jobs will be supported as direct and indirect workers spend portions of their income in the Lower 48.
- Bolstered by the income effect from the wages earned within the direct and indirect employment categories, these jobs will generate an average annual labor income of nearly \$750 million or \$63,500 per employee (about 38% higher than the average national wage in the United States).
- Average annual total value added—contributions to the Lower 48 GSP—will near \$1.3 billion.
- Annual personal and corporate tax revenues accruing to Lower 48 state governments will average \$165 million during the IPP. The cumulative total will reach \$4.1 billion. The corresponding federal personal and corporate taxes will amount to \$176 million annually and \$4.4 billion in total.

Employment contribution

Building and operating the Pebble Mine will require a broad supply chain and a network of professional and business services. Many of these resources will be sourced from the Lower 48, creating economic opportunities beyond the Alaskan borders. During the Construction Phase, the employment opportunities in the Lower 48 will approach 11,500 jobs per year. Driven largely by the indirect employment opportunities, these jobs represent high-value opportunities that generate an average annual labor income of nearly \$59,000 per employee, which is significantly higher than the Lower 48 average annual earnings for workers of \$46,000.

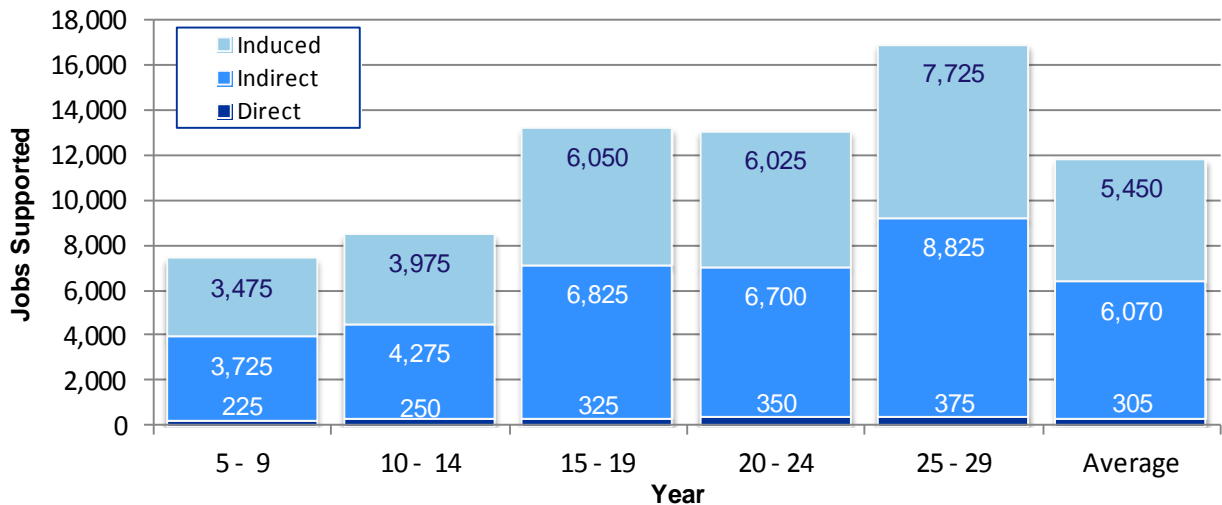
Average annual Lower 48 employment during the Construction Phase



Source: IHS Global Insight

Across the Lower 48 states, as the project shifts from the CP into the IPP, almost 12,000 jobs on average will be created across the direct, indirect, and induced categories. The forecast ramp-up of jobs is shown in five-year increments in the following chart. The direct jobs are Pebble Mine workers whose permanent residency is in the Lower 48. While they may be physically working in Alaska, most of their income will flow back to the Lower 48. Therefore, IHS classified these as direct jobs within the Lower 48.

Average annual Lower 48 employment during the Initial Production Phase



Note: A ramp-up in sustaining capital expenditures between Years 25 and 29 will drive large increases in indirect and induced jobs.

Source: IHS Global Insight

Value-added contribution to GDP and labor income

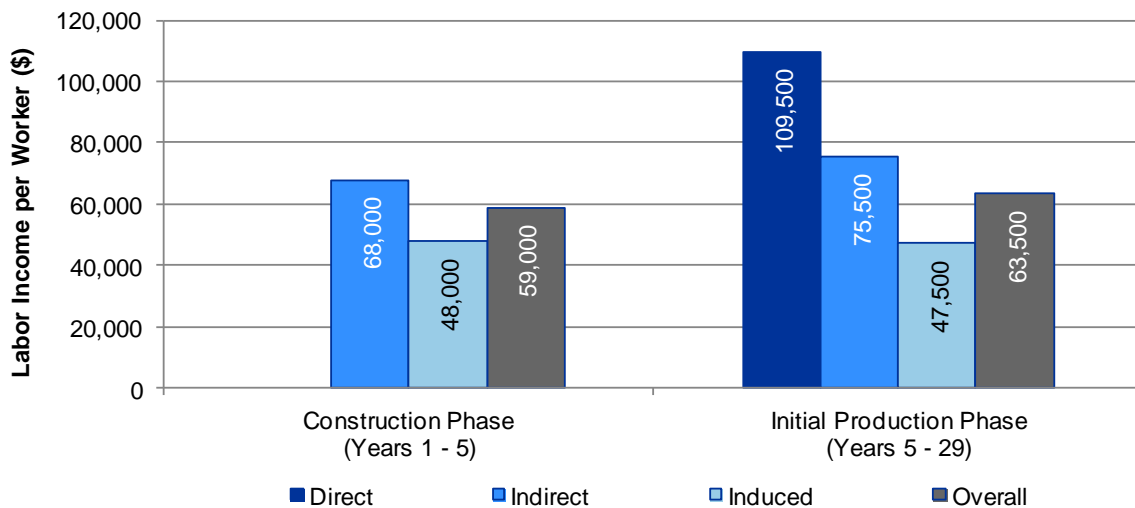
During the Construction Phase, the Lower 48 will share almost \$1.2 billion among their average annual GSPs (cumulative total is \$5.9 billion). As mine production ramps up during the IPP, the annual contribution of the Pebble Mine to the Lower 48 economy will modestly rise to \$1.3 billion per year, equivalent to more than \$32 billion over this entire phase.

Economic contribution summary of the Pebble Mine Lower 48		
Average annual value added		
(\$M)		
	Construction Phase	Initial Production Phase
Indirect	\$725m	\$820m
Induced	\$450m	\$470m
Total	\$1,175m	\$1,290m

Source: IHS Global Insight

During the Initial Production Phase, the jobs in the Lower 48 attributable to the Pebble Mine will have an average annual labor income of \$63,500 per employee, a premium of 38% above the average of \$46,000 for the Lower 48. The higher disposable income of these workers should result in a strong income effect that will drive induced consumer expenditures.

Economic contribution of the Pebble Mine to Lower 48 average annual labor income per worker



Source: IHS Global Insight

Government revenue and taxes

During both the Construction and Initial Production Phases, the federal and collective Lower 48 state governments will split tax revenues 52%/48%, respectively. Over the entire Construction Phase, the Lower 48 states will share a cumulative \$570 million in tax revenue (just under \$114 million annually), while the federal government will collect a total of \$640 million. Annual Lower 48 state government revenues will increase moderately to \$165 million during the IPP (cumulative total of \$4.1 billion). Federal government revenues will rise to \$176 million annually (or \$4.4 billion in total).

Government revenue generated in the Lower 48 during the Construction and Initial Production Phases

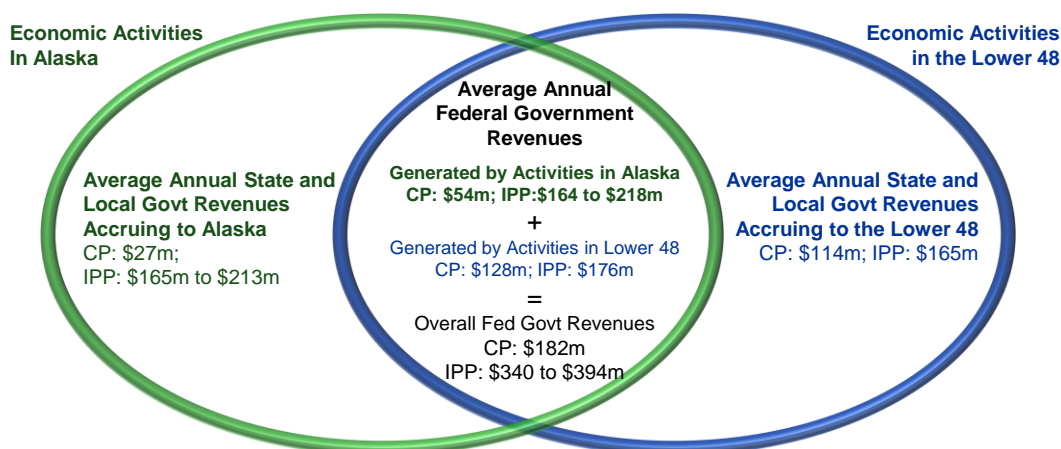
(2011 US dollars)

	Construction Phase		Initial Production Phase	
	Annual	Cumulative	Annual	Cumulative
Federal Taxes	\$128m	\$640m	\$176m	\$4,400m
Personal Taxes	\$102m	\$510m	\$136m	\$3,400m
Corporate Taxes	\$26m	\$130m	\$40m	\$1,000m
Lower 48 State Taxes	\$114m	\$570m	\$165m	\$4,125m
Personal Taxes	\$17m	\$85m	\$22m	\$550m
Corporate Taxes	\$97m	\$485m	\$143m	\$3,575m
Total Federal and State Government Revenues Generated in the Lower 48	\$242m	\$1,210m	\$341m	\$8,525m

Source: IHS Global Insight

During both the CP and IPP, indirect and induced activities in the Lower 48 will generate government revenues that are shared amongst various Lower 48 state governments and the federal government, not Alaska. The following graphic depicts the distribution of government revenues across Alaska, the Lower 48 and the federal government for the Construction Phase and Initial Production Phase.

Distribution of average annual federal, state and local government revenue



Total average federal, state and local government revenues: CP: \$323m; IPP: \$670 to \$772m

5. Potential Subsequent Development Phases

Based on the Pebble Limited Partnership's initial estimates of the measured, indicated, and inferred resources in the ground as of 2012 and its planned production levels, IHS estimates that approximately 17% of the mine's resources could be extracted by year 29 and 42% by year 50. Barring any financial, permitting, or physical limitations that may curtail assumed production levels of the Pebble Mine, IHS estimates three such 20-year PSDPs could be possible before exhaustion of the mineral resources. Given the degree of uncertainty, this estimation is not a prediction by IHS; instead, it is intended to underscore that the Pebble Mine could have a viable life that extends well beyond the IPP.

Although this study focuses primarily on the Construction and Initial Production Phases, PLP requested that IHS consider the potential economic contributions from Potential Subsequent Development Phases, beyond the IPP. Based on preliminary production, capital expenditure, and operating expense schedules provided by the PLP, IHS developed inputs for a representative 20-year PSDP, which were processed in its economic impact models to assess the potential average annual contributions to Alaska and the Lower 48 economies.

The PLP draft schedules anticipate a rise in the overall mineral grades extracted from the mine subsequent to the IPP. The net result is the annual valuation of mineral concentrates (derived by averaging the IHS and CRU price scenarios) jumps 60% from approximately \$2.1 billion during the IPP to just over \$3.2 billion during the following 20-year period. IHS used this period as the basis for developing high-level assessments of the economic contribution of Potential Subsequent Development Phases. This use results in a near-doubling of annual direct value added to the Alaska economy, as shown in the table below. It should be noted that extraction in PSDPs could be limited by physical, financial, and other constraints and require using open-pit mining methods, underground mining methods, or some combination of the two.

Average annual economic contribution during Subsequent Development Phases			
	Employment	GDP (Value Added)*	Labor Income
	(Number of Workers)	(2011 US dollars)	(2011 US dollars)
Alaska			
Direct	1,050	\$1,990 to \$\$2,210m	\$120m
Indirect	800	\$80m	\$60m
Induced	900	\$70m	\$40m
Total	2,750	\$2,140 to \$2,360m	\$220m
Lower 48			
Direct	350	--	\$40m
Indirect	7,150	\$970m	\$570m
Induced	6,400	\$550m	\$310m
Total	13,900	\$1,520m	\$920m
Grand Total, US	16,650	\$3,660 to \$3,880m	\$1,140m

* Ranges derived by merging model results of IHS and CRU metal price forecast scenarios

Source: IHS Global Insight

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

During Potential Subsequent Development Phases, the Pebble Mine could potentially support about 2,800 jobs in Alaska and about 14,000 in the Lower 48. The annual value-added contribution to Alaska's GSP would be between \$2.1 billion and \$2.4 billion, predominantly driven by the direct value added of the mine operations. The Lower 48 would see annual GSP gains of \$1.5 billion. This translates to a potential annual contribution to US GDP between \$3.6 billion and \$3.9 billion.

During PSDPs, Alaska would annually reap from \$261 million to \$291 million in state taxes and \$45–55 million in royalty payments. The Lake and Peninsula Borough could realize \$45–50 million in annual severance taxes. Each year, the Lower 48 would see aggregate state tax revenues of almost \$195 million, while the federal government will collect between \$610 million and \$660 million.

Average annual government revenue during Potential Subsequent Development Phases			
(2011 US dollars)			
	Alaska*	Lower 48	US Total*
Federal Taxes	\$410m to \$460m	\$200m	\$610m to \$660m
Personal Taxes	\$15m	\$155m	\$170m
Corporate Taxes	\$395m to \$445m	\$45m	\$440m to \$490m
State and Local Taxes and Royalty Payments	\$351m to \$396m	\$195m	\$546m to \$591m
State Personal Taxes	\$1m	\$25m	\$26m
State Corporate Taxes	\$150m to \$165m	\$170m	\$320m to \$335m
State Mining License Tax	\$110m to \$125m		\$110m to \$125m
State Royalty Payments	\$45m to \$55m	--	\$45m to \$55m
Severance Taxes Paid to L&P Borough	\$45m to \$50m	--	\$45m to \$50m
Total Federal, State and Local Government Revenue	\$761m to \$856m	\$395m	\$1,156m to \$1,251m

* Ranges derived by merging model results of IHS and CRU metal price forecast scenarios

Source: IHS Global Insight

6. Qualitative economic impact analysis

In addition to the technical economic analysis, IHS conducted supplementary interview-based research of regional economic stakeholders to obtain a qualitative perspective on the economic impacts of the Pebble Mine development and operations. Given the timeframe for this analysis, the number of interviews conducted was limited, but the resulting information presents an overview of the region's industry composition and regional stakeholders' perception of the main economic benefits that are expected from the mine's exploratory and production phases.

