

Rock Creek Mine

Environmental Information Document

Socioeconomics

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Prepared for
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Nome, Alaska

by

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**Rock Creek Mine Environmental Information Document:
Socioeconomic Analysis**

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Introduction

Alaska Gold, Inc. proposes to build and operate a new gold mine at Rock Creek just northwest of Nome, Alaska. Nome is located on the south coast of the Seward Peninsula, Alaska, facing Norton Sound on the edge of the Bering Sea. It lies 539 air miles northwest of Anchorage, which is a 75-minute passenger jet flight. There are no roads connecting Nome to the larger population and commercial centers within the state. Nome lies 102 miles south of the Arctic Circle, and 161 miles east of Russia. The city is located approximately 64.501110 North Latitude and -165.40639 West Longitude (Sec. 26, T011S, R034Q, Kateel River Meridian).

The proposed Rock Creek Mine project is situated 13km from Nome and is accessed via state maintained road. In order to render the mill at the Rock Creek mine site economic, it will be fed by rock hauled from a satellite site at Big Hurrah located approximately 60 road miles south of Rock Creek. It is estimated that a portion of the total project work force of approximately 130 personnel will rotate between Rock Creek and Big Hurrah; 42 will be drawn from city of Nome (population 3,505), 69 from other villages in the Bering Strait Region (regional population 5,574), and 18 from outside the region. At present the Rock Creek mine life is estimated to be 4-to-5 years; the satellite project at Big Hurrah is estimated to sustain a 4 year mine life at this writing. It is anticipated that pre-development activities will be completed in 2005, with construction scheduled to start in third quarter of 2006.

In order to pursue this development in a responsible manner, Alaska Gold has contracted with Bristol Environmental and Engineering Services, Inc. to research and write a professionally objective Environmental Information Document (EID) analyzing the potential impacts that the proposed project may yield. Any EID begins with an accurate description of the land and its people as they exist before the proposed development; this description is titled "Affected Environment". This is followed in the document by a corresponding discussion titled "Environmental Consequences"; this section overlays the footprint of the proposed development and its direct, indirect and cumulative impacts on the existing environment. Then, potential impacts are identified along with the mitigation measures that the developer could provide in order to ensure that the new project does not leave any significant negative impacts behind.

Methodology

Affected Environment & Environmental Consequences Analyses

Typically in an EID, the description of the baseline environment that will be affected by the proposed project is not in the same section as the corresponding discussion of the potentials impacts and proposed mitigation. In order to make this document user-friendly for the lay public, the impacts discussion has been moved forward in the document so that each immediately follows the description of the pre-project environment. This will render each subject matter fresh in the reader's mind as he or she reviews the impacts analyses, and it will require less flipping back and forth in a detailed document. The chapters that follow describe the socioeconomic environment that potentially will be affected by the proposed Rock Creek Mine.

An important part of this analysis is notation of community goals and objectives contained in the City of Nome's recently adopted (February, 2003) Comprehensive Plan, Phase I, as applicable to the proposed Rock Creek Mine Project. While it is important to note that the authority inherent in the Nome Comprehensive Plan is limited to land within the city limits (and only proposed access routes to the Rock Creek project lie within these regulatory boundaries), a review of this document yielded thirty-three goals, objectives or action statements that can and should be used as further guidance to the potential mine developers to ensure consistency as they contemplate the design and implementation of the Rock Creek project. Each of these applicable goals and objectives has been cited in the appropriate section of this socioeconomic section of the EID. (The scope of the Rock Creek Socioeconomic Impact Analysis does not include a section on land use, the subject Phase II of the Nome Comprehensive Plan.)

Two additional documents adopted by the Nome City Council provide guidance to potential mine developers the area. The Nome Coastal Management Plan (CMP), in a section devoted specifically to mining, includes the following paragraph.

