

# **The Social Costs of Mining on Rural Communities**

**A Report Prepared for  
Friends of the Chilkat and Klehini Rivers**

**By  
Power Consulting Incorporated  
Missoula, Montana**

**8/21/2019**

## About the Authors:

**Thomas Michael Power** is the Principal Economist in Power Consulting, Inc. and a Research Professor and Professor Emeritus in the Economics Department at the University of Montana where he has been a researcher, teacher, and administrator for over 40 years.

He received his undergraduate degree in Physics from Lehigh University and his MA and PhD in Economics from Princeton University.

**Donovan S. Power** is the Principal Scientist in Power Consulting, Inc. He received his undergraduate degree in Geosciences at the University of Montana and his M.S. in Geology from the University of Washington. He has been the Principal Scientist at Power Consulting, Inc. for the past 12 years.

## Table of Contents

<b>ABOUT THE AUTHORS.....</b>	<b>2</b>
<b>EXECUTIVE SUMMARY.....</b>	<b>4</b>
<b>1. INTRODUCTION: SOCIOECONOMIC IMPACTS .....</b>	<b>6</b>
<b>2. THE SOCIAL IMPACTS OF CONTEMPORARY MINERAL EXTRACTION.....</b>	<b>7</b>
a. Mining Town Maladies: A Look into the Dark Side of Mining's Social Impacts.....	8
b. Man Camps and the Increasing Transience of Mine Workers .....	11
c. The Impact of Transient Workers on Rural Communities .....	13
d. The Variety of Potential Socio-Economic Impacts Associated with Mineral Extraction .....	16
<b>3. LABOR DISPLACING TECHNOLOGICAL CHANGE: INCREASED PRODUCTION, DECREASED JOBS .....</b>	<b>16</b>
<b>4. LONG-RUN SOCIAL IMPACTS OF MINING ON RURAL COMMUNITIES: LESSONS FROM APPALACHIA.....</b>	<b>20</b>
<b>SUMMARY/CONCLUSIONS .....</b>	<b>24</b>
<b>BIBLIOGRAPHY .....</b>	<b>27</b>

## Executive Summary

Constantine Mineral Resources, a Canadian-based exploratory company, is pursuing the development of a large-scale copper/zinc mine in the upper Chilkat Valley, near the town of Haines, in northern Southeast Alaska. No one can say with certainty what impacts will be observed should the project be developed, however, research and observations from similar circumstances in other communities indicate that some or all of the following impacts are likely:

1. The extraction and processing of minerals will employ workers at above average wages and could provide a flow of revenue to the local government, however, based upon relevant comparisons, the often-presumed ripple effect on other segments of the economy is typically unrealized.
2. Large scale mining projects sited in rural, relatively isolated communities are statistically correlated with long-term out-migration, high poverty and unemployment rates, poorer health and lower education attainment.
3. Market volatility for mineral commodities often leads to significant fluctuations in employment and payroll levels, i.e., a “flickering” economy and ultimately a “boom-bust economy”, which often cautions communities against investing in the social infrastructure and prevention plans needed to mitigate the influx of a large, transient workforce.
4. Transient mine employees, typically young, single, males, employed in block shifts (two weeks on, two weeks off), are likely to be disruptive to the broader social community and are often associated with:
  - Increased alcohol and substance abuse, violence, morbidity, and mortality;
  - Increased violent crime including physical and sexual assault;
  - Increased pressure on law enforcement agencies;
  - Increased presence of convicted felons including drug dealers and registered sex offenders;
  - Undermining of Indigenous peoples’ and other residents’ ways of life and traditions; and
  - Increased conflict among residents along income, employment, and racial lines as the community fragments under the pressure of substantial transience among workers and residents.

There is considerable variation in the mineral extraction industry, the geography and demography of the areas that host mining activities, and the public policy that local, state, and federal governments adopt to minimize the public costs that mineral extraction might otherwise impose on nearby communities. Therefore, it is vital that local communities be fully informed about the mix of potential costs and benefits from such development, rather than focusing on a benefits-only-based “promise of mining.”

# The Social Impacts of Mining on Rural Communities

## 1. Introduction: Socioeconomic Impacts

Often the descriptions and measurements of the *socioeconomic* impacts of a new mineral extraction project on local populations and communities are focused on a few narrow economic measures: value of mineral production, number of jobs, size of payroll, value of purchases from outside suppliers, royalties paid, and revenues that support local and state governments. The choice of these particular mining impacts is partially tied to the ready availability of data on commercial market transactions. In addition, many local resident, businesses, and governments are likely to see their own self-interests tied to expanded local commercial transactions associated with a new mining project.

Assessing local well-being using commercial measures of the expansion of the commercial economy due to the operations of a new mining project seriously distorts the usual weighing of positive and negative impacts (benefits and costs) associated with any economic decision. Measuring only the expansion of the commercial economy typically means that only “benefits” are considered. i.e., the new mining project is depicted as generating only positive impacts. Implicitly, the mine is assumed to be costless.

Recently a consultant hired by Constantine Metal Resources discussed the “Social or Community Considerations” associated with the Constantine Palmer Project, commenting that:

“A new mine at Palmer would bring some social and economic changes to both [Haines and Klukwan]. The Palmer Project has the potential to significantly improve work opportunities for both communities. A new mine could generate approximately 260 direct full-time jobs plus the indirect jobs in the support and services industries. Regional engagement by Constantine has encountered a strong desire for the economic benefits that come with mining projects.”<sup>1</sup>

Constantine’s engagement with residents has also triggered concern about the overall impacts of the mine on the quality of life in the greater Haines area. The Haines Borough workforce totals about 1,300.<sup>2</sup> The 260 jobs projected for the Palmer Project would boost that by 20 percent. Note the implicit assumption from the consultant that the potential mine will generate nothing but benefits. If that were true, it would of course be irrational to question or challenge the construction of the new mine.

---

<sup>1</sup> Section 20.3, p. 20-19, “Preliminary Economic Assessment Report,” JDS Energy & Mining Inc. for Constantine Metal Resources Ltd. July 18, 2019. The direct employment

<sup>2</sup> Alaska Department of Labor and Workforce Development. The active labor force averages about 1,100 workers, peaking in summer at 1,200 to 1,400 workers and falling to about 1,000 during the winter. Total jobs including part-time was about 1,700 in 2016.

However, the “socio” part of the word “socioeconomic” reminds us there is a much broader range of impacts on residents and communities than what the narrow “economic” or commercial measurements allow us to discuss and quantify. Those social impacts, in no particular order, include:

- The *distribution* of income: poverty rates and large income differentials;
- Quality of life and environmental quality;
- Crime levels: property crimes as well as violent crimes;
- The relocation of convicted felons to booming mining areas;
- The health of the local population: disability, morbidity, and mortality rates;
- Substance abuse levels and overdose deaths;
- Educational achievement;
- Impact of non-traditional mine work schedule on community and family;
- Added stress to local services from the influx of non-local mine workers;
- The impacts of mining on the Indigenous and Aboriginal people of the area; and
- The shift of risk and responsibility away from worker’s organizations (unions) and the mining companies and onto the individual miner.

One of the reasons these local, social impacts are less frequently analyzed is that they are harder to quantify, especially in monetary terms, than numbers of jobs and income levels. The evaluation of such social impacts is often dismissed as unavoidably subjective and therefore resistant to objective evaluation. However, researchers are now delving into these topics and expanding our understanding of the social impacts that a mine can have in a local community. Ignoring social impacts because they are more difficult to express in monetary terms implicitly places a zero value on them. In fact, most social impacts *can* be quantified, and it is inappropriate to insist that only monetary valuations be considered.

We will proceed with the analysis of the social impacts associated with mineral extraction in two steps: (1) we will provide a review of the social impacts that have been measured for mineral extraction booms in the recent past, or ongoing social impacts from continuing mineral extraction in the present, and (2) we will provide a long-run overview of the social impacts associated with the nation’s oldest continuously mined region: Appalachia. Over two centuries, billions of dollars’ worth of minerals have been annually extracted and sold by Appalachian mining companies, typically paying well above average wages. Briefly looking back over that extensive period of mining provides a “bird’s eye view” of the potential long-run impacts on communities from relying on mining to support their economic well-being and vitality.