Many local stakeholders anticipate a positive impact on employment opportunities, income levels, tax revenue, access to diversified food products, goods, fuel, and improved education and health services. Nonetheless, many of the region's business owners and residents seek to further understand how the mine's development and operations will affect their businesses and communities over the long term. Regional stakeholders that have benefitted financially from PLP's exploratory activities addressed positive economic impacts they have already witnessed and expect that such trends will continue for at least another five years before PLP secures the required permits. While stakeholders had limited quantitative evidence to support their views regarding the mine's potential economic influence, their viewpoints regarding the economic value of the mine's development seemed to be closely tied to their location within the region, industry, and perception of the opportunities to benefit financially from the mine's operations.

Demographic profile

The Pebble Mine would be located in the Lake and Peninsula Borough. The five closest villages are Iliamna, Newhalen, Nondalton, Port Alsworth, and Pedro Bay. The majority of nearby residents are Alaska Natives, meaning they have active tribal councils and Native corporations that control some of the land and its use. Residents rely heavily on subsistence activities, and many of the villages have more than a third of their population living at or below the poverty level, according to federal income guidelines. The lowest incomes are in the village of Nondalton, with 48% of the village population with income below poverty level. A *Workforce Analysis for Southwest Alaska's Large Mines* conducted by the Alaska Department of Labor and Workforce Development also reported that one in five southwest Alaska working-age residents made an unemployment insurance claim at some point in 2010.

Nearby villages struggle with finding opportunities for economic diversification and the lack of employment opportunities has made it challenging to maintain the local population. The entire Bristol Bay region, which includes the Dillingham Census Area, Bristol Bay Borough, and Lake and Peninsula Borough, is home to 5,394 working-age residents, and many of the villages within it are quite small. The chart below gives an overview of the population of the five villages closest to the site where the Pebble Mine would be developed.

**The Economic and Employment Contributions of a Conceptual Pebble Mine
to the Alaska and United States Economies**

Village Name	Population (2011 est)¹	SW Alaska Workers (2010)²	Residents Employed (2010)³	Percent American Indian or Alaska Native (2010)⁴	Median Age (2010)⁵
Iliamna	110	85	33	54.1	29.9
Newhalen	189	47	63	80	22.8
Nondalton	178	86	52	63.4	28.8
Port Alsworth	156	32	48	21.4	25.1
Pedro Bay	47	21	9	66.7	40

NOTES:

¹ 2011 Alaska Department of Labor Estimate

² Workforce Analysis for Southwest Alaska's Large Mines. September 2011. Alaska Department of Labor and Workforce Development, Research and Analysis Section

³ Alaska Department of Commerce, Community, and Economic Development
Division of Community & Regional Affairs, Research and Analysis Section, Alaska Community Database Community Information Summaries

⁴ Alaska Department of Commerce, Community, and Economic Development. Division of Community & Regional Affairs, Research and Analysis Section, Alaska Community Database Community Information Summaries

⁵ Alaska Department of Labor and Workforce Development, Research and Analysis Section. Alaska Census Data, 2010.

In many of these communities, people have migrated from their village to Anchorage or other places where they can find employment. Ventura Samaniego, CEO of Kijik Corporation, which is the Alaska Native village corporation for the community of Nondalton, explains the difficult situation in Nondalton: "The Nondalton population declined by 26% between 2000 and 2010. Approximately half of the Kijik Corporation's shareholders now live in Anchorage." While the decline in village populations is common, some proximal communities, such as Port Alsworth, have witnessed recent growth. Further, mineral exploration has certainly contributed to new workers coming into the region in the past decade.

Industry composition and largest employers

The regional economy near the proposed Pebble Mine site is heavily dependent on public-sector employment (governments, tribal entities, schools, etc.), trade, transportation, and utilities, the fishing industry, and tourism, in addition to jobs associated with PLP's spending on mine exploration, which has increased significantly since 2004.

The *Workforce Analysis for Southwest Alaska's Large Mines* completed by the Alaska Department of Labor and Workforce Development in September 2011, explains:

"The public sector is the largest employer in Southwest Alaska. Local government—which includes school districts and city, borough, and tribal governments—employs 40% of current Southwest workers. Trade, transportation, and utilities—which includes retailers—is the second-largest industry in Southwest Alaska, employing 16% of current residents; followed by education and health services, which employs 13%. Manufacturing, which includes seafood processing, employs 9% of the Southwest resident workforce. These four industries make up three-quarters of Southwest resident

worker employment, showcasing the lack of diversity in the industry composition of Southwest Alaska.”⁹

Many of the region’s residents have grown up dependent on fishing as a way to feed their families, and many participate in the seasonal fishing industry. According to the Alaska Department of Fish and Game, “Bristol Bay is the largest sockeye salmon fishery in the world and the most valuable single salmon fishery in Alaska.”⁸

Historically, commercial fishing and fish processing have been a large part of the region’s economy, but primarily offer only seasonal employment. Processing benefits are largely concentrated where canneries are located and fish processing and shipping occurs, such as Dillingham, Naknek, South Naknek, and King Salmon. In past years, the number and percentage of commercial fishing permits held by local Alaskans declined and the price per pound of salmon dropped significantly.¹⁰ Lisa Reimers, CEO of the Iliamna Development Corp., explains how this has affected her family and the community at large. “As the daughter of a commercial fisherman, I grew up fishing, but the industry is no longer providing opportunities for a sustainable source of employment. Before the Iliamna Development Corp. got contracts with Pebble, we were struggling. Commercial fishing prices had declined. Salmon went from \$2.00/lb to \$0.40/lb, so the economics weren’t there to make your salary for the year in just a few months. To get to the fish runs, you had to charter a plane for roughly \$3,000. Then you had to put money aside for mending nets and food. All told, you’d already be up to \$10,000 in expenses, before you even started fishing. At \$0.40/ lb, there was no way to catch enough fish to have a sustainable income.”

Although commercial fishing income to the region has declined, thousands of sport fishermen visit the area near Lake Clark and Iliamna Lake each summer to fish for trophy rainbow trout.¹¹ Visitors also travel to the region for wildlife viewing, hunting, hiking, kayaking, and general outdoor enthusiasm. As with fishing, the opportunities for building a tourism business tied to hunting have declined in recent years. Tim LaPorte, owner of Iliamna Air Taxi, explains, “Our business survived previously in summer months from hunting by tourists. We used to have five float planes operating 500 hours per year serving 700 hunters. Last year we operated 216 hours with two float planes.”¹²

While economic challenges persist, the broader Bristol Bay area does contain a number of local lodges, housing either tourists or Pebble employees, consultants, and researchers. The Bristol Bay Native Corporation (BBNC), which represents over 9,000 shareholders with ties to the region and owns 40 subsidiary companies around the world, has made general statements regarding its long-range plans to increase investments in local businesses.¹³ In addition to their four main investment categories of petroleum distribution, oilfield and industrial services, government services, and construction services, the BBNC annual report stated they plan to expand into tourism and they see the tourism industry as a potential

⁹ *Workforce Analysis for Southwest Alaska’s Large Mines*. September 2011.

¹⁰ *Socioeconomic Review of Alaska’s Bristol Bay Region*. Prepared for North Star Group by Marie Lowe, Assistant Professor of Anthropology, Institute of Social and Economic Research. University of Alaska—Anchorage. 2007.

¹¹ Alaska Department of Commerce, Community, and Economic Development Division of Community & Regional Affairs, Research and Analysis Section, Alaska Community Database Community Information Summaries

¹² Tim La Porte explains that the caribou herds have gone from over 200,000 to 16,000 in recent years.

¹³ Bristol Bay Native Corporation, 2012 Annual Report. <http://www.bbnc.net/images/stories/BBNC-report2012.pdf>

avenue to increase employment opportunities while co-existing with the region's culture. Meanwhile, John Baechler, Sr. owns four lodges in Iliamna and leases them all to PLP, providing opportunities for local employment. Despite the local employment generated by Pebble's accommodation requirements in Iliamna, the majority of the Bristol Bay region's lodging employees come from outside Alaska.¹⁴

Finally, the region hosts a number of transportation service businesses, including helicopter and airplane flight services, barge services, and other freight and passenger transportation services.

Impact of the Pebble Mine on local employment

Overall, much of the region is economically disadvantaged, and jobs are scarce. The areas near the proposed Pebble Mine have high unemployment rates, a large percentage of underemployed workers, and have witnessed significant migration of their residents to urban areas where better job opportunities are available. Of the 5,394 working-age residents living in the Bristol Bay region, just 63% of the area's working-age population worked in 2011, and just over 35% of those worked all four quarters of 2011.¹⁵

The Alaska Department of Labor and Workforce Development reports that the workers who remain in southwest Alaska are "underutilized," with the majority of the region's residents working seasonally in construction, fishing, or firefighting. Community information summaries provided by the Alaska Department of Commerce's Division of Community & Regional Affairs (DCRA) show residents obtain summer employment in the Bristol Bay fisheries, with Iliamna Lake tourism services, or with the lodges, outfitters, or guides catering to summer recreational enthusiasts. The area's residents rely heavily on subsistence activities, with salmon, trout, grayling, moose, caribou, rabbit, porcupine, sheep, seal, and other game, fish, and plants all providing sources of food.

Interviews with local stakeholders confirmed that the potential presence of the Pebble Mine has changed the region's employment opportunities. Those interviewed noted that the main opportunities to benefit during the exploration phase were tied to providing transportation services (of people, equipment, and fuel), catering, and lodging, and support for other exploration and development related field activities, but that mine operations would have even more significant economic effects on the region.

Some of those who have already benefitted financially are in Iliamna, the location of the Pebble Limited Partnership's operational headquarters. Lisa Reimers explains, "Even with no mine, the existence of Pebble has brought a positive impact for the economics of the Iliamna community. Without Pebble, we wouldn't have anything." Her village corporation, Iliamna Natives Limited and its subsidiary, the Iliamna Development Corp., approached Northern Dynasty Minerals five years ago for a "seat at the table" and now have contracts with PLP for catering, fuel, freight, and barging. They also have employed managers working in Iliamna.

¹⁴ Alaska Department of Commerce, Community, and Economic Development Division of Community & Regional Affairs, Research and Analysis Section, Alaska Community Database Community Information Summaries

¹⁵ State of Alaska Department of Labor and Workforce Development, Research and Analysis Section, Alaska Local & Regional Information, 2011.

Abe Williams, a former assemblyman on the Bristol Bay Borough Assembly, also sees the current benefits and anticipates future ones: “The area has such a negative outlook and high cost of living. Anything we can do would be positive, including the direct and indirect jobs that would come from Pebble. Community members are now working on exploration as drillers and laborers. These jobs were created in a region where there were zero economic opportunities. The jobs are 100% turnaround from the past, when employment was always sporadic, inconsistent, and seasonal.”

As Pebble brings in researchers, biologists, mechanics, surveyors, and drillers, the region’s air companies are among those who benefit the most. Glen Alsworth, owner of Lake Clark Air, which employs 47 people with a 2011 payroll of approximately \$750,000 to the Lake Clark/Nondalton area, sees the “opportunity tied to transporting people.” He notes that his business, which primarily serves the tourism industry (fishing lodges and outdoor enthusiasts), received 7% of its customer base last year from “Pebble people.” While Alsworth has not calculated how development of the mine will translate directly into new income, he anticipates his customer base will grow as people travel for work and residents gain expendable income that allows them to buy goods that need to be transported. Tim LaPorte, the owner of Iliamna Air Taxi, has also seen a similar boost to his business due to Pebble’s presence in the region. He explains, “[Pebble] has been the saving factor for the air taxi business; it helped steady the air taxi to provide continuity of air service.”

Ventura Samaniego, who has been with Kijik Corporation for four years, explains that the “biggest thing that Pebble did was create business opportunity.” He clarifies, “There are few air carriers set up to service exclusively heavy industry. We were able to gain this strategic insight from working with Pebble. Kijik had been dormant, from a business perspective, prior to our Pebble relationship. When Pebble started working with us, it allowed us to build a resume for our subsidiary, Kijik Aviation Services, and build key teaming relationships with Alaska-based air operators. After two years of working with Pebble, we were able to meet the business history requirement of the [US Small Business Administration] that enabled us to pursue our 8(a) certification. We eventually achieved this certification and are now seeking federal contract opportunities, as well as examining heavy industry opportunities throughout Alaska, in conjunction with our teaming partners.” Samaniego not only anticipates growth in Kijik Corporation’s air service business, but also believes mine development could lead the Kijik Corporation to serve as one of the mine’s suppliers of needed aggregate and concrete materials. In addition to the local businesses that have benefitted already (vehicle rental services, lodging, catering, construction, helicopter and fixed-wing airplane transportation, barge transport, and personnel services), the region’s small businesses could benefit by supplying the mine with gravel or other needed materials that are abundant locally.

While many see the economic opportunity tied to the development of the Pebble Mine, other lodge managers and tourism industry businesses have concerns that mine operations could threaten the region’s water quality, wildlife habitats, and attractiveness to tourists as a remote, undeveloped location for wilderness tourism and wild salmon fishing.

Workforce training

New business opportunities created by the mine translate into prospects for regional employment for workers of all types, from pilots to mechanics, and from administrative staff and office managers to senior managers. Some stakeholders interviewed were uncertain whether all new positions could be filled by local residents.