## 2. The Social Impacts of Contemporary Mineral Extraction

We begin our analysis with a focus on the social impacts of the most recent mineral extraction booms in different parts of the United States as well as some locations around the world. We will consider evidence of increases in violent crime, demands for public services, alcoholism and other substance abuse, the in-migration of convicted felons, changes in the social structure of local communities, the impact on Indigenous or Aboriginal people who often live in close

proximity to large, rural, resource extraction projects, and overall social fragmentation associated with mining towns and man camps.

Mineral extraction booms and busts are not a thing of the past. They continue to be a socially disruptive characteristic of mining. One contemporary example has been the development of new technologies allowing the extraction of oil and natural gas from “tight” formations that previously could not be profitably produced. Fracturing (“fracking”) techniques and horizontal drilling have not only resulted in a substantial increase in American oil and gas production, they have facilitated a productive research opportunity since the state of New York has banned that mining practice while neighboring Pennsylvania allows it.

High natural gas and petroleum prices initially led to a new drilling and production boom through fracking. That boom was soon followed by a substantial decline in oil and natural gas prices that led to a substantial decrease in drilling activity. As oil prices rebounded, drilling and production increased again. Researchers are now investigating the social impacts of this boom-bust-boom in the United States.

These shifts in mining techniques are bringing with them broader changes that impact the surrounding communities as well. A similar scenario to the Marcellus Shale mining is playing out in the Bakken deposit in eastern Montana and western North Dakota, where communities are experiencing a mass in and out migration of oil field workers as the price of natural gas and oil rises and falls.

As described above, our primary focus will be on the *social* impacts of relatively large populations of miners moving into relatively rural areas. While not all of these impacts are easily quantified in dollar terms, we will include, when possible, quantitative measures of the social impacts associated with mineral development in non-monetary terms.

#### *a. Mining Town Maladies: A Look into the Dark Side of Mining’s Social Impacts*

There are many important social issues associated with mining in rural areas that have significant impacts on the well-being of residents and communities, e.g., increases in alcohol and drug consumption, pressure on local law enforcement, incidence of sexual and aggravated physical assaults, presence of convicted felons, etc. These impacts will not show up in the commercial statistics on jobs and income that are typically used to document the benefits of expanded mineral extraction. However, these social changes can have substantial impacts on resident well-being.

Small towns near a new or expanding mine typically experience an increased pressure on the police force and many other social services provided by local governments. There can be a myriad of different reasons for this, but the basic principal is easy to understand: Increased population requires the police and other social services providers to do more work. This statement was highlighted by Archbold in “Policing the Patch”, where “the Patch” referred to the Bakken “oil patch.”<sup>3</sup> In that study Archbold reported that 80 percent of the officers interviewed

<sup>3</sup> Archbold, C. Policing the Patch: An Examination of the Impact of the Oil Boom on Small Town Policing and Crime in Western North Dakota. *Police Quarterly*. 2014.

said the oil boom had affected their work. While the impacts were many and varied the most basic impact was that the officers were called out for service significantly more than they had been before the oil boom began. In fact, "...Four out of the eight police agencies included in this study have had triple the number of calls for service since 2008. One agency had double the number of calls for service..."<sup>4</sup> Police get called out on all sorts of service calls, but the basic fact that the Bakken area had 2-3 times the service calls to the police since the oil boom got well underway points to something in the community dramatically changing due to the oil boom, issues sufficiently serious enough that residents asked the police for assistance much more often.

Other studies of the Bakken area of North Dakota and Montana have shed some light on the kinds of calls to which the police were responding. Jayasundrara found that nearly all of the regional analyses had an increase in domestic violence, dating violence, sexual assault, and stalking.<sup>5</sup> It is also important to mention that in the Jayasundrara study they caution that: "...not all communities in the Bakken region had the same experiences, and some were more affected than others..." The increase in violent crime in the Bakken directly mirrors the experience in the Marcellus Shale region of Pennsylvania that saw a 30 percent increase in violent crime as the unconventional gas boom developed.<sup>6</sup> The same sort of story is told in Australia where mining towns in Queensland experienced rates of violence to which police responded increasing between 1.4 and 2.3 times the state average at the five different mining communities studied.<sup>7</sup> While no two communities are identical, the added presence of a significant number of new mine workers is likely to increase the service calls to the police and other social services, and result in a rise in the number of assault cases. As Ennis and Finlayson, who studied the Boom Town of Darwin, Australia put it:

"There must be recognition of the likely impact of resource industry structures, workplace practices and culture, and the local "frontier" cultures which combine to support high levels of alcohol consumption and associated violence. Until this occurs, the alcohol and violence-related social disruptions will continue to be a hallmark of any boomtown scenario but especially for Darwin."

Much of the literature on mining camps and mining town maladies attempts to draw a correlation between community dependence on mining and alcohol use and abuse. In the Northwest Territories of Canada, which have seen a large increase in mining in the last decade, Gibson has quoted the Canadian Police (the RCMP): "The RCMP estimates that 80% of crime is

---

<sup>4</sup> Archbold, C. Policing the Patch: And Examination of the Impact of the Oil Boom on Small Town Policing and Crime in Western North Dakota. *Police Quarterly*. 2014.

<sup>5</sup> Jayasundara, D., Heitkamp, T., Mayzer, R., Legerski, E., and Evanson, T. Exploratory Research on the Impact of the Growing Oil Industry in North Dakota and Montana on Domestic Violence, Dating Violence, Sexual Assault, and Stalking: A Final Summary Overview. National Institute of Justice Award Number 2013-ZD-CX-0072. 2016.

<sup>6</sup> Komarek, T. Crime and natural resource booms: evidence from unconventional natural gas production. *Annals of Regional Science*. 2017.

<sup>7</sup> Carrington, K. The resource boom's underbelly: Criminological impacts of mining development. *Australian and New Zealand Journal of Criminology*. 2011.

directly or indirectly related to alcohol or drug abuse.”<sup>8</sup> In the United States, in fact, mining has had the top billing as the drunkest industry. According to Bush:

“Workers in the mining (17.5 percent) and construction (16.5 percent) industries had the highest rates of past month heavy alcohol use.”<sup>9</sup>

It was the second year in a row that mining had topped this list of industries by level of alcohol use. While we might be tempted to think that this was just a U.S. problem, studies focused on mining-impacted communities around the world show that it is a common problem no matter where the mining town is located.

The influx of strangers into areas experiencing a mining boom may undermine existing community social controls on resident behavior and create an environment attractive to those with a history of criminal behavior. One study of energy development in the Greater Yellowstone region found that the number of Registered Sex Offenders grew about 2-3 times faster in counties dependent on oil and gas extraction relative to those dependent on recreation or agriculture.<sup>10</sup>

One should not be shocked by these findings. A large group of single, transient, males who work long hours out of sync with the local standard work week, who have a large amount of money to spend and long blocks of idle time, are not likely to make good neighbors without significant public planning and provision of support services. While the miners’ barracks or man camps may indeed be “dry” in the sense that alcohol is banned on mining company property and the mining company may have very stringent rules about what the miners can and cannot do when on company property, the same rules cannot, and likely should not, be applied to towns in the vicinity of the mine when the miners are on their own time pursuing their private interests.

Any town located nearby a proposed mine should prepare itself to counter these specific maladies. The most basic steps that need to be taken would be an increase in police presence, the creation of outreach programs for substance abuse and domestic abuse, and some type of plan to try and assimilate the miners into the local culture. Is there a large enough police force, can the police force work more hours, or do they need to hire more police? Are there social services available for the inevitable spike in violence and substance abuse? Is there enough housing if the miners are going to be housed in the local area? For example, in the Bakken, where oil workers had to find their own shelter, housing was a serious issue that the area is just now sorting out. If the miners are being housed in “man camps,” will they be traveling back to their “hometowns” on their block breaks or staying in one of the towns in the vicinity of the mine? Can the towns accommodate the miners’ demand for housing during their off-time?

---

<sup>8</sup> Gibson, G. Canada’s Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

<sup>9</sup> Substance use and Substance use Disorder by Industry. Bush, M. Ph.D. and Lipari, R. The CBHSQ Report from the National Survey on Drug Use and Health. April 2015.