In the *Workforce Analysis for Southwest Alaska's Large Mines*, the Alaska Department of Labor and Workforce Development reported that "Major resource extraction projects in remote areas face certain challenges, especially in rural Alaska, where large population centers are scarce and much of the local population lives in small, isolated communities. When these projects are the first of their kind in the region, otherwise willing-and-able workers may not have the specific skills required." Samaniego points out, "For some village populations, adequate training may not be the only issue. Substance abuse is a serious issue affecting local employment."

These issues aside, training programs will be required, and several are already available through the University of Alaska, village corporations, local vocational schools (such as the one in King Salmon), and company-specific training.¹⁶ For example, Iliamna Development Corporation, with support from PLP, is obtaining training for local people on how to work in the kitchen, offers programs for carpenters and mechanics, and also teaches how to work with fuel trucks and freight trucks.

While programs such as the Aviation Maintenance Technology program are available at the University of Alaska-Anchorage,¹⁷ all of the region's air transportation providers note a shortage of aircraft mechanics, pilots, and maintenance technicians in America overall, and especially in the region. Tim LaPorte recounts, "I have a standing offer to hire locals who get a pilot's license or mechanic's license. I haven't gotten one pilot or mechanic from this area in 40 years. Instead, we get pilots from all over the U.S. And there is especially a shortage in mechanics, all over the world."

Thus, the demand for new workers, new skills, and new certifications that meet requisite environmental, health, and safety compliance standards, present both opportunities and challenges. On one hand, the mine's operations in the area could create new career and employment opportunities in the local region and encourage local companies to make upgrades that will benefit everyone. At the same time, as locals may not be prepared immediately to participate in the labor force and it will take time to train and educate workers into the more skilled and professional positions, local competition for skilled employees will likely increase, and some talent will likely have to be brought in from outside the region.

Tax revenue

In addition to the economic effects resulting from new jobs and new business opportunities, stakeholders shared the expectation that PLP's current operations and the mine's future development would have a positive impact on the region's tax revenue, as well as on tax revenues for the state and country as a whole.

¹⁶ For a full list of training programs see McDowell's draft report, *Pebble Project: Workforce Development Plan*, Appendix D—University & Other Training.

¹⁷ <http://www.uaa.alaska.edu/aviation/academics/atmaintenance.cfm/>

One stakeholder suggested that the “tax revenue impact will be huge,” not just because of the “incredible state and federal impacts,” but also because local people would no longer be reliant on unemployment insurance or public subsidies for their economic livelihood.

When compared with the fisheries business and landing taxes the borough collected of \$463,354 in 2011¹⁸, and other fisheries revenue sharing which in total provide between \$1.5 - \$2m in annual revenue to the Lake & Peninsula Borough, the preliminary estimates of average annual severance tax receipts of \$29–33 million could prove transformational to the Lake and Peninsula Borough.

Former assemblyman Williams believes benefits from the Pebble Mine’s development would be broadly based, far more than the opposition acknowledges: “The tax revenue could help the school district with money for new schools, help growing schools stay open, and overall allow local governments to invest in capital projects that they’ve put off for lack of resources.”

Effects of broader infrastructure developments

Given the remote location of the proposed site of Pebble Mine, development will require building a source of power to run the mine, as well as a port, and other transportation infrastructure that will not only make mine operations possible, but also contribute to the region’s economic opportunities and adjust the costs of power, food, fuel, and other services.

One of the main economic challenges noted by stakeholders throughout the region was the high cost of energy, due to the lack of a local power generation facility and the need to import fuel into the area by either airplane or barge. Although the geographic dispersion of villages would make it hard to develop transmission lines that would decrease electricity prices across the region, stakeholders are hopeful that the development of the Pebble Mine would help lower residents’ costs of energy. Lake Clark Air owner Glen Alsworth notes how important a decrease in the cost of electricity could be to his business and family: “My electric bill every month is \$5,000 for the business and my home. I would love to cut this down with more affordable power.”

In some cases, PLP’s exploratory operations have already lowered fuel prices and increased access, as was the case for the Iliamna Development Corp., which contracted with Pebble to become its fuel supplier, offering an alternative to independent fuel service providers, who shipped fuel in by plane from Kenai. Others mentioned the value of road and shipping corridors to get goods and services across the region, as well as the increased opportunities that would be tied to import/export services. Given that much of the land around the proposed mine site is owned by Native corporations, Alaskan Natives can benefit financially from the leasing of their land for transportation needs, as well as from the ease of transportation it will provide.

Whereas the development of infrastructure is viewed positively by many, those whose businesses thrive on the Bristol Bay region’s remote wilderness setting see the construction of transportation and industrial infrastructure as a potential threat to their livelihood. The development of transportation infrastructure could also decrease the cost of food for residents near the proposed Pebble Mine site, as well as increase

¹⁸ Source: UFA Community Commercial Fishing and Seafood Processing Fact Sheets – Version 2012-1, page 15

the variety of available foods. According to Reimers, transporting goods by barge (such as canned food) versus flight has lowered the costs of food by as much \$0.40 per pound. Also, a deepwater port could allow imports of food from low-cost providers in other parts of Alaska or anywhere in the world. Right now, the high costs of bringing goods into the region by air and local transport prevent affordable, diverse food products from entering the region on a regular basis.

Finally, the stakeholders interviewed for this study expect development of the Pebble Mine would have other favorable economic influence on their communities, such as that related to the healthcare and education systems. By increasing the local tax base, offering job opportunities for young people, increasing incomes, and improving mobility, many stakeholders expect that the proposed Pebble Mine will lead to more disposable income in the region, a better education system, increased access to medical care, and more opportunities to “go off to school.” While these stakeholders believe the development of the mine could lead to an overall more “livable community,” others were concerned that the mine’s development would force a change to the region’s subsistence lifestyle and culture.

Local stakeholder opposition and support

The anticipated magnitude of economic impact on the region surrounding the proposed mine site might be mitigated by the level of public knowledge about the project, career opportunities and the entrepreneurial or business development activities that could ensue. Further, concerns about the risks to other industries in the area, such as tourism or fishing, are largely based on speculation, rather than hard data or deeper consumer research using data from PLP and the Bristol Bay region. For example, while some say that an “Open pit mine is not very pleasing aesthetically,” others interviewed reckon that the mine’s draw of people to the area would only increase tourism, that “people wouldn’t know [the mine] was there unless you showed it to them,” and that new opportunities for tourism business could emerge such as “mine tours.” As for the threat to the commercial fishing industry, others believe the project will be held to extremely high environmental standards and will not be permitted if there is any scientific evidence the mine would be built at a cost to Bristol Bay fisheries. Stakeholders contend the mine would allow the region to diversify its economy beyond commercial fishing, lessening dependence on an industry that pays low wages, offers only seasonal employment, and hires a largely nonresident workforce.

Also, given that Native corporations control local land resources and non-Native people are not allowed to buy land in the area, many suggest that the opportunities for industry development and economic benefit are all in the “hands of the Natives.” Native populations could benefit from the Pebble Mine’s development by participating in mining-related activities, building up the area’s lodging and tourism industry, building transportation service businesses, or doing other “normal things that happen in cities.”

While stakeholders interviewed acknowledge the aesthetic concerns, potential for environmental risk and cultural changes that the region would undergo, many are also optimistic that the Pebble Mine will lead to new economic opportunities in the region. Lisa Reimers in Iliamna concludes, “People here want iPods, computers, and clothes. We want to live in the village, but we also want a choice. If you want progress, you have to adjust to change.”

Conclusion

The Pebble Limited Partnership has the potential to develop one of the most significant discoveries of copper, molybdenum, gold, and silver in the world. IHS was commissioned to conduct an assessment of the potential economic impact on Alaska and the Lower 48 states during a five-year Construction Phase (CP) and 25-year Initial Production Phase (IPP) of the Pebble Mine. A summary assessment of Potential Subsequent Development Phases (PSDPs) was also developed. Because the Pebble Mine does not have a definitive, approved, and permitted development plan in place, IHS was provided with the investment, operating, and production schedules of a “conceptual” development plan. The intent of this study was to establish a preliminary benchmark of the potential economic impacts the mine. More comprehensive economic assessments will be needed as the development plan becomes more refined and finalized.

The Construction Phase (years 1–5) will be characterized by significant capital expenditures as the infrastructure required for the mine is established. The Initial Production Phase (years 5–29) represents the extraction activities associated with the steady-state operation of the mine during the initial permitting period. For the State of Alaska, key findings of this study include:

- Some \$1.2 billion of capital investment per year is expected between year 1 and year 5.
- During the CP, the Pebble Mine will support an average of 4,725 jobs in Alaska and support nearly 2,900 jobs per year during the IPP. The mining operations will support, on average, 1,220 direct jobs, of which 915 (or 75%) will go to Alaskan residents.
- Operating and sustaining capital expenditures during the Initial Production Phase will exceed \$1 billion per year between year 5 and year 29.
- Under the IHS metal price forecast scenario, the average value of produced mineral concentrates expected during the IPP will be approximately \$1.9 billion, reaching a peak of \$2.9 billion. The corresponding figures under the CRU scenario are \$2.2 billion and \$3.3 billion, respectively.
- The Pebble Mine’s contribution to Alaska’s GSP will be \$400 million per year during the CP and will reach between \$1.1 billion and \$1.4 billion per year during the IPP.
- During the Initial Production Phase, the Pebble Mine will generate significant fiscal benefits for the state of Alaska—\$136–180 million per year from state taxes and licensing fees, and royalties. The Lake and Peninsula Borough stands to collect between \$29 million and \$33 million in severance taxes annually.
- The region has already experienced new business and employment opportunities tied to PLP’s exploration of the area. Those interviewed noted that local transportation businesses (helicopter, barge, and fixed-wing airplane) have already increased their customer base, and that PLP has created business opportunities for catering, lodging, field activities, construction, and consulting businesses.

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

The Pebble Mine will also make an amplified contribution to the Lower 48 states as the major supply-chain industries will continue to provide support to Alaska's industrial sectors. The benefits to the broader US economy are as follows:

- During the Construction Phase, the Pebble Mine will support an average of almost 11,500 jobs in the Lower 48 economy and employment contribution will register close to 12,000 per year during the Initial Production Phase.
- The Pebble Mine's contribution to Lower 48 GSPs would be more than \$1.2 billion per year during the CP and would increase modestly to \$1.3 billion per year during the IPP.
- The average annual state government revenue collectively accruing to the Lower 48 is expected to be \$114 million during the Construction Phase and \$165 million during the Initial Production Phase. The corresponding federal government revenues would be \$128 million and \$176 million, respectively.

Overall, the economic activities associated with the Pebble Mine could support over 16,000 jobs in the US during the CP and almost 15,000 jobs during the IPP. A total of \$1.6 billion could be added to US GDP during the CP. This figure increases to \$2.4–2.7 billion during the IPP. The federal government could collect a total of more than \$900 million in taxes during the Construction Phase and \$8.5–9.9 billion over the 25-year Initial Production Phase.

The economic and employment contributions demonstrated through this study reflect the significant capital intensity requirements of developing and operating the Pebble Mine, the ability to source inputs from many domestic sources, the coast-to-coast structure of the supply chain required to build and operate the mine, and the high quality of the jobs created. As the project moves beyond the capital-intensive Construction Phase, these economic contributions will be sustained and significant additional tax revenue realized over the 25-year Initial Production Phase. In the final analysis, the combined economic and employment contributions from the development and operation of the Pebble Mine would be felt across the entire country.

Appendix A: Economic contribution of the Pebble Mine: summary tables

The average annual contribution during the Construction, Initial Production, and Potential Subsequent Development Phases are summarized in the following tables.

Summary of employment, value added, and labor income contribution
attributable to the Pebble Mine

Summary: Contribution of the Pebble Mine to the United States Economy

Average annual employment

(Number of workers)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	2,525	915 (Alaska); 305 (L48)	1050 (Alaska); 350 (L48)
Indirect	7,175	7,245	7,950
Induced	6,475	6,250	7,300
Total	16,175	14,715	16,650

Average annual value added

(2011 US dollars)

	Construction Phase	Initial Production Phase*	Potential Subsequent Development Phase*
Direct	\$210m	\$970m to \$1,265m	\$1,990m to \$2,210m
Indirect	\$815m	\$930m	\$1,050m
Induced	\$550m	\$530m	\$620m
Total	\$1,575m	\$2,430m to \$2,725m	\$3,660m to \$3,880m

Average annual labor income

(2011 US dollars)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	\$190m	\$130m	\$160m
Indirect	\$485m	\$540m	\$630m
Induced	\$300m	\$290m	\$350m
Total	\$975m	\$960m	\$1,140m

* Ranges derived by merging model results of IHS and CRU metal price forecast scenarios

Source: IHS Global Insight

Summary of employment, value added, and labor income contribution
attributable to the Pebble Mine (continued)

Summary: Contribution of Pebble Mine to the Alaska Economy

Average annual employment

(Number of workers)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	2,525	915	1,050
Indirect	925	1,175	800
Induced	1,275	800	900
Total	4,725	2,890	2,750

Average annual value added

(2011 US dollars)

	Construction Phase	Initial Production Phase*	Potential Subsequent Development Phase*
Direct	\$210m	\$970m to \$1,265m	\$1,990m to \$2,210m
Indirect	\$90m	\$110m	\$80m
Induced	\$100m	\$60m	\$70m
Total	\$400m	\$1,140m to \$1,435m	\$2,140m to \$2,360m

Average annual labor income

(2011 US dollars)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	\$190m	\$100m	\$120m
Indirect	\$60m	\$80m	\$60m
Induced	\$50m	\$30m	\$40m
Total	\$300m	\$210m	\$220m

* Ranges derived by merging model results of IHS and CRU metal price forecast scenarios

Source: IHS Global Insight

Summary of employment, value added, and labor income contribution
attributable to the Pebble Mine (continued)

Summary: Contribution of the Pebble Mine to the Lower 48 Economy

Average annual employment

(Number of workers)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	--	305	350
Indirect	6,250	6,070	7,150
Induced	5,200	5,450	6,400
Total	11,450	11,825	13,900

Average annual value added

(2011 US dollars)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	--	--	--
Indirect	\$725m	\$820m	\$970m
Induced	\$450m	\$470m	\$550m
Total	\$1,175m	\$1,290m	\$1,520m