<sup>10</sup> “Sexual Predators, Energy Development, and Conservation in Greater Yellowstone,” Joel Berger and Jon P. Beckmann, 2010, *Conservation Biology* 24(3):891-896/

These are the sorts of questions that need to be asked and concrete strategies need to be developed before the mine is in full swing.

### *b. Man Camps and the Increasing Transience of Mine Workers*

The volatility of international markets for commodities such as copper, oil, or coal has always led to fluctuations in the level of employment and payroll in the extractive industries. Employment and payroll tend to “flicker” as mines adjust their levels of production to market conditions. Given that miners are very mobile, this can lead to fluctuations in population and expanded ripple effects in the local economy. The construction of “man camps” to house, feed, and serve miners outside of urban areas, adjacent to the mineral extraction site, adds to worker transience. This additional transience is tied to the movement of mine workers to and from man camps with each work cycle, e.g., two weeks on the job with long workdays and two weeks off the job and out of the man camp. Workers reside in company housing near the mine site during their on-shift have to vacate that housing and provide themselves with an alternative residence, locally or not, during their off-shift when a new set of workers come in to keep the mine continuously operating. This can lead to fluctuating impacts in local rural communities as these waves of workers come and go. This transience is a product of the remote nature of many of the mineral deposits that are still undeveloped and the difficulty of getting the required workforce reliably to the remote mine site on time for the continuous operations of the mines.<sup>11</sup> Constantine projects that its operations, maintenance, technicians and construction workers will work eleven or twelve hour shifts, two weeks on and two weeks off. Engineers, administrative and management employees will work twelve-hour shifts, four days on and three days off.<sup>12</sup>

There may be limited hiring from the existing, local population because the high pay associated with mining jobs is partially tied to the experience and skill of people with past mining employment. The mining company will recruit regionally, and the miners will either fly-in, fly-out or drive-in, drive-out. The flicker in economic activity as mining companies adjust production levels to international market conditions and commodity prices, as well as the long on-job and off-job work shifts at man camps, both work to increase the transience of the mine work force in the area where the mine is located.

This scene is currently playing itself out in Australia where much of the population lives near the coast and many of the mining developments are in the interior:

“Alongside these radical structural shifts in employment practices, the organization of work itself – the seven-day, 35-hour working week won by coal miners in a historic 1970 victory (Murray and Peetz, 2010: 13) – has been transformed with multiple-week block rosters of 12-hour shifts to support continuous production processes. An increasingly non-resident workforce leaves their homes to work these extended rosters (e.g. 14 days on, 7 days off or 9 days on, 5 days off). They are accommodated in work

---

<sup>11</sup> This is the work schedule of the proposed Pebble Mine in Bristol Bay, AK. as well as the proposed Stibnite mine outside of McCall, ID. It is also what the Palmer Project plans according to its Preliminary Economic Analysis, to name three proposed mines.

<sup>12</sup> “Preliminary Economic Assessment for the Palmer Project,” NI 43-101 Technical Report, JDS Energy & Mining Inc. for Constantine Metal Resources Ltd., July 18, 2019. Mine Personnel, p. 16-24,

camps or other single persons' quarters – caravan parks or motels – during work cycles.”<sup>13</sup>

This isolation and mandatory coming and going of the workers help to erode what social structure may have existed in the local area around the mine. Because of the extended work hours and block nature of the work, it is hard for families and even communities to adapt to this type of schedule. Workers who live with this schedule find themselves with a relatively large paycheck and a large block of time with no structure in a community that has structure.

Others have described how this transient nature of work and workers makes it hard for mining communities to invest in the services that the incoming workers will use. Although a local area might well know that a mine is coming, they may be reluctant to invest in the infrastructure necessary to accommodate the new workers for a number of different reasons. If the workers are living in company housing near the mine it may be unclear how much strain they will put on local resources. If the mine is housing people in the local community, local residents may be reticent to invest in providing services to a population of transient strangers, according to Ruddell:

“Demands on a community's physical infrastructure (such as water, sewage, waste, housing, roads, and transportation), as well as health, social, education, and protective services (emergency medical, fire, and law enforcement) increase but often there is a political reluctance to invest in these services as population increases are sometimes short-lived, or followed by an economic bust. Consequently, there is often a lag between the recognition of a boom and the time when local services actually match the community's needs.”<sup>14</sup>

It can be hard for a local community to invest in the increased infrastructure and services to support in-migrating workers to a new mine because it is hard to tell how long they will be in town. In the Ruddell quote above, the lack of investment in the Fort McMurray area led to a crime rate three times higher than the national average and ranked Fort McMurray in the top five Canadian cities for violent crime in 2009.<sup>15</sup> While the police worker per capita ratio finally reached the national average in 2009, it lagged well behind the national average for the two decades that preceded 2009 precisely because the local government was reluctant to invest in public services for transient workers and industry.

The uncertainty associated with volatile global commodity values that leads to uncertainty about the level of mineral production, number of jobs, total payroll, and revenues to local governments also leads to hesitation on the part of local governments, local businesses, and residents to make investments that might be stranded or lost if world mineral prices turn downward. It is not just hesitation to expand local government budgets, for instance for additional police. School

---

<sup>13</sup> Carrington, K. The resource boom's underbelly: Criminological impacts of mining development. Australian and New Zealand Journal of Criminology. 2011.

<sup>14</sup> Ruddell, R. Boomtown Policing: Responding to the Dark Side of Resource Development. *Policing*. 2011.

<sup>15</sup> Ruddell, R. Boomtown Policing: Responding to the Dark Side of Resource Development. *Policing*. 2011.

districts are also likely to be hesitant to expand schools to handle the increased population. Small businesses will be hesitant to invest in the expansion of their businesses given the uncertainty about future resident spending, and residents, including miners, may be hesitant to invest in new homes in the vicinity of the mine since they might lose value if the markets for the minerals soften or collapse. The net result of this unavoidable uncertainty about the level of production at the mine is an overall underinvestment in the community that can lead to the general run-down character of mining towns.

### *c. The Impact of Transient Workers on Rural Communities*

While above we noted increases in crime and lack of infrastructure and public service investment, it is the social toll that may be the most under-reported and under-analyzed of mining impacts. Because of the nature of the mining workforce, and the new work schedules that are increasingly used at mine sites, the basic schedules of the local mine workers do not fit with the local community's schedules. This can have a number of different impacts as Carrington points out.

"In other words, precarious work practices may have a range of diffuse, often adverse social consequences for individuals and communities, even if work is generously rewarded in economic terms." And...

"What is clear is that the rapid swelling of local populations in small resident communities potentially imposes enormous pressures on existing local services, infrastructure, amenity and the social fabric." And...

"On the one hand, median weekly incomes for full-time workers ranged from 1.5 times to almost double the national median income in 2006. On the other hand, good economic times drive up local living costs. In some towns, housing costs have reached exorbitant levels." And...

"In crude terms, the mining industry has been at the forefront of a trend to encourage trading of rights, security and conditions for high wages."<sup>16</sup>

Given that the mining workforce is likely to be male, relatively young, not accompanied by family, and have considerable income available for spending, the impact of these workers spending two-weeks in a local community every month could be socially stressful for both the community and workers. Communities around mines may see their populations swell as miners with large blocks of time off come to town with much higher than average pay. While this might not be a problem for a relatively large town that can accommodate the needs of mine workers with large blocks of time off, it may be hard for small towns to accommodate such schedules. This is not to say that it is impossible and there is some literature that shows, at least when using conventional commercial metrics, that having a large mine near a rural town was not causing problems. But what is clear is that there will be changes in the local community as it

---

<sup>16</sup> Carrington, K. The resource boom's underbelly: Criminological impacts of mining development. Australian and New Zealand Journal of Criminology. 2011.

tries to accommodate the new resident miners and that these towns must plan for the arrival of the miners and the stress that they are likely to put on the local services. If a town near a mine has adequate social services to welcome the miners, it is possible that the impacts will be minimized as Hajkowicz found in Australia:

“We find no evidence of systematic negative associations between quality of life and the gross value of minerals production. Instead, mining activity has a positive impact on incomes, housing affordability, communication access, education and employment across regional and remote Australia.”<sup>17</sup>

Note that this conclusion focused primarily on the positive economic outcomes typically emphasized in mine “economic impact” studies: mines provide relatively well-paid jobs. That is the promise of mining. Yet mining areas and towns rarely show the economic affluence and quality of life projected when the mine seeks the required permits. It is partially the social impacts due to miner transience and mineral market instability that limit the positive impacts associated with the additional jobs and income. Our point is not that mining projects always lead to drunkenness and a concentration of bad actors. In fact, there are some very positive benefits to the miners that hold the jobs and the communities that receive the royalties and/or tax base from the mine. What we are attempting to stress is that there is more to a mine locating near a local community than the narrow “jobs and income” commercial view of the impact on a local community. This is especially true when looking at the impact on Indigenous or Aboriginal people.

Because of the remote nature associated with many new mining developments and because Indigenous people were often given, relocated, or restricted to remote land, Indigenous people are increasingly impacted by mining developments. While the average Non-indigenous resident of a community is clearly impacted by the transient nature of the mining industry, for the Indigenous residents this impact may be greatly multiplied. The Indigenous cultural structure is even less similar to the block-structure of the new mining working schedule; subsistence hunting and fishing, oral tradition, traditional jobs, and community relations can be strained for Indigenous people that are hired on by mines. Gibson reports that the Canadian town of Polaris, the northernmost town in Canada, was also the richest in 1992 with a per capita income of almost \$93,000 for each of the 200 residents.<sup>18</sup> While towns in Canada used to be created around ore bodies, the government now encourages temporary housing and community developments as the model for mine development to discourage the possibility of a ghost town in the future. Gibson goes on to say that:

“Participation in the mine economy can also alter the subsistence lifestyle. For people employed by the mine, who work long daily hours and a two week on/off schedule, less time can be spent on the land hunting and fishing. A study of the Slave Lake Metis

---

<sup>17</sup> Hajkowicz, S., Heyenfa, S., and Moffat, K. The relationship between mining and socio-economic wellbeing in Australia’s mining regions. *Resource Policy*. 2010.

<sup>18</sup> Gibson, G. Canada’s Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

community found 71% of workers employed by the mine reported spending less time on the land (North Slave Metis Association, 2002).<sup>19</sup>

Along with a lack of time and energy to continue the subsistence lifestyle, since the learning and history of Native societies has traditionally been orally based, “and involve knowledge transmission through *observing*, decreased practice of hunting practices may also signal the loss of associated knowledge.”<sup>20</sup> This has led to fewer people speaking the Aboriginal languages of the Northwest Territories and has preferentially led the mining companies to hire those more traditionally educated people<sup>21</sup> that rely less on their native languages which in turn discourages their speaking of the native language. Those communities that have been able to change or distance themselves from their culture so that they could become more effective miners have reaped the reward of a much higher salary. This further separates them from other Indigenous communities that are farther from the mine site.<sup>22</sup>

While the plight of the Indigenous mine worker is something of a special case, many of the cultural dislocations that they acutely experience are felt throughout mining towns all around the world. Parkins recognized those experiences in his paper on social structure, fragmentation, and substance abuse in resource-based communities:

“Specifically, the linkages between social structure, community fragmentation, and family dysfunction offer a way of understanding differential resistance and susceptibility to substance abuse. Five thematic areas were linked to susceptibility in this study: (1) an economy based on multiple divergent sectors, which gives rise to income disparity and social inequality; (2) a highly transient population, which results in social distancing and lack of social support; (3) shift work, which prevents opportunities for consistent and productive family and community relationships; (4) high incomes, which lead to material competition and financial stress; and (5) a culture of entitlement, which produces certain expectations and perceived privileges among some workers and their families.”<sup>23</sup>

These “thematic” areas are exactly those that must be carefully considered when evaluating the social impacts of mining. It is the combination of these social impacts that leads a mining town, or a man camp, or the local area around a mine to become separated from the mine workers and leads to social dysfunction. Whether this dysfunction is happening in Indigenous communities where there is the possibility for an even larger negative impact, or in the more traditional setting of a new mine in other small communities around the world, specific themes

---

<sup>19</sup> Gibson, G. Canada's Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

<sup>20</sup> Gibson, G. Canada's Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

<sup>21</sup> Here we take “traditionally educated” to mean the more European classical forms of education such as a college degree or standard U.S. or Canadian high school education.

<sup>22</sup> Gibson, G. Canada's Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

<sup>23</sup> Parkins, J. Linking social structure, fragmentation, and substance abuse in a resource-based community. *Community work and family*. 2011.

appear repeatedly in the literature. A separate culture is created by the mine that, because of its structure, its pay, and the diverse cultures of its workforce, may not fit well with the existing residents of the towns and cities that are closest to that mine. The results are the specific social maladies discussed above.

#### *d. The Variety of Potential Socio-Economic Impacts Associated with Mineral Extraction*

The discussion above of the potential social costs associated with mineral extraction is not meant to suggest there is some sort of “iron law” that always causes these social costs to burden communities in the vicinity of active mines or other mineral developments. The actual social costs experienced will depend on a wide variety of characteristics associated with the mine and the socioeconomic environment in which it is embedded. These characteristics vary across the landscapes and communities and, as a result, so do the character and severity of the social costs experienced:

- The mineral being extracted: Market volatility will partially depend on what minerals are being produced;
- The geological and environmental setting will partially determine the potential environmental damage associated with the mine;
- The mining and processing methods that will be used will also impact the environmental footprint and legacy;
- The size of the required workforce relative to the size and density of the existing population in local communities will partially determine the amount of social disruption that is likely to be associated with the operation of the mine;
- The way in which the mine will schedule its workforce and whether the mine will use a residential facility adjacent to a remote mine for its workers will partially determine the mine’s impact on local communities;
- The character of the local planning to accommodate the mine while protecting the existing social structure will partially determine the extent to which the operation of the mine will damage local social networks and undermine local quality of life; and
- The social cohesiveness of the existing communities and the willingness to act to maintain that social capital and trust.

### **3. Labor Displacing Technological Change: Increased Production, Decreased Jobs**

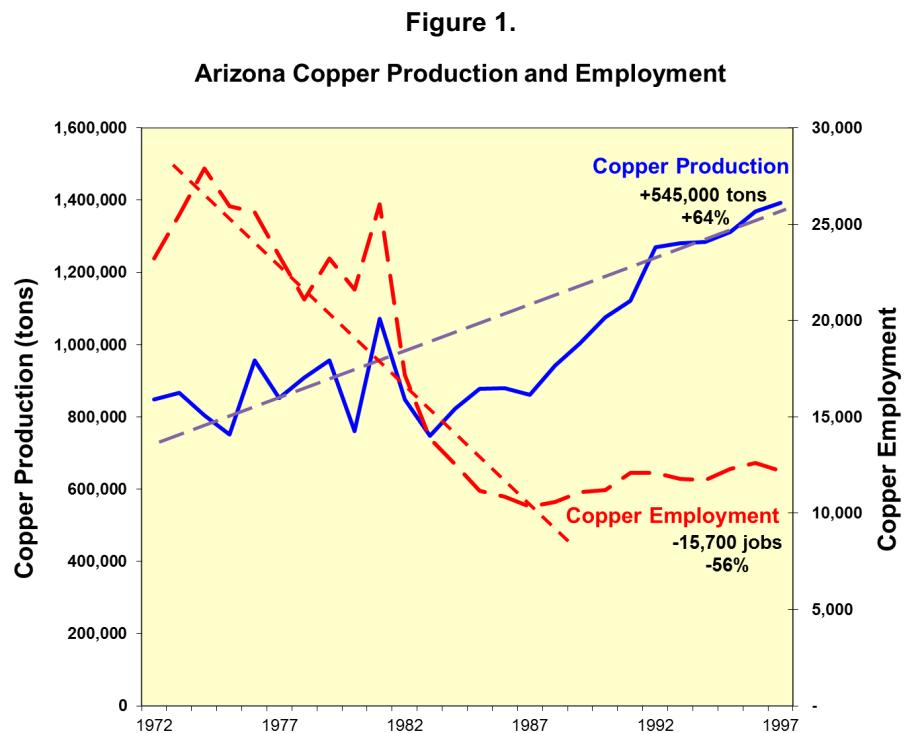
Substantial increases in copper production have not always brought increased copper industry employment. For instance, between 1974 and 1997, when Arizona copper production increased by 73%, the copper industry workforce in Arizona was cut by more than half (56%) or about 16,000 jobs.<sup>24</sup> See Figure 1 below.