Average annual labor income

(2011 US dollars)

	Construction Phase	Initial Production Phase	Potential Subsequent Development Phase
Direct	--	\$30m	\$40m
Indirect	\$425m	\$460m	\$570m
Induced	\$250m	\$260m	\$310m
Total	\$675m	\$750m	\$920m

Source: IHS Global Insight

**The Economic and Employment Contributions of a Conceptual Pebble Mine
to the Alaska and United States Economies**

Summary of federal, state, and local government revenue attributable to the Pebble Mine

Government revenue generated in Alaska during the Construction and Initial Production Phases

(2011 US dollars)

	Construction Phase		Initial Production Phase IHS Scenario		Initial Production Phase CRU Scenario	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
Federal Taxes	\$54m	\$270m	\$164m	\$4,100m	\$218m	\$5,450m
Personal Taxes	\$49m	\$245m	\$19m	\$475m	\$19m	\$475m
Corporate Taxes	\$5m	\$25m	\$145m	\$3,625m	\$199m	\$4,975m
State and Local Taxes and Royalty Payments	\$27m	\$135m	\$165m	\$4,125m	\$213m	\$5,325m
State Personal Taxes	\$4m	\$20m	\$2m	\$50m	\$2m	\$50m
State Corporate Taxes	\$23m	\$115m	\$69m	\$1,725m	\$90m	\$2,250m
State Mining License Tax			\$44m	\$1,100m	\$59m	\$1,475m
State Royalty Payments			\$21m	\$525m	\$29m	\$725m
Severance Taxes Paid to L&P Borough			\$29m	\$725m	\$33m	\$825m
Total Federal, State and Local Government Revenues	\$81m	\$405m	\$329m	\$8,225m	\$431m	\$10,775m

Source: IHS Global Insight

Government revenue generated in the Lower 48 during the Construction and Initial Production Phases

(2011 US dollars)

	Construction Phase		Initial Production Phase	
	Annual	Cumulative	Annual	Cumulative
Federal Taxes	\$128m	\$640m	\$176m	\$4,400m
Personal Taxes	\$102m	\$510m	\$136m	\$3,400m
Corporate Taxes	\$26m	\$130m	\$40m	\$1,000m
Lower 48 State Taxes	\$114m	\$570m	\$165m	\$4,125m
Personal Taxes	\$17m	\$85m	\$22m	\$550m
Corporate Taxes	\$97m	\$485m	\$143m	\$3,575m
Total Federal and State Government Revenues Generated in the Lower 48	\$242m	\$1,210m	\$341m	\$8,525m

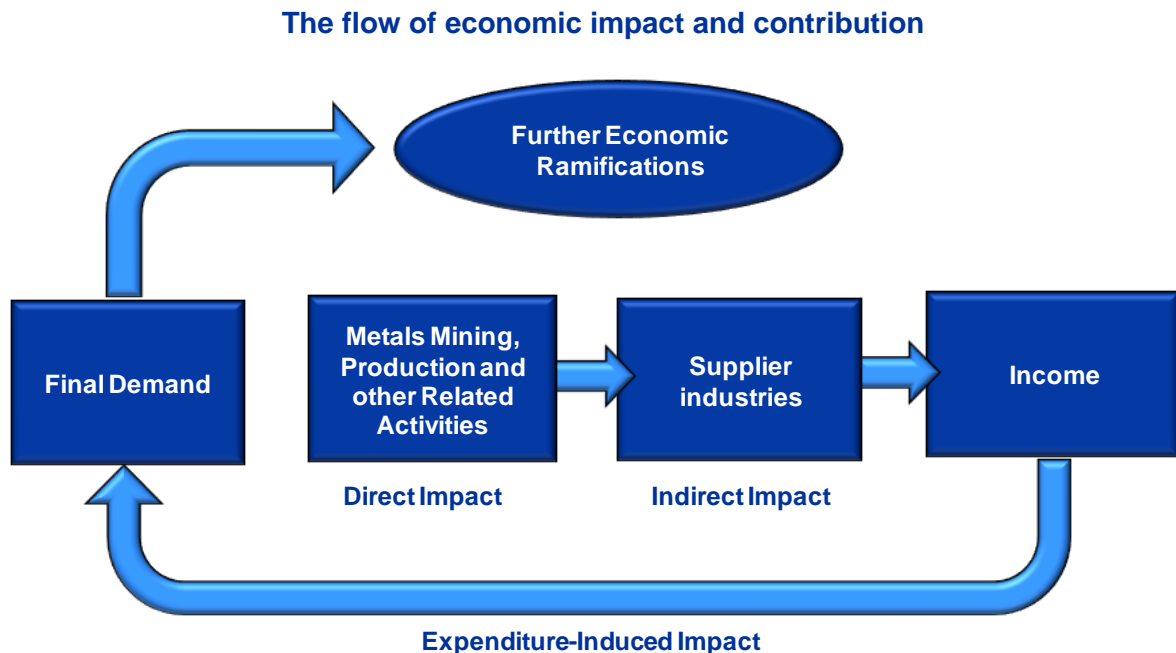
Source: IHS Global Insight

Appendix B: Modeling approach and methodology

The goal of this study was to objectively assess the potential economic contribution of the proposed Pebble Mine by capturing all of the direct, indirect (supply-chain), and induced (income) effects associated with the mine's activities in Alaska and the Lower 48 states. The capital, operating, and sustaining capital expenditure estimates that were provided by PLP were integrated into a modeling system to capture the comprehensive contribution of the Pebble Mine to the Alaska and the Lower 48 economies.

The steps used to derive the economic contribution of any industry can be summarized as follows:

- Any dollar of industrial revenue (in this case, the mining industry) results in direct repercussions on GDP;
- Furthermore, any dollar of trade expenditure (spending with suppliers) results in indirect repercussions on final demand. Theoretically, an increase of copper production, with everything else constant, would lead to more revenue and output among supplier industries, such as chemicals, machinery, and professional services. This increase would also result in higher US demand for manufactured products such as pumps and cement, which in turn require more fabricated metal and steel products. These are only a few of the repercussions in the supply chain resulting from activities of the Pebble Mine.



Copper mining and production use many different types of products and services from the mining, manufacturing, services, and other sectors. Thus, a change in the copper mining industry would result in both direct effects (through production) and indirect effects (via supply-chain dynamics) across a broad spectrum of sectors. The contribution to these supplier industries has repercussions on their supply chains, thereby magnifying the indirect contribution.

As further explained below, the net effects on Alaska's economy (and Lower 48) and its industrial sectors due to these contributions are divided into three classes: the direct contribution, the indirect contribution, and the induced economic contribution.

- The **direct contribution** is the effect of the core industry's output, employment, and income. For example, the copper mining industry's direct contributions are generated by the exploration, production, transport, and delivery of copper to downstream elements or by providing critical onsite services. Investments in these activities have a direct contribution to production levels (output), the number of workers employed by the industry, how much those workers are paid and otherwise compensated, etc.
- Any change in the direct purchasing activities of the copper mining industry initiates the **indirect contributions** to all of the supplier industries that support copper mining and production activities. Changes in demand (from the direct industries) lead to corresponding changes in output, employment, and income throughout the supply chains, as well as suppliers' inter-industry linkages. The affected supplier activities span selected industries in Alaska and the Lower 48 economies.
- Finally, workers and their families in both the direct and indirect industries spend their income on food, housing, leisure, autos, household appliances, furniture, clothing, and other consumer items. The additional output, employment, and income effects that result from these consumer spending activities are categorized as the **induced economic contribution**.

One of the major benefits of our approach in assessing the economic contribution is ensuring that the regional sources of inputs are carefully assigned. To this end, detailed research and input from subject matter experts were incorporated into our analysis to segment the source of the capital and operating spending in Alaska and the Lower 48.

The direct and indirect impacts represent all of the production, marketing, and sales activities that are required to bring the primary products to the marketplace in a consumable form. The use of input-output analysis allows for the quantification of indirect and indirect impacts. The sum of all impacts relative to the economy's total size provides initial benchmark estimates to evaluate the importance of a given industry. The expenditure-induced impact represents the changes consumers make when their incomes are altered.

For each stage in the analysis, the economic contribution is quantified in terms of employment, value-added contribution to GDP, and labor income. In addition, overall estimates of federal, state, and local tax revenues are calculated.

How economic contribution assessments are reported

The direct, indirect, and induced results of the economic contribution assessment are reported for Alaska, the Lower 48, and the United States as four sets of metrics: employment, value added, labor income, and government revenues. Each metric set is briefly described below.

Employment contribution

In many infrastructure-intensive commercial undertakings, the economic contribution typically occurs in two distinct phases. The first is the Construction Phase during which many construction and manufacturing jobs are created and trigger growth in indirect and induced jobs. Often, Production Phases see many of the jobs dissipate as construction and infrastructure build-outs come to an end, leaving most jobs in only the direct core industry and indirect supplier industries. In the case of the Pebble Mine, the two phases—the Construction Phase (years 1–5,) and the Initial Production Phase (years 5–29)—were separately analyzed. In addition, summary estimates of the potential impacts of the Potential Subsequent Development Phases (year 30 and beyond) were developed.

Value-added contribution

Value added is the difference between the production cost of products or services and the sales price (i.e., total value added is revenue less outside purchases of material and services). The frequently cited US GDP is simply the sum of value added across all products and services produced in the United States. The corresponding measure for a state is GSP. Both GDP and GSP are generally considered the broadest measure of the health of a national or state-level economy. Thus, assessing the value-added contribution of the Pebble Mine demonstrates the vital role it plays in the Alaska, Lower 48, and US economies.

Labor income contribution

A subcomponent of value added is labor income, which captures the compensation (wages and benefits) paid to workers. A common measure of the relative contribution of an industry to the overall economy is labor income per worker. The higher the ratio, the greater is each worker's quality and contribution to growth.

Government revenues

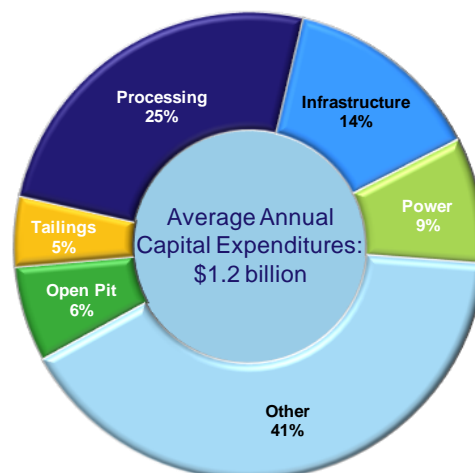
Increased activity in the mining industry will increase the federal, state, and local government taxes paid by PLP, its employees, its extensive supply chain, companies in ancillary industries, and so on.

Modeling the economic contribution of the Construction Phase

The conceptual plan used to develop the inputs required for the economic impact analysis specified five years of infrastructure and capital investments (years 1–5) during the Construction Phase. The final year of the Construction Phase is concurrent with the first year of the Initial Production Phase. In other words, during year 5 the capital expenditures of the Construction Phase will be winding down as mine production begins to ramp up.

PLP will spend approximately \$1.2 billion per year on direct capital investment and wages during the Construction Phase. The following chart presents the average distribution of the major capital expenditure categories during the Construction Phase.

Distribution of capital expenditures during the Construction Phase



Source: The Pebble Limited Partnership

The major capital expenditure categories were disaggregated into many detailed subcategories, including labor, mining equipment, electrical equipment, and steel products. The spending within each subcategory was then mapped to its corresponding source industries to derive inputs for the economic impact models. The detailed subcategories are presented in Appendix C.

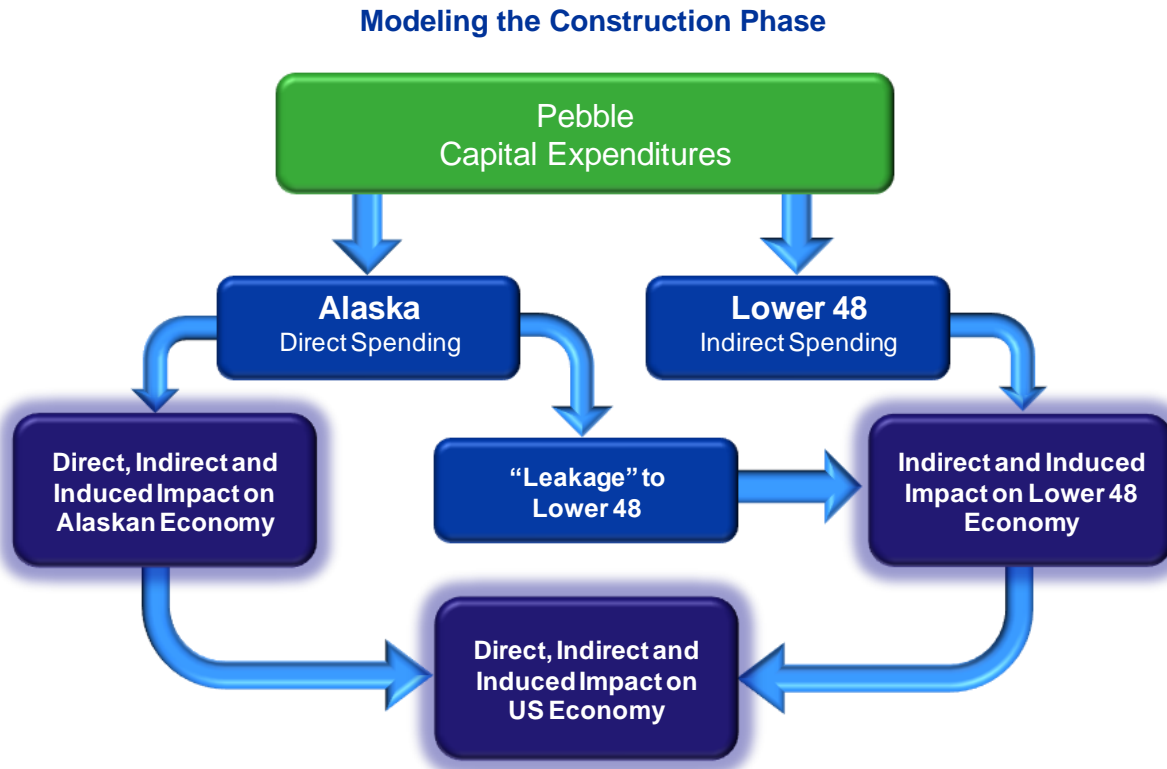
Prior to exercising the economic impact assessment models, Pebble’s estimated capital expenditures were categorized by both geography (Alaska, Lower 48, and International) as well as industry (IMPLAN sector). To assess the impact on Alaska, the direct Alaska spending was entered into the IMPLAN Alaska model. This entry produced an assessment of the direct, indirect, and induced effects on employment, contribution to GDP, and labor income attributable to the average annual spending during the Construction Phase.