---

<sup>24</sup> We use the Arizona experience with copper mining for several reasons. First, Arizona is the largest copper producing state in the nation. Second, the Arizona mines are largely producing solely copper, not

This disturbing loss of copper industry jobs while copper production was expanding significantly was then followed by an equally strong collapse of copper production and another deep loss of copper jobs, so that by 2003 copper industry employment was only ~25% of what it had been in 1974.

The collapse in employment during the boom in copper production during the last quarter of the 20<sup>th</sup> century was tied to rapid increases in labor productivity that decreased the labor needed to produce a thousand tons of copper. In 1974, it took about 35 workers to produce 1,000 tons of contained copper. In 2003, it took only 7 workers to produce this same quantity of copper. See Figure 2 below. From 2003 to 2012, copper worker productivity declined somewhat, helping to boost copper industry employment.

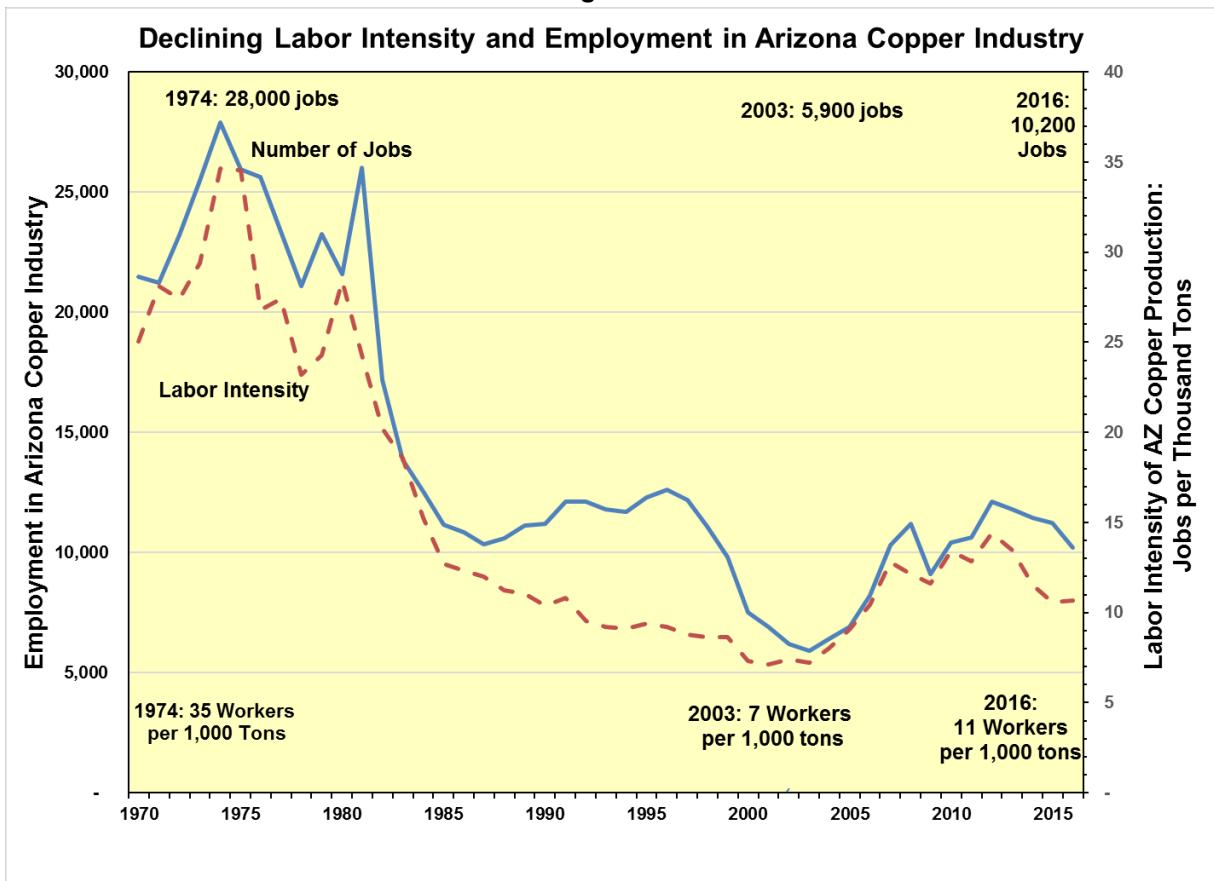


This pattern of copper mining job losses despite expanded copper production was not unique to Arizona or to copper mining. Between 1987 and 2002 the number of workers per unit of contained metal mined was cut almost in half across all of metal mining in the United States. That is, in a seventeen-year time period, the labor force needed to mine and process any given quantity of metal ore was almost cut in half.

---

a mix of several minerals. Third, copper industry analysts in Arizona have tracked copper industry employment (mines, concentrators, smelters, and refineries) on an annual basis for many decades, providing a data set that would be difficult to recreate in states where copper plays a smaller role in the economy.

Figure 2.



The shift to open pit mining from underground mining, the adoption of larger and larger ore shovels and haul trucks, the increased use of chemical extraction of copper metal from the ore, and other technological improvements made copper mining less and less labor intensive between the early 1970s and 2002. Fewer and fewer workers were needed even when copper production was rising.

The labor-displacing technological change from 1975 to 2000 has helped copper mining companies control costs and remain competitive while processing lower and lower grade ores and facing low copper prices. The higher labor productivity also supports the high wages paid. The downside of growth in labor productivity for workers and communities is that the labor required per unit of production declines, reducing the number of jobs associated with the industry. Thus, even if production is stable, employment continuously falls.

A relatively new chapter to this story is only beginning to be written now. For years the productivity of the mining industry had been increasing while the number of workers they hired declined. But beginning in the early 2000's metal mining productivity began to fall and costs of production rose. The response of the largest mining companies in the world (Rio Tinto and BHP Billiton) has been to invest in new labor-saving technologies, for example, deploying completely

autonomous vehicles and doing away with many human workers all together.<sup>25</sup> Some of the vehicles being used are the hauling vehicles that move the vast amount of waste rock created at today's hard rock mines, and some of the new technology is in robots that are used for mining in very inhospitable conditions where humans cannot spend much time. The proposed Resolution Copper mine in Arizona, for example, is proposing to mine at a depth between 4,500-7,000 feet where it is far too hot for workers to be present for a full mining shift.<sup>26</sup>

The autonomous vehicles can either be driven by people at some distance from the mine itself or operated without a human to guide them at all (in the case of the ore hauling trucks). Touting a 15% savings<sup>27</sup> on the most expensive portion of their mining operations (moving the massive amounts of low-grade ore), it seems unlikely that the days of human operators will again be on the rise. In their place will be mines that hire fewer and fewer people giving back less and less to the communities near the mining operations. Ironically, while this certainly would help to ease the impact of transient workers on a community that is unprepared to deal with them, it is unlikely that communities around ever more autonomous mines would hope for zero people to be hired by the local mine.