A parallel process was used for the Lower 48—the initial tier of indirect spending in the Lower 48 was entered into an IMPLAN model of the region. This entry yielded only a partial result as much of the economic activity that begins in Alaska actually “leaks” to the Lower 48. For example, an Alaskan manufacturer that receives money from Pebble may need to order materials from suppliers in the Lower 48. The spending on those supplies “leaks” to the Lower 48.

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Therefore, when IHS ran the Alaska assessments, we utilized the Multi-Regional Analysis (MRA) functionality of IMPLAN. Using the MRA model, the effect of spending in one region (Alaska) on another region (the Lower 48) can be captured. IHS undertook the MRA and added the results to those obtained for the first-tier indirect contribution in the Lower 48 economies.

Finally, the Alaska and Lower 48 results were summed to assess the impact of the Pebble Mine on the overall US economy.



Modeling the economic contribution of the Initial Production Phase

The Initial Production Phase (IPP) represents the “steady state” running of the mining operations during which the concentrates are produced, and is limited only by the duration of the initial mining permit. As with the modeling done for the Construction Phase, IHS captured the “leakage” effect from Alaska to the Lower 48. Assessing the impact of the Initial Production Phase required another modification to the modeling process.

The value of the concentrates will fluctuate with the final price of the refined metals (copper, molybdenum, gold, and silver). The human and capital resources required to extract the concentrate will not exhibit a corresponding volatility. In other words, the number of mine workers and spending with suppliers are correlated with the **volume** of concentrate produced by the mine and will therefore be unaffected by shifts in the value of the concentrates. Therefore, a primary objective when assessing this phase was to decouple the value of the concentrates from the operating expenses and the sustaining capital spending.

For both Alaska and the Lower 48, the IPP economic contribution was assessed in the following three stages:

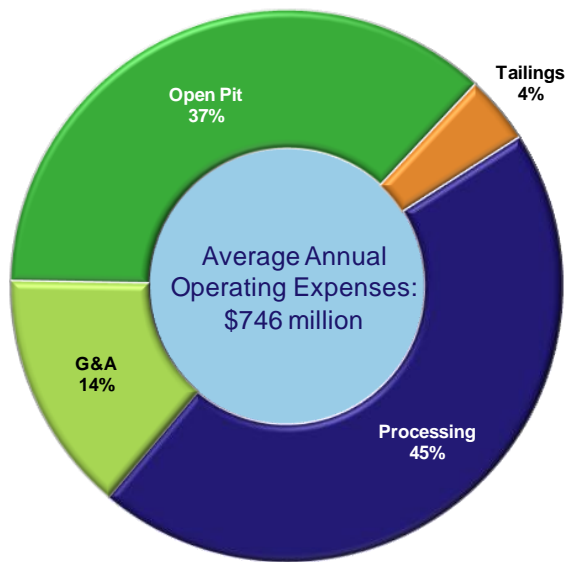
- 1) Impact of Operating Expenses,
- 2) Impact of Sustaining Capital, and
- 3) Wage Impact of Pebble Mine employees.

The value of the concentrates does affect the value-added contribution to GSP and GDP, plus it also affects the mine’s tax liabilities. The value of concentrates affects net income, which is a component of the value-added contribution to GSP and GDP. Net income is also a determinant of royalty payments, mining license tax, severance tax, and both federal and state corporate tax liabilities. Therefore, these effects were added to the Alaska three-stage assessment to derive a composite assessment of the economic contribution.

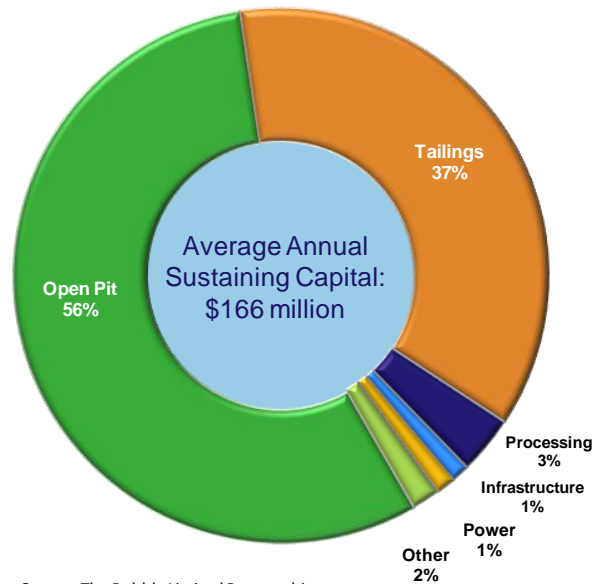
Operating expenses

IHS assumed the Pebble Mine will transition to the Initial Production Phase, in which the mine begins extraction of ore and production of mineral concentrates, during year 5. Likewise, spending patterns will shift toward supporting those activities that support and lead to concentrate production. Significant expenditure subcategories include consumable steel, reagents, and personnel transport, all of which are presented in Appendix C. The following chart presents the average distribution of the operating expenses by major categories during the Initial Production Phase.

Distribution of expenditures (excluding labor) during the Initial Production Phase



Source: The Pebble Limited Partnership



Source: The Pebble Limited Partnership

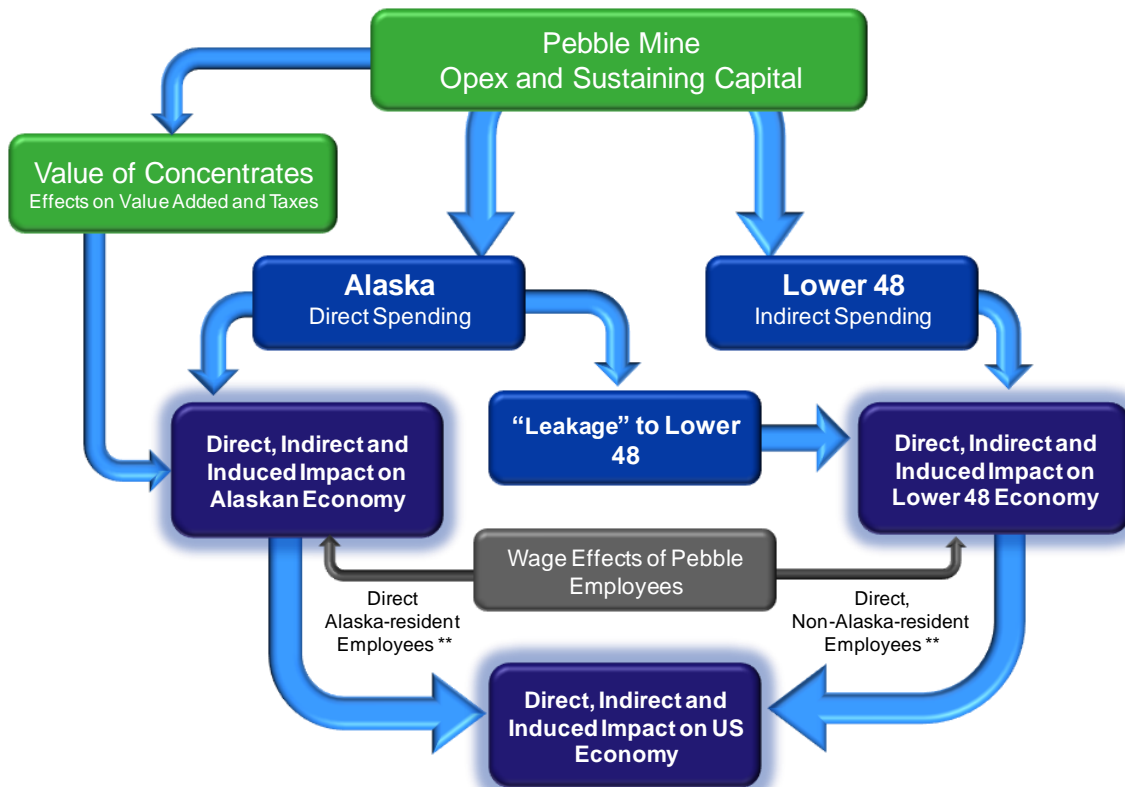
Sustaining capital

When the mine is in operating mode, PLP will need to invest in maintenance activities, replacing capital assets (mining fleet, equipment replacement, etc.) that have served their useful lives. The detailed categories of the sustaining capital are presented in Appendix C. The chart above shows the average distribution of the major categories of sustaining capital during the IPP.

**The Economic and Employment Contributions of a Conceptual Pebble Mine
to the Alaska and United States Economies**

PLP’s annual direct, non-wage operating expenses and sustaining capital expenditures will exceed \$900 million in the Initial Production Phase. The diagram below presents a schematic of the modeling process used to assess the economic contribution of the IPP. This approach yielded assessments of the direct, indirect, and induced impacts on employment, value added, wages, and government revenues in Alaska, the Lower 48, and the overall US economy.

Modeling the Initial Production Phase



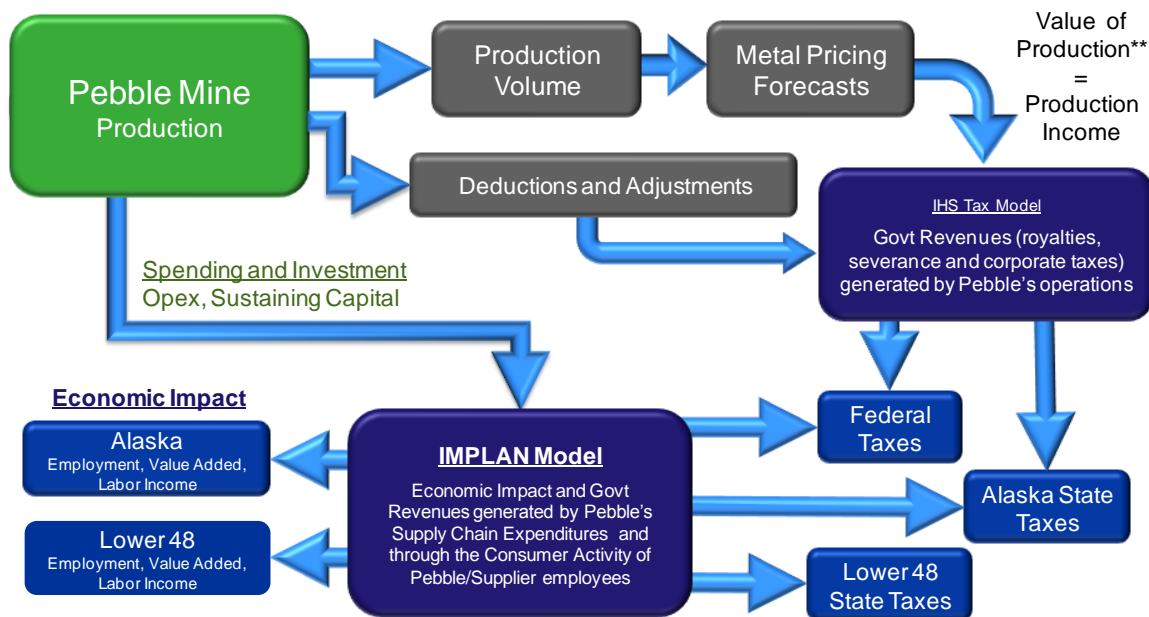
** 75% of Pebble workers were assumed to be Alaska residents

Modeling the tax implications during the Initial Production Phase

In addition to the corporate and personal taxes commonly generated by general economic activities, the operations of the Pebble Mine will trigger several taxes unique to the natural resource extraction industry. Therefore, two models were used to measure the tax impacts of the Pebble Mine. For the direct tax impacts associated with the operation of the Pebble Mine, IHS leveraged a proprietary mining-tax model to determine payments to governments. The methodology of the proprietary model will be summarized in the rest of this section. Additionally, IHS used IMPLAN’s tax modeling functionality only to assess the general corporate and personal taxes associated with indirect and induced impacts, without taking into account any recognized tax planning opportunities that may be available to PLP.

In addition, IHS acknowledges that a US partnership is itself not subject to corporate taxation, but rather its partners would be subject to such taxes. Nevertheless, to effectively model the tax impact, it has been assumed the Pebble Mine itself is subject to taxation, and that these taxes would be shared pro-rata among the partners, without taking into account each partner’s specific tax attributes or positions. As a result, tax revenues presented in this report are subject to change.

Modeling the tax implications



** Value of Production = Value of Ore Concentrate, assumed to be 88% of the value of the final refined metals (copper, gold, molybdenum, silver)

The taxes associated with the direct mining activities were assessed using a modified version of a proprietary model that was originally developed by IHS for the mining industry. At a high level, the taxes, or government portion, from the model are as follows:

State Government Take = State Corporate Taxes + Royalties + Severance Tax

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Consistent with guidelines published by the state of Alaska to determine the appropriate deductible costs and depletion allowances, IHS's mining tax model encompasses a series of variables including revenues (value of the concentrates), initial capital investment, operating cost, and sustaining capital expenditure. In addition, depreciation schedules have been incorporated into the model. Royalties, severance taxes, and corporate taxes were assessed as follows:

$$\begin{aligned} \text{Value of Output} &= \text{Production Income} = \text{Value of Concentrates} \\ &= \text{Value of Refined Metals} - \text{Transport and Smelting Costs} \\ &= (\text{Volume of Refined Metals} \times \text{Price}) * 88\% \end{aligned}$$

$$\begin{aligned} \text{Royalty Payments} &= \text{Royalty Rate} \times \text{Net Income} \\ &= \text{Royalty Rate} \times (\text{Production Income} - \text{Deductible Costs} - \text{Depletion Allowance}) \end{aligned}$$

- A Royalty Rate of 3% was assumed for the analysis
- Deductible Costs include Operating Expenses, Transport Costs, and Lease Payments
- Depletion Allowance was assumed to be 15% of Production Income

$$\text{Mining License Tax} = 7\% \text{ of Net Income}$$

- IHS assumed a 3.5-year tax hiatus in the initial years of production

$$\text{Severance Tax} = \text{Value of Output} \times \text{Severance Tax Rate}$$

- A Severance Tax Rate of 1.5% for the Lake and Peninsula Borough was assumed

$$\text{State Corporate Tax} = \text{Taxable Income} \times \text{State Corporate Tax Rate}$$

- Taxable Income = Production Income – Operating Expenses – Transport Costs – Sustaining Capital – Lease Payments – Depreciation – Depletion Allowance – Royalty Payments
- Alaska Corporate Tax Rate = 9.4%

$$\text{Federal Corporate Tax} = \text{Taxable Income} \times \text{Federal Corporate Tax Rate}$$

- Taxable Income = Production Income – Operating Expenses – Transport Costs – Sustaining Capital – Lease Payments – Depreciation – Depletion Allowance – Royalty Payments – Domestic Manufacturing Deduction – State Corporate Taxes
- Domestic Manufacturing Deduction = 9% of Taxable Income
- Federal Corporate Tax Rate = 35%
- The tax model also performed an Alternative Minimum Tax (AMT) calculation (20% of adjusted income); the assessed Federal Corporate Tax was the greater of the standard tax calculation and the AMT calculation.

Finally, the direct value-added contribution to gross state product of the Pebble Mine during the Initial Production Phase was assessed as follows.

$$\text{Value Added} = \text{Value of Concentrates} - \text{Operating Expenses} + \text{Labor Cost}$$

IMPLAN model

For the direct, indirect, and induced impact, IHS Global Insight used the IMPLAN model to quantify the impact of the mining sector on the Alaska and the Lower 48 economies. The IMPLAN model closely follows the accounting conventions used in the US Bureau of Economic Analysis's study, *Input-Output Study of the US Economy*, and is flexible enough to evaluate changes via the value of output or employment from the source industry. When possible, IHS Global Insight customized the inputs to the IMPLAN model to correspond with Pebble Mine capital and operating expenditure requirements. This process allowed examination of the impacts of selected large elements of the mining sector and of the interactions with other sectors.

For purposes of this study, IHS Global Insight, with support of the Pebble Limited Partnership, researched the source of the capital, material, and service inputs and segmented the total expenditure categories accordingly. Domestically-sourced inputs were funneled into Alaska and the Lower 48. This methodology provides a more objective process of modeling the economic impact.

The direct, indirect, and induced job estimates in this report were quantified through input-output modeling and social accounting matrices using the IMPLAN model. This modeling effort also produced estimates of value added and labor income related to direct and indirect jobs. This section provides additional information about the IMPLAN model. The discussion is based in part on descriptions by Minnesota IMPLAN Group, Inc. (MIG), the model's sponsor¹⁹.

IMPLAN, short for "Impact Analysis for Planning," is a widely used, commercially available model for input-output analysis. MIG is responsible for the production of the IMPLAN data, model, and software. Using classic input-output analysis in combination with regionally specific social accounting matrices and multiplier models, IMPLAN provides a highly accurate and adaptable model for its users. The IMPLAN system was designed to serve three functions:

- data retrieval
- data reduction and model development
- impact analysis

Comprehensive and detailed data coverage for the US economy and the ability to incorporate user-supplied data at each stage of the model-building process provide a high degree of flexibility in terms of both geographic coverage and model formulation. The IMPLAN system has two components: the databases and the software. The databases provide information needed to create IMPLAN models. The software performs the calculations and provides an interface for the user to make final-demand changes.

The IMPLAN system includes:

- a national-level technology matrix
- estimates of sectoral activity for final demand, final payments, industry output, and employment for the United States

¹⁹ www.IMPLAN.com

Input-output accounting describes commodity flows from producers to intermediates and final consumers. The total industry purchases of commodities, services, employment compensation, value added, and imports are equal to the value of the commodities produced.

Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the region (imports and value added) stop the cycle.

These indirect and induced effects (the effect of household spending) can be mathematically derived. The derivation is called the Leontief inverse. The resulting sets of multipliers describe the change of output for every regional industry caused by a one-dollar change in final demand for any given industry.

Creating regional input-output models requires a tremendous amount of data. The costs of surveying industries within each region to derive a list of commodity purchases production functions are prohibitive. IMPLAN was developed as a cost-effective means to develop regional input-output models.

IMPLAN easily allows the user to do the following:

- develop a complete Social Accounting Matrix (SAM) for a regional economy
- develop Multiplier models for predicting economic impacts
- modify components of the SAM including
 - industry-specific information such as employment and income values
 - production functions
 - by-products
 - trade flows
- create custom impact analyses based on the nature of an event
- generate a wide variety of reports describing the social accounts, the multiplier model, and the direct, indirect, and induced effects of an economic event
- examine how the effects of economic impact in a single region ripple into surrounding regions
- view tax impacts of economic changes

IMPLAN software

Minnesota IMPLAN Group developed the current version of IMPLAN Version 3.0 in 2009. It is a Windows®-based software package that performs the calculations necessary to create the predictive model. The software reads the database and creates the complete set of SAMs and the input-output accounts. Next the IMPLAN software derives the predictive multipliers. The software enables the user to make changes to the data, the trade flows, or technology. It also enables the user to make final-demand changes that result in the impact assessment.

Features of the IMPLAN Version 3.0 include

- direct export to Excel for ease of report manipulation or printing
- advanced data editing functions with balancing features
- complete SAM
- a choice of trade-flow assumptions
 - IMPLAN National Trade Flows model
 - econometric regional purchase coefficients
 - supply/demand pooling
- libraries for storing custom activities and the ability to import already-created IMPLAN libraries
- flexible model aggregation tools—allowing for aggregation of the model or the results
- single reports location—all results can be viewed, exported, and printed from a single screen
- Study Area, Social Accounts, Industry Accounts, and Multiplier Reports demonstrating all stages of model building and analysis
- activity menu structure for easy, intuitive impact analysis
- event-based impact databases
- built-in and editable margins and deflators
- model data in MS Access Database format

IMPLAN database

For this project, IHS Global Insight used the 2010 IMPLAN databases. Each database contains information on the following components for each industrial sector in the IMPLAN model.

- **Employment** is total wages for salary jobs as well as self-employment jobs in the US economy.
- **Value added** is an industry's or an establishment's total output less the cost of intermediate inputs. Value added is further divided into three subcomponents:
 - **Labor income** captures all forms of employment income, including employee compensation (wages and benefits, employer-paid payroll taxes, unemployment taxes, etc.) and proprietor income (payments received by self-employed individuals and unincorporated business owners).
 - **Other property-type income** consists of payments from rents, royalties, and dividends. This category includes payments to individuals in the form of rents received on property, royalties from contracts, and dividends paid by corporations. It also includes corporate profits earned by corporations.
 - **Indirect business taxes** consist primarily of excise and sales taxes paid by individuals to businesses. These taxes are collected during the normal operation of these businesses but do not include taxes on profit or income.
- **Final demand** includes goods and services purchased for their ultimate use by an end user. For a region, it would include exports as exporting is a final use for that product. In an input-output framework final demands are allocated to producing industries, with margins allocated to the service sectors (transportation, wholesale and retail trade, insurance) associated with providing that good to the final user. Thus, final demands are in producer prices, and the model provides them by components of GDP.
- **Personal consumption expenditures (PCE)** consist of payments by individuals/households to industries for goods and services used for personal consumption. Individuals tend to buy little directly from industries other than retail trade. In an input-output table, purchases made by individuals for final consumption are shown as payments made directly to the industry producing the good. PCE is the largest component of final demand.
- **Federal government purchases** are divided among military purchases, nonmilitary uses, and capital formation. Federal military purchases are those made to support the national defense. Goods range from food for troops to missile launchers. Nonmilitary purchases are made to supply all other government functions. Payments made to other governmental units are transfers and are not included in federal government purchases.
- **State (provincial) and local government purchases** are divided among public education, non-education, and capital formation. Public education purchases are for elementary, high school, and higher education. Non-education purchases are for all other government activities. These include state

(provincial) government operations, including police protection and sanitation. Private-sector education purchases are not counted here. Private education purchases show up in IMPLAN sectors 495 and 496.

- **Inventory purchases** are made when industries do not sell all output created in one year, which is generally the case. Each year a portion of output goes to inventory. Inventory sales occur when industries sell more than they produce and need to deplete inventory. Inventory purchases and sales generally involve goods-producing industries (e.g., agriculture, mining, and manufacturing).
- **Capital formation** is private expenditures made to obtain capital equipment. The dollar values in the IMPLAN database are expenditures made to an industrial sector producing the capital equipment. The values are not expenditures by the industrial sector.
- **Foreign exports** are demands made to industries for goods for export beyond national borders. These represent goods and services demanded by foreign parties. Domestic exports are calculated during the IMPLAN model creation and are not part of the database.

IMPLAN multipliers

The notion of a multiplier rests upon the difference between the initial effect of a change in final demand and the total effects of that change. Total effects can be calculated either as direct and indirect effects or as direct, indirect, and induced effects. Direct effects are production changes associated with the immediate effects or final-demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries (for example, additional purchases to produce additional output). Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects.

Type I multipliers

A Type I multiplier is the direct effect produced by a change in final demand plus the indirect effect, divided by the direct effect. Increased demands are assumed to lead to increased employment and population, with the average income level remaining constant. The Leontief inverse (Type I multipliers matrix) is derived by inverting the direct coefficients matrix. The result is a matrix of total requirement coefficients, the amount each industry must produce for the purchasing industry to deliver one dollar's worth of output to final demand.

Type SAM multipliers

Type SAM multipliers incorporate “induced” effects resulting from the household expenditures from new labor income. The linear relationship between labor income and household expenditure can be customized in the IMPLAN software. The default relationship is PCE and total household expenditure. Each dollar of workplace-based income is spent based on the SAM relationship generated by IMPLAN.

Appendix C: Data requirements and assumptions

IHS Global Insight received the underlying data from the Pebble Limited Partnership and transformed the data to undertake an economic contribution assessment. The analysis was performed for the state of Alaska and the Lower 48 economies, primarily focused on two different time periods—the Construction Phase (years 1–5), and the Initial Production Phase (years 5–29). In addition, IHS produced a high-level assessment of the potential contribution of a twenty-year Potential Subsequent Development Phase. During the five-year Construction Phase, the Pebble Mine will focus on the capital expenditures required to establish the base infrastructure required for the mine. During the Initial Production and Potential Subsequent Development Phases the input requirements will be limited to materials, supplies, and services for operations plus the sustaining capital needed to address maintenance.

During a series of working sessions, the Pebble Limited Partnership, the McDowell Group, and IHS mapped estimated spending levels in the preliminary capital, operating, and sustaining capital schedules to the primary industries that would provide the products and services specified in those schedules. North American Industry Classification System (NAICS) codes were used during this mapping exercise. This mapping was followed by a series of working meetings to determine the most likely sourcing region (Alaska, Lower 48, and Non-US) for each expenditure category. This stage was one of the most critical steps of the analysis because it determined the regional sourcing of the inputs, which are key drivers of economic contribution. Finally, IHS mapped separately the spending-by-NAICS code for Alaska and the Lower 48 to the IMPLAN industry scheme.

Capital phase

Capital expenditure schedules were provided by PLP in 2009 dollars. Capital expenditures by type were first segmented by geography (i.e., Alaska versus Lower 48) and were then mapped to the standard industrial classifications and input into the IMPLAN model. The results of the IMPLAN model were converted to 2011 dollars.

Tables C.1 and C.2 present the mapping of estimated capital expenditures and the IMPLAN model sectors for Alaska and the Lower 48.

Table C.1 Mapping of capital expenditures by type to the Alaska IMPLAN sectors

Pebble project type	IMPLAN sector
Construction Labor	Construction of other new nonresidential structures
Fuel	Refineries
Steel	Steel product manufacturing from purchased steel
Power	Electric power generation
Bulk Electrical	Motor and generator manufacturing
Instrumentation	Industrial process variable instruments manuf.
Earthworks Materials	Construction of other new nonresidential structures
Cement Materials	Quarrying on construction materials
Cement	Cement manufacturing
Equipment Rental	Commercial & indust. equipment rental/ leasing
Capital Equipment	Wholesale Trade
Piping	Wholesale Trade
Camp	Construction of other new residential structures
Engineering, Procurement, and Construction Managen	Engineering services
Air Transport of Personnel	Air Transport
Machine Repair and Maintenance	Wholesale Trade
Tires	Wholesale trade
Blasting	Wholesale trade
Dewatering	Wholesale Trade
Primary Equipment	Wholesale Trade
Ancillary Equipment	Wholesale Trade
Other Support Equipment	Material handling equipment manufacturing
Haul Roads	Construction of other new nonresidential structures
Electrical Infrastructure	Construction of other new nonresidential structures
Concrete	Cement manufacturing
Pumps	Wholesale Trade
Capital Equipment	Other basic organic chem manuf.
Water Transportation	Water Transportation
Truck Transportation	Truck Transportation

Source: IHS Global Insight and The Pebble Limited Partnership

Table C.2 Mapping of capital expenditures by type to the Lower 48 IMPLAN sectors

Pebble project type	IMPLAN sector
Construction Labor	Construction of other new nonresidential structures
Fuel	Refineries
Steel	Steel product manufacturing from purchased steel
Power	Electric power generation
Bulk Electrical	Motor and generator manufacturing
Instrumentation	Industrial process variable instruments manuf.
Earthworks Materials	Construction of other new nonresidential structures
Cement Materials	Quarrying on construction materials
Cement	Cement manufacturing
Equipment Rental	Commercial & indust. equipment rental/ leasing
Capital Equipment	Steel product manufacturing from purchased steel
Piping	Steel product manuf.
Camp	Construction of other new residential structures
Engineering, Procurement, and Construction Mgt.	Engineering services
Air Transport of Personnel	Air Transport
Machine Repair and Maintenance	Commercial. Ind.machinery & eq. repair and maint.
Tires	Tire manufacturing
Blasting	All other chemical product and preparation mfg.
Dewatering	Pump and pumping equipment manufacturing
Primary Equipment	Mining and oil and gas field machinery mfg.
Ancillary Equipment	Construction machinery manufacturing
Other Support Equipment	Material handling equipment manufacturing
Haul Roads	Construction of other new nonresidential structures
Electrical Infrastructure	Construction of other new nonresidential structures
Concrete	Cement manufacturing
Pumps	Pump and pumping equipment manufacturing
Capital Equipment	Other basic organic chem manuf.
Water Transportation	Water Transportation
Truck Transportation	Truck Transportation

Source: IHS Global Insight and The Pebble Limited Partnership

Initial Production Phase

For the Initial Production Phase, IHS used the detail of the estimated operating and sustaining capital expenditures and established a correspondence with the standard industrial classifications. Data were mapped and entered into the IMPLAN model for Alaska and the Lower 48 in 2009 dollar terms for all reference years. The results of the IMPLAN models were converted to 2011 dollars.