There are several forces driving the move towards these automated and robotic mining systems. One is that the ore bodies being pursued are much deeper underground at or beyond heat levels that workers can tolerate for many hours a day. Safety concerns associated with underground mining are also an area of concern, especially in extreme conditions. But probably the most powerful driving force is the need to lower the overall cost of extracting the ore that led to labor productivity *falling* and labor costs *rising* in the 2000's. Reducing labor costs is a key attraction for using robotics and automation in copper mines.<sup>28</sup>

These new mines will not operate without workers. But they will operate with much more highly skilled workers who use computers to monitor and operate the equipment and maintenance people who have to be able to repair electronic equipment, automated machinery, and deal with the quirks of software programs and communication technology. The fact that many of these workers can operate from a mining company's central office rather than from the mine in a rural area is also likely to reduce the demand for workers from where the mine is located. It is also likely to reduce the local opportunities to supply the mining operation with supplies and services as those become more specialized and technical.<sup>29</sup>

---

<sup>25</sup> Markman, J. These Are the Robots That Will Mine In Hell. Forbes. 7.14.2017. <https://www.forbes.com/sites/jonmarkman/2017/07/14/these-are-the-robots-that-will-mine-in-hell/#3106d7266fb7>

<sup>26</sup> USDA. Resolution Copper Project and Land Exchange DEIS. Page 139. August 2019. <https://www.resolutionmineeis.us/sites/default/files/deis/resolution-deis-vol-1.pdf>

<sup>27</sup> Caughill, P. Mining Companies Turning to Automation to Boost Efficiency. They vow to pursue automation "as aggressively as possible." Futurism. 1.6.2017. <https://futurism.com/mining-companies-turning-to-automation-to-boost-efficiency>

<sup>28</sup> Fast Forward, **Mining Magazine**, Carly Lovejoy, June 2012, p. 68; Keeping up with Caving, Carly Lovejoy, **Mining Magazine**, June 2012, pp. 46-64.

<sup>29</sup> "Exploring the social dimensions of autonomous and remote operation mining," K. McNab et al. Centre for Social Responsibility in Mining, The University of Queensland, Brisbane, Australia. 2013. Also see "Robotic technology could hobble prospects of mine workers," Owen Jacques, July 31, 2013, **Noosa**

In the past, mining companies have sought to promise local residents, including Native Americans, training programs to assure that some of the jobs could go to local residents. The types of jobs for which the local workforce could be trained in a relatively short period of time, the entry level jobs, were largely those of heavy equipment operators and other material handlers. But these are exactly the types of jobs that the automation and robotics will eliminate.

As one analysis of these changes in the future metal mining workforce put it:

“New roles in equipment maintenance, data processing, systems and process analysis, operational control and mine planning are likely to emerge. These new roles require different competencies, such as knowledge and skills in mathematics and science, and an aptitude for using information technology.”<sup>30</sup>

The training required for these new jobs is much more extensive and specific. The competencies are also much more selective. They are not entry-level jobs.

The shifts in the technology of mining during the last quarter of the 20<sup>th</sup> century dramatically cut the employment opportunities in metal mining in the United States. That had very painful impacts on mining towns, impacts from which most mining towns have not recovered. For better or worse, technological change in metal mining has not halted. The new technologies being adopted by contemporary mines, will also reduce the positive job impacts that contemporary mines can have on the local communities near the mine.

#### 4. Long-Run Social Impacts of Mining on Rural Communities: Lessons from Appalachia

The mining of Appalachian coal is slightly older than the United States as a nation. The first actual production of Appalachian coal occurred in 1768 with the development of coal deposits in the Pittsburgh area. By 1776, Appalachian coal was being used to help forge weapons for the Continental Army at the Carlisle Iron Works in Cumberland County, Pennsylvania.<sup>31</sup> Before the clearing of the eastern forests for settlement and farming, wood and charcoal made from wood were the primary source of space and process heating and the smelting of iron ore. By the end of the first half of the nineteenth century, however, Appalachian coal had become the dominant fuel used by homes and businesses. Improvements in transportation infrastructure and technology (canals and railroads) allowed the movement of coal on the “western” frontier of the

---

**News.** <http://www.noosanews.com.au/news/robotic-technology-hobble-prospects-mine-workers/1965169/>

<sup>30</sup> Ibid. K. McNab et al. p. vii.

<sup>31</sup> **A History of Appalachian Coal Mines** Kenneth Lasson, 1972, University of Baltimore School of Law, [https://scholarworks.law.ubalt.edu/cgi/viewcontent.cgi?article=1789&context=all\\_fac](https://scholarworks.law.ubalt.edu/cgi/viewcontent.cgi?article=1789&context=all_fac)

eastern states to the more densely settled and increasingly industrialized East Coast and Great Lakes region.<sup>32</sup>

After the end of the Civil War, the demand for steel for the development of multiple transcontinental as well as local railroads, increased the demand for coal for the smelting of the iron ore. With the most accessible surface mines and quarries already developed, coal mining increasingly involved tunneling underground to reach coal and expand supply. The industrialization and, then, the electrification, of the American economy created steadily increasing demand for coal. Appalachia was the most important source of that American coal production. Between 1900 and 1958 Appalachia provided about 80% of American coal.<sup>33</sup> At the end of the twentieth century, in 1997-1998, Appalachian coal production peaked. At that point in time, Appalachian coal was still the source of 43% of American coal production.<sup>34</sup> But competition from both other coal producing regions (e.g. the Powder River Basin in Wyoming and Montana) and from other energy sources (e.g. natural gas, wind, and solar) provided increasing competition to Appalachian coal in meeting American energy demands.

Over two centuries of coal mining in Appalachia provides a very long-run view of the potential for mining to generate sustainable economic prosperity to the region where those mines were and are located. Appalachia, however, rather than being a symbol of a region where a long history of mining has supported prosperous and healthy communities, has long been a symbol of the opposite: a region of persistent and deep poverty, unemployment, serious and widespread health problems and environmental degradation. Since the commitment in the Kennedy-Johnson administrations in the 1960s to reduce, if not end, poverty in America, a substantial part of the “War on Poverty” has focused on the Appalachian region. A state-federal joint effort covering parts of thirteen states, the Appalachian Regional Commission, was established to deal specifically with the divergence between the ongoing extraction of considerable mineral wealth from Appalachia and a century or more of deep and persistent poverty.

This is not a controversial characterization of Appalachia. That region’s mines continue to produce billions of dollars’ worth of coal. As one analyst pointed out, in 2008 Appalachia was the source of about 390 million short tons of coal, about 35% of total U.S. coal production. If this 2008 level of coal production is valued at the 2010 average spot price of \$56 per short ton, annual Appalachian Basin coal production at that time would be valued at about \$22 billion per year.<sup>35</sup> Clearly Appalachian coal continued to represent a significant economic asset, yet it is not clear what benefits this coal production passed on to the local economy.

---

<sup>32</sup> Ibid.

<sup>33</sup> Production and Depletion of Appalachian and Illinois Basin Coal Resources, Robert C. Milici and Kristin O. Dennen, Chapter H of The National Coal Resource Assessment Overview. U.S. Geological Survey Professional Paper 1625-F, Figure 2, page 3.

<sup>34</sup> “Coal mining, economic development, and the natural resources curse,” Michael R. Betz et al., *Energy Economics* 50(2015) 105-116.

<sup>35</sup> Op. cit. “Economic Assessment of Appalachia,” Appalachian Regional Commission, June 2010. Appalachian Regional Development Initiative Working Group, Appalachian Regional Commission.

"The Appalachian counties that produced the most coal also had poverty and disability rates that were well above national and Appalachian averages. The fact that such great wealth has been produced in counties with such high rates of poverty and disability is an anomaly that merits further analysis."<sup>36</sup>

**Table 1.**  
Poverty and Disability Rate Averages for U.S. Counties,  
Appalachian Counties and Appalachian Coal-producing Counties, 2008

	Poverty Rate	Disability Rate
United States (All Counties)	13.2%	19.2%
Appalachia (All Counties)	17.9%	21.3%
Appalachian Coal-Producing Counties	19.5%	48.3%
Top 10 Appalachian Coal-Producing Counties	22.6%	59.1%

Source: Energy Information Administration; U.S. Census Bureau,  
Small Area Income and Poverty Estimates 2008.

Note in Table 1 above that the Appalachian Counties that are coal producers have higher Poverty Rates and Disability Rates. The term "disability" is defined by the U.S. Bureau of the Census to encompass "impairments, activity limitations, and participation restrictions a person may experience in their daily lives."<sup>37</sup> The disability rate in the top 10 Appalachian Coal-Producing Counties is almost three times the Disability Rate across all of Appalachia and the U.S. Just having the coal mining industry active in an Appalachian county is associated with Disability Rates over twice the average disability rate in all Appalachian counties. Being one of Appalachia's top ten coal producing counties is associated with poverty rates over 70% above the average U.S. level.

Similar patterns appear when the health of the population is measured by the "all-cause mortality rate": deaths per 1,000 people. (See Figure 3 below).

The data show that mining counties in Appalachia have substantially higher mortality rates than those for non-mining Appalachian counties of the rest of the U.S. Mortality rates, or death rates, are the number of deaths per year as a fraction of the total population, e.g. annual deaths per 1,000 people. The mortality rates in Appalachian mining counties tend to be almost 50% higher than for non-Appalachian U.S. counties.<sup>38</sup>

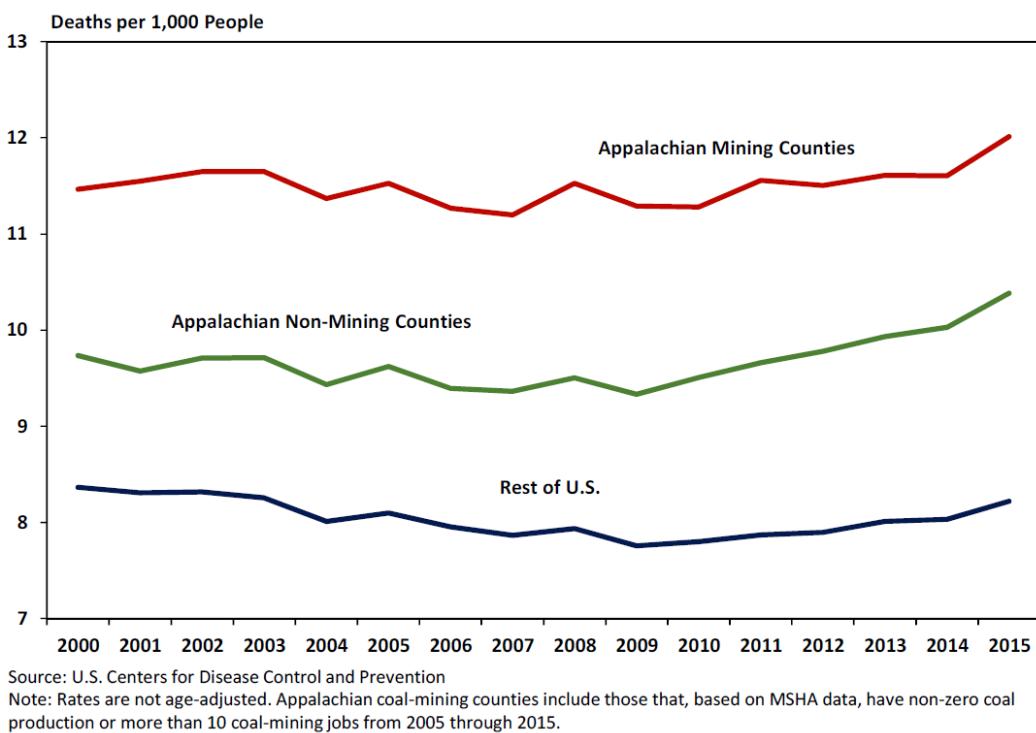
<sup>36</sup> Ibid. p. 24. For a expanded discussion of this economic anomaly, see "The Economic Anomaly of Mining: Great Wealth, High Wages, Declining Communities." Chapter 3 in **Decision-Makers Field Guide 2005: The Environment, Water, Economics and Sustainable Development**. Edited by L. Greer Price et al. New Mexico Bureau of Geology & Mineral Resources and New Mexico Tech. 2005, pp. 96-99.

<sup>37</sup> " <https://www.census.gov/library/publications/2018/demo/p70-152.html>

<sup>38</sup> "An Overview of the Coal Economy in Appalachia," Eric Bowen et al., West Virginia University, Commissioned by the Appalachian Regional Commission, January 2018,

[https://www.arc.gov/assets/research\\_reports/CIE1-OverviewofCoalEconomyinAppalachia.pdf](https://www.arc.gov/assets/research_reports/CIE1-OverviewofCoalEconomyinAppalachia.pdf)

**Figure 3: All-Cause Mortality Rate, Select Appalachian County Groups.**



The Appalachian workforce is disproportionately threatened on a large scale by substance abuse, in particular the opioid overdose epidemic. Appalachians, on the whole, are 65 percent more likely to die from a drug overdose than the rest of the country. Disparities are especially high among people in their prime working years, ages 25-44; the overdose mortality rate is 70% higher for men and 90% higher for women in the Region than in the non-Appalachian United States. Some of the Region's rural counties are experiencing overdose-related mortality rates two, three, and sometimes even four times higher than the rest of the nation.<sup>39</sup> One of the primary reasons presented for the different maladies that are expressed in the Appalachian coal mining regions is the lack of reliable employment. Although there has been coal mining in the region since before the U.S. was a nation, it is the on-again off-again nature of coal mining that has contributed to the social ills that have plagued the region.

Changes in the supply of and demand for mineral resources can have unexpected impacts on the competitiveness of particular mineral deposits, leading to fluctuations in production, employment, payroll, and revenues to governments and local businesses. This “flickering” of the economic impacts of a given mine on local communities is an ongoing aspect of mining that can have a serious negative impact on those communities. National and international mineral markets are volatile and unpredictable. That puts mining dependent communities at risk.

Changes in the cost of alternative fuels for the generation of electricity have tended to undermine the competitiveness of coal and have led to the retirement of many coal-fired electric

<sup>39</sup> “Performance and Accountability Report: Appalachian Regional Commission, Fiscal Year 2018, pp. 4-

generators and a deep decline in the demand for coal. As the Appalachian Regional Commission described it:

“The Appalachian Region’s economy has historically been dominated by a few industries, including **mining**, textiles, tobacco, and timber. Dependence on these industries as economic drivers and employers has left many communities, particularly those in the most economically distressed counties, vulnerable to economic fluctuations as their businesses face increasing competition, specialization, and market changes.”<sup>40</sup> (emphasis added)

The conclusion reached in an “Economic Assessment of Appalachia” done for the joint state and federal Appalachian Regional Commission focused on this *economic anomaly of mining*: poverty, unemployment, and ill health coexisting side-by-side with the wealth production and the high wages associated with mining:

“Appalachia continues to be a region of economic challenges. Its high rates of unemployment, disability, and poverty, along with low per capita income and college graduation rates, occur in a region with a wealth of natural resources, highlighting the need for economic diversification in the Region. **While Appalachia’s resources have greatly benefited the nation, they have not generated the level of economic stability, employment, and prosperity that one might expect** from a region so rich in natural assets and untapped human potential.”<sup>41</sup> (Emphasis added.)

The current dramatic decline in Appalachian coal production may well have a significant additional drag on the overall Appalachian economy. The research literature suggests that mine closures and job losses are likely to result in population loss, which further depresses the local economies in the long-term. This finding is supported by the “resource curse” literature that indicates declining coal economies have long-run impacts on future economic growth.<sup>42</sup>

## Summary/Conclusions

The “promise” of mining is that it will uncover mineral treasures long buried in the Earth’s crust and bring them to the surface for processing. The extraction and processing of those minerals will employ workers at well above average wages while also providing a flow of revenues to local governments to support the provision of essential government services. As the mine, its workers, and local governments spend the increased revenues from mineral extraction, “ripples” of additional economic activity, jobs and income, are expected to boost local well-being throughout the economy.

---

<sup>40</sup> Investing in Appalachia’s Future: The Appalachian Regional Commission’s Five Year Strategic Plan for Capitalizing on Appalachia’s Opportunities, 2016-2020,” p. 9.

<sup>41</sup> Op. cit. “Economic Assessment of Appalachia,” Appalachian Regional Commission, June 2010. Appalachian Regional Development Initiative Working Group, Appalachian Regional Commission.

<sup>42</sup> Op. cit. “An Overview of the Coal Economy in Appalachia,” Eric Bowen et al., West Virginia University, Commissioned by the Appalachian Regional Commission, January 2018, p. 42.

Casual observation of local communities that are heavily dependent on mineral extraction does not provide obvious evidence of superior economic well-being or vitality. Mining or oil & gas towns are often rundown, suffer out-migration, have high poverty and unemployment rates, poorer health, and lower educational attainment. The Appalachian region of the United States provides a dramatic example of a mining-dependent region that engaged in significant coal production for over two centuries but has remained a disturbing national example of persistent poverty, poor health, and environmental damage.