Tables C.3 to C.6 present a mapping of operating and sustaining capital expenditures with the IMPLAN model sectors for Alaska and Lower 48.

Table C.3 Mapping of operating expenditures by type to the Alaska IMPLAN sectors

Pebble project type	IMPLAN sector
Labor	
Fuel	Refineries
Power	Wholesale Trade
Open Pit - Machine Maintenance	Wholesale Trade
Tires	Wholesale Trade
Blasting	Wholesale Trade
Open Pit - Dewatering	Wholesale Trade
Open Pit - Rehandling	Wholesale Trade
Open Pit - IPCC	Wholesale Trade
Tailings Materials	Steel product manuf.
Lime	Lime manufacturing
Consumable Steel	Steel product manufacturing from purchased steel
Processing - Other Reagents	Other basic organic chem manuf.
Processing Machine Maintenance	Machine Repair
Processing Overheads	Technical consulting
Baseline Studies	Env. & Tech Consulting
Wetlands Compensation	Construction
Fish Mitigation/Compensation	Construction
Other Reagents	Other basic organic chem manuf.
Environmental - Other	Env. & Tech Consulting
Access Road - Steel	Steel product manuf.
Access Road - Aggregate/Sand	Mining/Quarrying
Inbound Logistics	Water transport
Inbound Logistics	Truck transport
Personnel Transport	Air Transport
Airfreight	Air Transport
Transportation - Other	Ground passenger transport
Catering	Facility Support
Recruiting	Employment services
Insurance	Insurance carriers
G&A - Other	Management of companies

Source: IHS Global Insight and The Pebble Limited Partnership

Table C.4 Mapping of operating expenditures by type to the Lower 48 IMPLAN sectors

Pebble project type	IMPLAN sector
Labor	
Fuel	Refineries
Power	Electric power generation, transmission, and dist.
Open Pit - Machine Maintenance	Commercial. Ind.machinery & eq. repair and maint.
Tires	Tire manufacturing
Blasting	All other chemical product and preparation mfg.
Open Pit - Dewatering	Pump and pumping equipment manufacturing
Open Pit - Rehandling	Material handling equipment manufacturing
Open Pit - IPCC	Material handling equipment manufacturing
Tailings Materials	Steel product manuf.
Lime	Lime manufacturing
Consumable Steel	Steel product manufacturing from purchased steel
Processing - Other Reagents	Other basic organic chem manuf.
Processing Machine Maintenance	Machine Repair
Processing Overheads	Technical consulting
Baseline Studies	Env. & Tech Consulting
Wetlands Compensation	Construction
Fish Mitigation/Compensation	Construction
Other Reagents	Other basic organic chem manuf.
Environmental - Other	Env. & Tech Consulting
Access Road - Steel	Steel product manuf.
Access Road - Aggregate/Sand	Mining/Quarrying
Inbound Logistics	Water transport
Inbound Logistics	Truck transport
Personnel Transport	Air Transport
Airfreight	Air Transport
Transportation - Other	Ground passenger transport
Catering	Facility Support
Recruiting	Employment services
Insurance	Insurance carriers
G&A - Other	Management of companies

Source: IHS Global Insight and The Pebble Limited Partnership

Table C.5 Mapping of sustaining capital expenditures by type to the Alaska IMPLAN sectors

Pebble project type	IMPLAN sector
Fuel	Refineries
Steel	Steel product manufacturing from purchased steel
Bulk Electrical	Motor and generator manufacturing
Instrumentation	Industrial process variable instruments manuf.
Earthworks Materials	Construction of other new nonresidential structures
Cement Materials	Quarrying on construction materials
Cement	Cement manufacturing
Equipment Rental	Commercial & indust. equipment rental/ leasing
Capital Equipment	Wholesale Trade
Piping	Wholesale Trade
Camp	Construction of other new residential structures
Dewatering	Wholesale Trade
Primary Equipment	Wholesale Trade
Ancillary Equipment	Wholesale Trade
Other Support Equipment	Material handling equipment manufacturing
Haul Roads	Construction of other new nonresidential structures
Open Pit- Other	Construction of other new nonresidential structures
Spare Parts	Other basic organic chem manuf.
Waste Management	Construction of other new nonresidential structures
Port	Construction of other new nonresidential structures

Source: IHS Global Insight and The Pebble Limited Partnership

Table C.6 Mapping of sustaining capital expenditures by type to the Lower 48 IMPLAN sectors

Pebble project type	IMPLAN sector
Fuel	Refineries
Steel	Steel product manufacturing from purchased steel
Bulk Electrical	Motor and generator manufacturing
Instrumentation	Industrial process variable instruments manuf.
Earthworks Materials	Construction of other new nonresidential structures
Cement Materials	Quarrying on construction materials
Cement	Cement manufacturing
Equipment Rental	Commercial & indust. equipment rental/ leasing
Capital Equipment	Steel product manufacturing from purchased steel
Piping	Steel product manuf.
Camp	Construction of other new residential structures
Dewatering	Pump and pumping equipment manufacturing
Primary Equipment	Mining and oil and gas field machinery manufacturing
Ancillary Equipment	Construction machinery manufacturing
Other Support Equipment	Material handling equipment manufacturing
Haul Roads	Construction of other new nonresidential structures
Open Pit- Other	Construction of other new nonresidential structures
Spare Parts	Other basic organic chem manuf.
Waste Management	Construction of other new nonresidential structures
Port	Construction of other new nonresidential structures

Source: IHS Global Insight and The Pebble Limited Partnership

Appendix D: Price assumptions and valuation of Pebble Mine output

IHS Global Insight's price forecasts were generated using the price forecasting models maintained by the Pricing and Purchasing Service. Although each model is different in its composition, all share a basic structural format where prices are viewed, in their simplest form, as a function of production costs and market fundamentals (supply and demand).

Costs are defined as operating costs, with the cost components of each model being roughly similar (that is, labor, mining equipment and supplies, explosives, flotation and processing chemicals, electric power and diesel fuel). This approach reflects the fact that mining operations, even across different metals, have similar characteristics or, as is the case with the proposed Pebble Mine, multiple products are processed from a common ore body.

Fundamental analysis relies on a traditional market balance approach where production (supply) is matched against consumption (demand). The picture of each side of the market is assembled from the bottom-up; in the case of production by mine, globally, and for consumption, by country. The resulting market balance calculation (surplus, equilibrium, or deficit) is used to generate an inventory change term that is used to help forecast prices.

Investors are an important factor in copper, gold, and silver markets, and their influence is accounted for separately in these models. Our analysis suggests that, as a group, investors tend to reinforce (not create or lead) movement in market fundamentals, thereby accentuating price movement. To model this behavior, these models incorporate a measure of the trade weighted of the US dollar exchange rate. The notion is that investor allocations between asset classes, including commodities, are related to exchange rate movements with their embedded expectations of interest rates and relative inflation rates.

For three of the four metals in this study: copper, gold, and silver, we currently see prices enjoying a sizeable premium over estimated cash operating costs, a condition we believe is not likely to persist beyond the medium term (3-5 years) and almost certainly will not persist over the longer term (10 years). In the case of copper, our fundamental analysis indicates a market moving to surplus, pointing to lower prices.

We currently view both gold and silver prices as being strongly influenced by investor sentiment, which we believe over the span of the next 5-10 years will wane as financial markets return to a more normal state (i.e., as interest rates rise and liquidity is withdrawn). Prices for both precious metals will descend toward costs and stabilize at a level we believe will still be sufficient to attract capital in the long term.

We also assume some "flexibility" in costs during this period. We believe the same factors currently inflating precious metals prices are also influencing costs. Removing some of the froth from these markets will not only reduce prices, but costs as well. Absent this assumed reduction in costs, our gold price forecast would be about \$100–150/troy ounce higher per year after 2020.

The bottom line is that we believe nominal prices for all four metals will be lower in 2020 than they are today.

Because the long-term forecast horizon of this study is beyond the mine investment cycle, conducting a detailed mine-by-mine survey of potential supply is impossible. To forecast prices within the structure of our models, therefore, we have made the simplifying assumption of a rough long-term equilibrium in markets. Although markets will certainly not be in equilibrium every year over the next century, we believe that deficit years will roughly equal years when the markets record surpluses. This equilibrium assumption reduces long-term prices to a function of costs and investor behavior.

Based on the long-term, 50-year forecasts prepared by IHS Global Insight's Pricing and Purchasing Service and US Economic Forecasting Service, we project real cost increases of about 0.25% per year between 2021 and 2064. There is a slight acceleration in cost escalation after 2030.

Our long-term exchange rate forecasts show the dollar, both nominal and real, continuing to depreciate against the currencies of our major trading partners. Although the depreciation in the real trade-weighted dollar exchange rate is very slight, commodities priced in dollars would be expected to increase as a result, all other things being equal.

We do assume, however, the maturation of emerging capital markets serves to dampen long-term investor demand for precious metals. It will be particularly important with regard to demand from China and India. While Indian consumption is deeply rooted in the culture, this traditional preference for precious metals has, to some extent, been shaped by a lack of investment alternatives. We do not assume a wholesale change in Indian customs over the long term, but rather a small shift in preferences as capital markets both broaden and deepen.

Finally, productivity gains in the mining industry are expected to partially offset the effects of declining ore quality and of rising costs on prices. Hence, although real prices are forecast to rise, the rate of increase for each metal remains very modest. Notably, real prices for each of the four metals remain below the levels recorded at the peak of the so-called "super cycle," even at the end of the 40-year long-term interval.

**The Economic and Employment Contributions of a Conceptual Pebble Mine
to the Alaska and United States Economies**

Long-term metal average 5-year real price forecasts

	Copper, London Metals Exchange Cash Price, Spot (2011 \$/Metric ton)	Canned Molybdic Oxide, Estimated North American Market Price, Spot (2011 \$/lb)	Gold, Handy- Harman NY, Spot (2011 \$/tr oz)	Silver, Handy Harmon NY, Spot (2011 \$/tr oz)
2024-2028	6,251.1	17.7	571.5	9.2
2029-2033	6,255.1	18.6	579.0	9.3
2034-2038	6,256.8	18.7	589.8	9.5
2039-2043	6,278.8	18.7	602.0	9.7
2044-2048	6,281.5	18.7	613.1	9.8
2024-2048	6,264.7	18.5	591.1	9.5

Source: IHS Global Insight

IHS's metal price forecasts are conservative. Other influential firms, such as CRU, have alternative views on the direction the metal markets will take over the forecast period, especially concerning the price of precious metals. IHS ran an alternative pricing scenario (in real 2011 dollars) for each of the metals, based on recent CRU pricing forecasts, through the economic impact models and included these outcomes in our findings.

Metal	CRU Range	CRU Average	IHS Average	Difference
Copper (2011\$/metric ton)	\$5,587.4 – \$6,139.9	\$6,063.6	\$6,264.7	-3.2%
Molybdenum (2011\$/lb)	\$16.87 – \$16.98	\$16.98	\$18.5	-8.2%
Gold (2011\$/troy ounce)	\$1,309	\$1,309	\$591	+121.5%
Silver (2011\$/troy ounce)	\$22.11 – \$25.32	:\$25.29	\$9.5	+166.2%

The CRU forecast period for copper extended to 2035; for the other metals it was until 2025. After the final year of a forecast period, pricing was held constant in subsequent years. All other parameters of the analysis (production level, tax rates, etc.) remained unchanged. The economic impacts attributable to the value of concentrates are presented in Section 3 (Economic contribution to the Alaska economy).

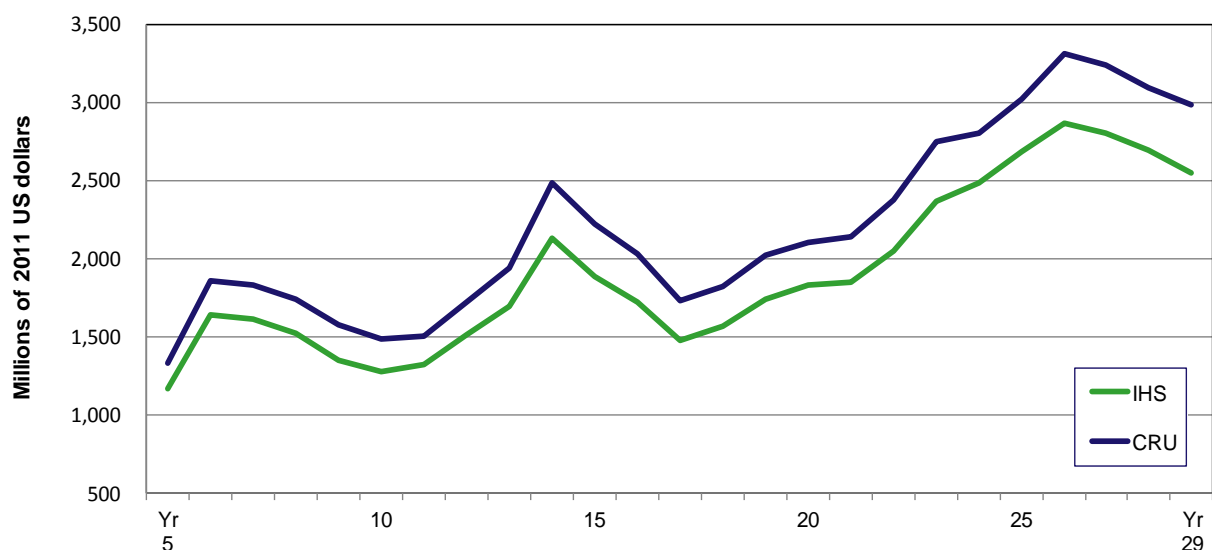
Pebble Mine production forecasts and valuation of output

The Pebble Limited Partnership provided IHS with anticipated annual yields of refined product for each of the four metals expected to be extracted from the mine (copper, molybdenum, gold, and silver). Combining these production schedules with the IHS and CRU pricing forecasts, IHS estimated the value of the concentrates produced by the mine (value of output). During the Initial Production Phase (years 5–29), copper will account for slightly more than 95.0% of the mine’s output by weight. Molybdenum will account for approximately 4.5% of the Pebble Mine’s output by weight. Although gold and silver will account for a very small amount of the Pebble Mine’s output by weight (0.01% and 0.02%, respectively), they are expected to deliver a disproportionately larger share of the Pebble Mine’s value of output.

The final value of the refined metals from the proposed Pebble Mine was determined by integrating the refined metal production and metal price forecasts. Two valuation scenarios were run. The first scenario was based on the IHS metal price forecasts; the second was based on the CRU metal price forecasts. These valuations were inclusive of transportation costs to smelting operations conducted by the metal refineries. The refinery charges were assumed to be approximately 12% of the value of the refined metal. Therefore, the refined metal valuations were discounted by 12% to arrive at the estimated value of the concentrates shipped from the mine.

The value of the concentrate represents the Pebble Mine’s revenues for a given year. The value of the concentrates serves as the basis from which IHS assessed Pebble’s tax liabilities as well as its contribution to Alaska’s GSP and the overall US economy. Thus, establishing valuations for the concentrates was a key step in the economic contribution analysis conducted by IHS.

Valuation of the annual output of the Pebble Mine during the Initial Production Phase



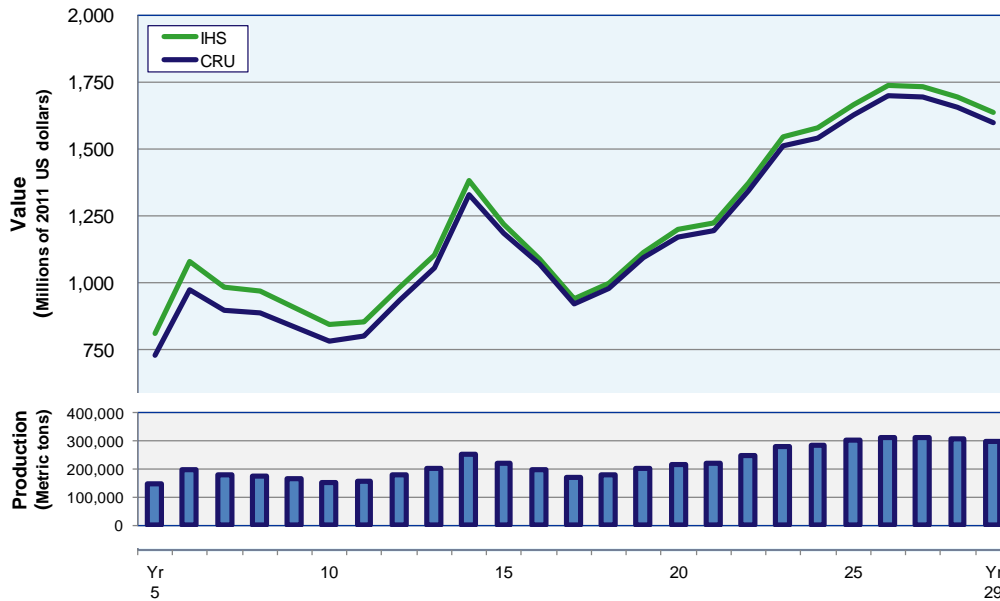
Source: IHS Global Insight

In general, using the CRU metal price forecasts resulted in higher valuations for the concentrates produced by the Pebble Mine. Nevertheless, the methodology the report authors used to assess the economic impact of the Pebble Mine decoupled the operational efforts required to extract a given volume of ore from the price at which the concentrates are eventually sold downstream to refineries. In other words, the level of capital investment, operating expenses, and employment are correlated with the volume of concentrate produced, not the market value of the concentrate. Under this approach, a higher price for gold affects neither the number of workers in the mine nor the operational spending with suppliers to the mine, and so on.

The following graphs provide more insight into similarities and differences in the derived valuations under the IHS-based pricing scenario and the CRU-based pricing scenario for each of the four metals. In general, the IHS and CRU price forecasts track fairly well for copper and molybdenum. There is significant divergence in the forecasts for gold and silver.

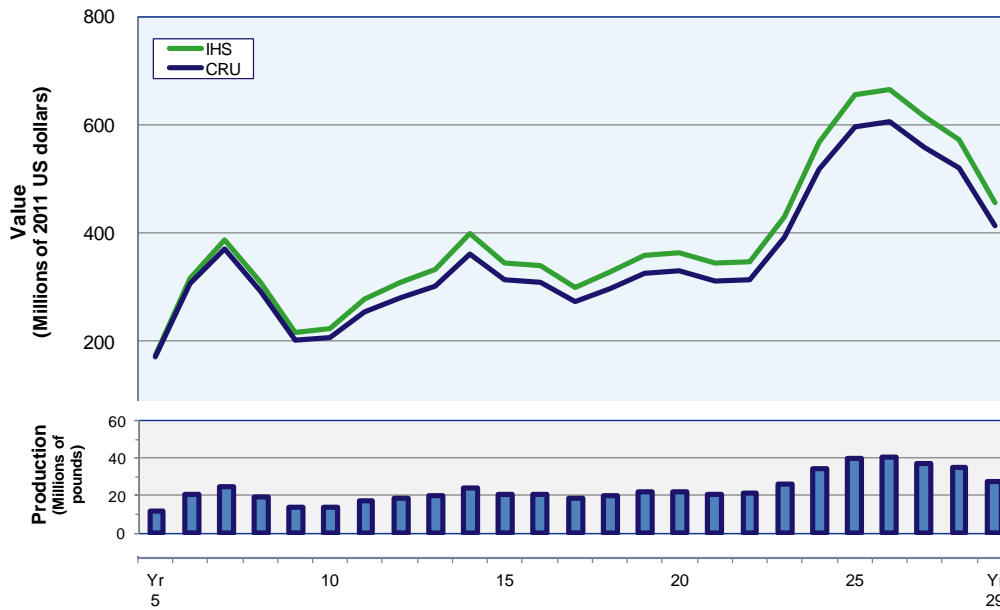
The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Annual production levels and value of output of the Pebble Mine during the Initial Production Phase: Copper



Source: IHS Global Insight and the Pebble Limited Partnership

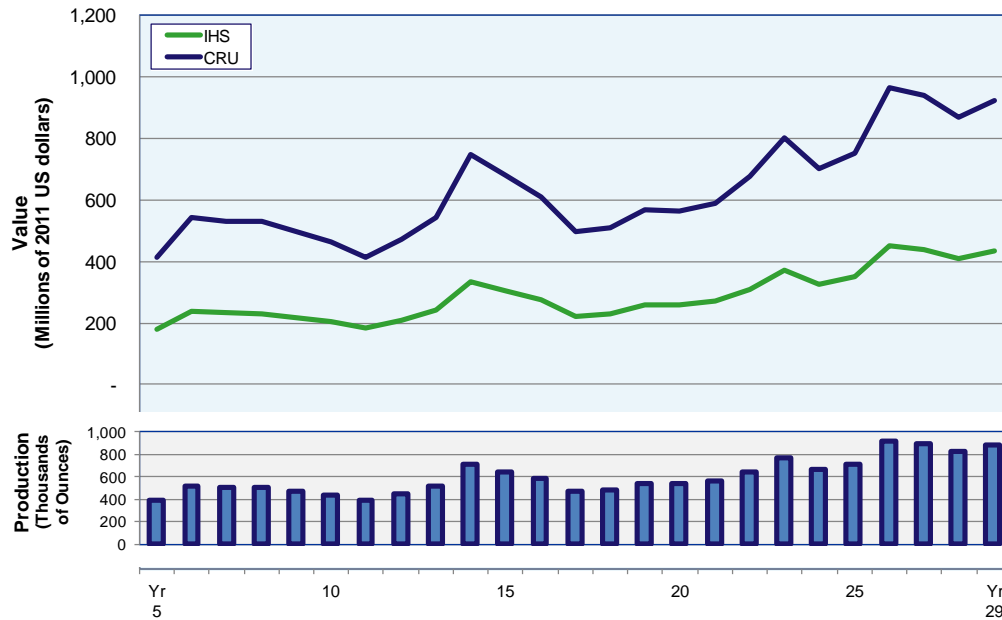
Annual production levels and value of output of the Pebble Mine during the Initial Production Phase: Molybdenum



Source: IHS Global Insight and the Pebble Limited Partnership

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

Annual production levels and value of output of the Pebble Mine during the Initial Production Phase: Gold



Source: IHS Global Insight and the Pebble Limited Partnership

Annual production levels and value of output of the Pebble Mine during the Initial Production Phase: Silver



Source: IHS Global Insight and the Pebble Limited Partnership

The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies

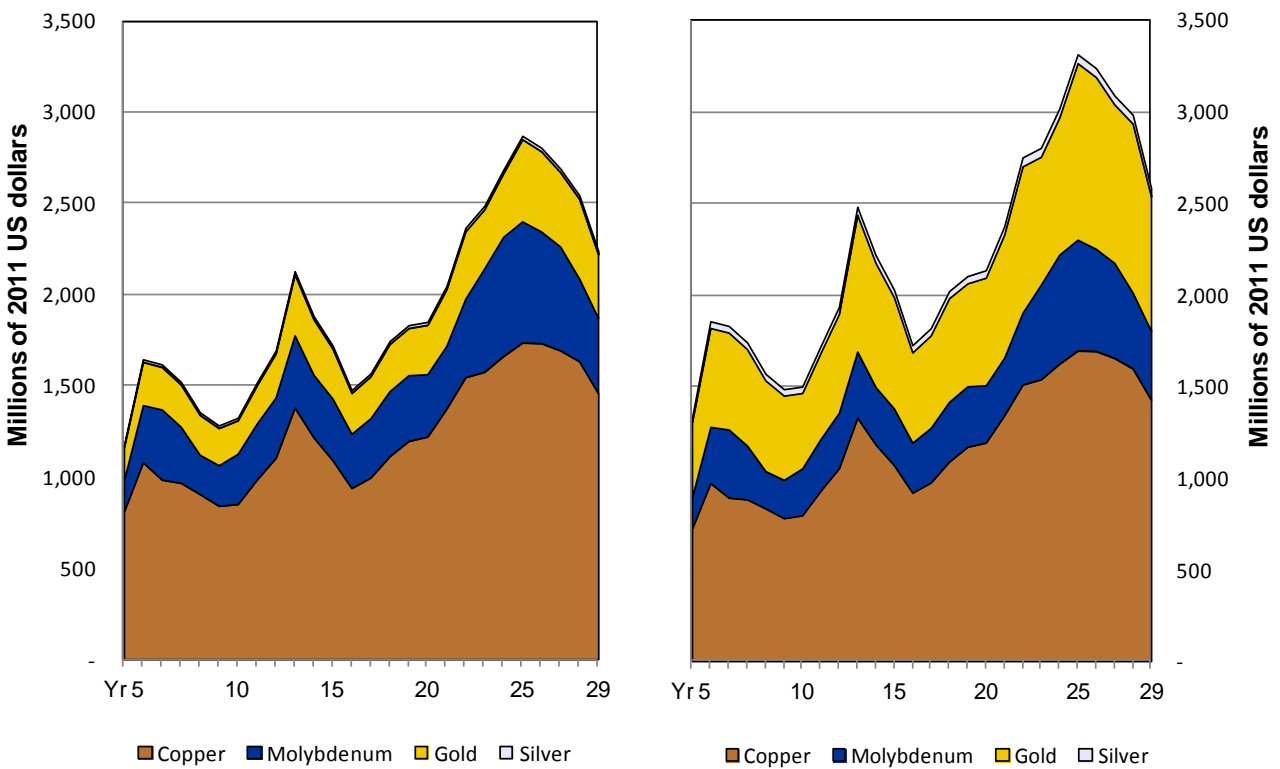
Finally, the two charts below detail the contribution each of the four metals will make to the value of output from the Pebble Mine, under the two scenario conditions, during the Initial Production Phase. These charts highlight the effects of the dramatically different gold prices in the IHS and CRU forecasts. As a result, the value of output for any given year under the CRU scenario conditions will be 12–18% higher than under the IHS scenario conditions.

There are two areas where this difference in the value of the concentrates will affect the economic impact of the Pebble Mine. The first area is direct value-added contribution, defined as the mine’s revenues less operating expenses, which reflects the direct contribution of the Pebble Mine to Alaska’s GSP and US GDP. Higher valuations for the concentrates would increase the Pebble Mine’s revenues while, as already mentioned, the operational expenses of the mine would remain unchanged. Therefore, the higher valuations for the concentrates under the CRU scenario could increase the mine’s direct value-added contribution to Alaska’s GSP and US GDP by about 30%. The second area is taxes, where higher prices for concentrates would drive higher revenues and profits, thereby increasing PLP’s tax liability by approximately 35% in the CRU scenario.

Comparison of Pebble Mine value of output by metal ore concentrate

Based on IHS metals price forecasts

Based on CRU metals price forecasts



Source: IHS Global Insight