Two important aspects of mineral extraction explain why the “promise” of mining is rarely realized in practice. One is narrowly economic in its origin, but the other is tied to the social impacts of mining. That is the reason Environmental Impact Statements are required to not only look at the economics but to also carefully review the *socioeconomic* impacts of a mineral extraction project. Those social costs of mineral extraction have been the focus of this report.

The volatility of global markets for commodities such as copper, oil, and coal have always led to fluctuations in the level of employment and payroll in the extractive industries. Employment and payroll tend to flicker as mines adjust their levels of production to constantly changing market conditions. Given that miners are very mobile, this can lead to fluctuations in population and expanded ripple effects in the local economy. Changes in the supply of and demand for mineral resources can have unexpected impacts on the competitiveness of particular mineral deposits, leading to fluctuations in production, employment, payroll, and revenues to governments and local businesses.

This flickering of the local economic impacts of a given mine on local communities is an ongoing aspect of mining that can have a serious negative impact on those communities.<sup>43</sup> National and international mineral markets are volatile and unpredictable. That puts mining dependent communities at risk. Mine workers, residents, local businesses, and local governments recognize this constant risk of mineral markets declining by being cautious about the fixed investments they make in the vicinity of mineral extraction activities. Miners do not build homes near the mine, local businesses make do with smaller physical facilities than the size of their customer base would otherwise justify, schools are hesitant to borrow money to support new school buildings, and local governments do not put a high priority on adjusting government services to serve what might be temporarily rising populations. Overall investment in all sectors of the community is reduced and mining towns decay beyond what one would expect the wealth extracted and the wages paid would support. In addition to this economic flickering associated with the volatility of mining activity, there is also the likelihood of a boom and bust as employment and payroll associated with the mine goes through an expansion during the construction phase, then flickering operations, and finally a permanent shut down because of

---

<sup>43</sup> Steven Deller, 2014, “Does Mining Influence Rural Economic Growth?”, *Journal of Regional Analysis & Policy*, 44(1):36-48, p. 38. Also see, Thomas M. Power, 2005, “The Economic Anomaly of Mining—Great Wealth, High Wages, Declining Communities, Chapter 3 in *Mining in New Mexico: The Environment, Water, Economics, and Sustainable Development*, L.G. Price et al. editors. New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology.

either exhaustion of commercially viable ore, a long period of low mineral commodity prices, or both.

The effects of the economic volatility, uncertainty, and risk associated with mineral extraction, were not the focus of this report. We focused on the social impacts from mining on small towns and rural areas that undermines community well-being and quality of life in serious ways, as a result of several relatively new characteristics of many mineral extraction projects:

- The influx into the community of miners who tend to be young, male, single in the sense of not being with a family, and unusually well-paid compared to existing residents.
- Mines' increasing reliance on "man camps" to house and serve the mining workforce and the adoption of a relatively long work/rest schedule, e.g. two weeks on the job and two weeks off. During the off-work cycle, the workers have to leave the man camp and provide housing etc. for themselves while a different group of workers comes in to keep the mine continuously operating.

The result of these current characteristics of the contemporary mineral extraction workforce assures a transient population moving in and out of local communities in the vicinity of the mine. A predominately young, male, single population with money to spend almost always comes into conflict with existing residents and their social values and expectations. As we have documented above, the mining-dependent small communities and rural areas are at risk for the following social problems:

- Increased alcohol and substance abuse and the violence, morbidity, and mortality associated with it;
- Increased violent crime including physical and sexual assault;
- Increased pressure on law enforcement agencies because of substantial increases in citizens seeking police assistance in dealing with social problems;
- Increased presence of convicted felons including drug dealers and registered sex offenders;
- Undermining of Indigenous peoples' and other existing residents' ways of life and traditions; and
- Increased conflict among residents along income, employment, and racial lines as the community fragments under the pressure of substantial transience among workers and residents.

These summary conclusions are not intended to suggest that communities located in the vicinity of mineral extraction projects will inevitably suffer such social costs. There is considerable variation in the mineral extraction industry due to the geography and demography of the areas that host mining activities, and the public policy that local, state, and federal governments adopt to minimize the public costs that mineral extraction might otherwise impose on communities close to those mining activities. The actual mix of costs and benefits associated with mineral extraction will vary depending on the particular details associated with each mining project. What is important is that local communities be fully informed about the mix of both costs and benefits rather than a misleading focus on a benefits-only "promise of mining."

## Bibliography

Alaska Department of Labor and Workforce Development.

Appalachian Regional Commission. Economic Assessment of Appalachia. Appalachian Regional Development Initiative Working Group. June 2010.

Appalachian Regional Commission. Investing in Appalachia's Future: The Appalachian Regional Commission's Five Year Strategic Plan for Capitalizing on Appalachia's Opportunities, 2016-2020.

Appalachian Regional Commission. Performance and Accountability Report. Fiscal Year 2018.

Archbold, C. Policing the Patch: And Examination of the Impact of the Oil Boom on Small Town Policing and Crime in Western North Dakota. *Police Quarterly*. 2014.

Betz, M. Coal mining, economic development, and the natural resources curse. *Energy Economics*. 50(2015) 105-116.

Berger, Jon. And Beckmann, J. Sexual Predators, Energy Development, and Conservation in Greater Yellowstone. *Conservation Biology*. 24(3):891-896. 2010.

Bowen, E. An Overview of the Coal Economy in Appalachia. West Virginia University, Commissioned by the Appalachian Regional Commission. January 2018.

[https://www.arc.gov/assets/research\\_reports/CIE1-OverviewofCoalEconomyinAppalachia.pdf](https://www.arc.gov/assets/research_reports/CIE1-OverviewofCoalEconomyinAppalachia.pdf)

Bush, M. Ph.D. and Lipari, R. Substance use and Substance use Disorder by Industry. The CBHSQ Report from the National Survey on Drug Use and Health. April 2015.

Carrington, K. The resource boom's underbelly: Criminological impacts of mining development. Australian and New Zealand Journal of Criminology. 2011.

Gibson, G. Canada's Resilient North: The Impact of Mining on Aboriginal Communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health* 3(1).

Hajkowicz, S., Heyenfa, S., and Moffat, K. The relationship between mining and socio-economic wellbeing in Australia's mining regions. *Resource Policy*. 2010.

Jacques, O. Robotic technology could hobble prospects of mine workers. Noosa News. July 31, 2013.

Jayasundara, D. Heitkamp, T., Mayzer, R., Legerski, E., and Evanson, T. Exploratory Research on the Impact of the Growing Oil Industry in North Dakota and Montana on Domestic Violence, Dating Violence, Sexual Assault, and Stalking: A Final Summary Overview. National Institute of Justice Award Number 2013-ZD-CX-0072. 2016

JDS Energy & Mining Inc. Preliminary Economic Assessment Report. Constantine Metal Resources Ltd. July 18, 2019.

Komarek, T. Crime and natural resource booms: evidence from unconventional natural gas production. *Annals of Regional Science*. 2017.

Lasson, K. A History of Appalachian Coal Mines. University of Baltimore School of Law. 1972.

Lovejoy, C. Fast Forward. *Mining Magazine*. June 2012.

Lovejoy, C. Keeping up with Caving. *Mining Magazine*. June 2012.

McNab, K. Exploring the social dimensions of autonomous and remote operation mining. Centre for Social Responsibility in Mining, The University of Queensland, Brisbane, Australia. 2013.

Milici, R. Production and Depletion of Appalachian and Illinois Basin Coal Resources. , Chapter H of The National Coal Resource Assessment Overview. U.S. Geological Survey Professional Paper 1625-F

Parkins, J. Linking social structure, fragmentation, and substance abuse in a resource-based community. *Community work and family*. 2011.

Ruddell, R. Boomtown Policing: Responding to the Dark Side of Resource Development. *Policing*. 2011.

U.S. Census. Americans with Disabilities: 2014. 11.29.2018.

<https://www.census.gov/library/publications/2018/demo/p70-152.html>