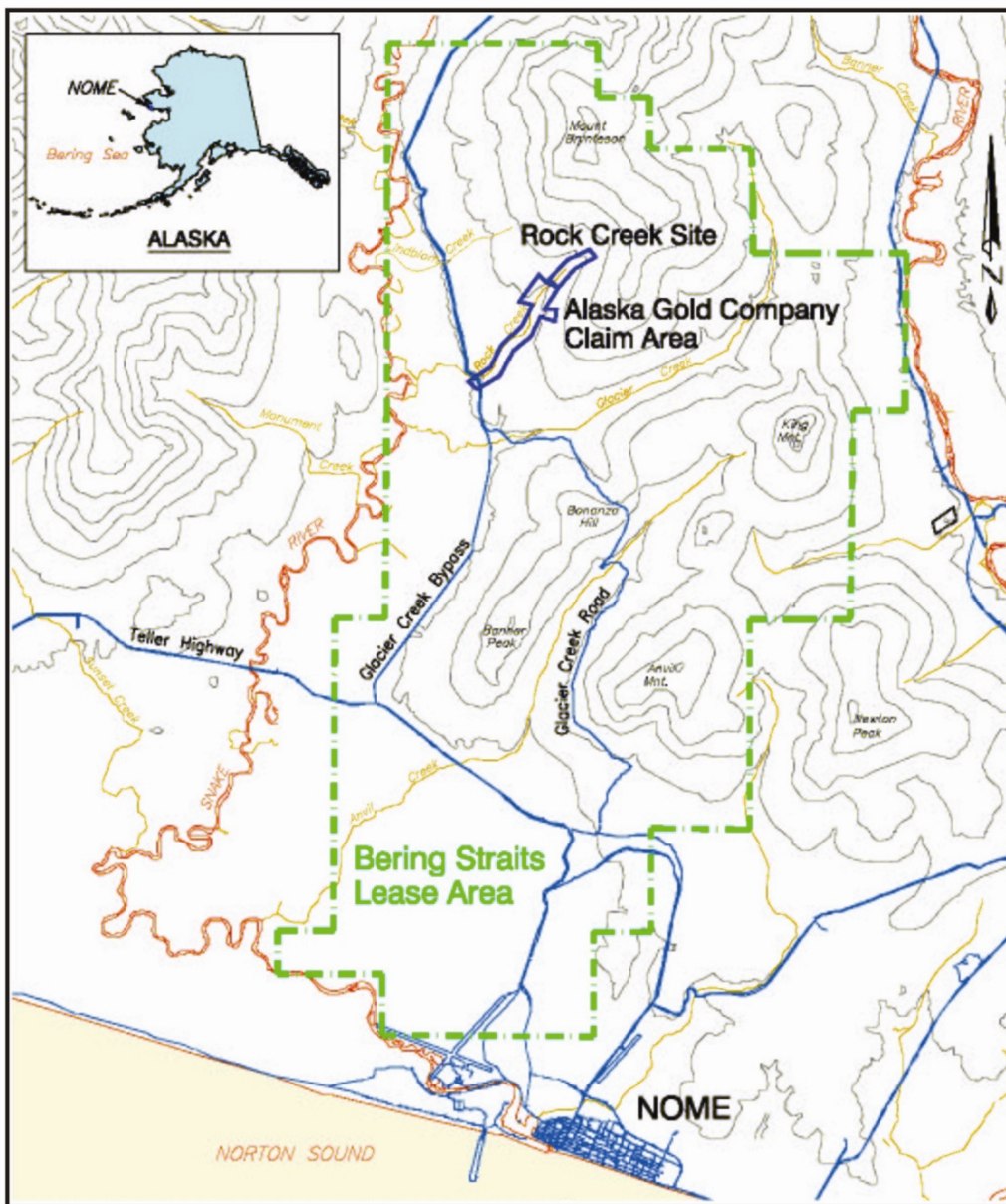
The current CMP enforceable policies for mining are the state standards that were in place in 1983. Since that time district plans have been written that contain specific regulations regarding reclamation and habitat protection. The Nome Planning Commission would like to see regulations in place that prohibit mining operations that are adjacent to hospitals, residences, or other uses that

may be adversely impacted.

In addition, developers should note the primary goal of the Nome Hazard Mitigation Plan: to prevent community losses due to flood and erosion hazards, extreme weather conditions, ice override and earthquakes.

Figure 1 shows an overview of the project location and the surrounding areas, applicable to all potentially affected resources.

Figure 1: Project Area Overview



Chapter 1 Demographics

Affected Environment

Malemiut, Kauweramiut and Unalikmiut Eskimos occupied the Seward Peninsula historically. During the early 1900's, this Native population was complemented by prospectors, gamblers, claim jumpers, saloon keepers, and other colorful characters to reach an all-time high population total of 20,000. However, the gradual depletion of gold, a major influenza epidemic in 1918, the depression, and finally World War II took their toll on Nome's population. A 2002 study by a State Demographer shows the population to be 3,493.

According to the 1990 U.S. Census, the percentage of males to females in Nome, Alaska was 54% and 46%, respectively. The total population at that time was 3,500 and has only increased to 3,505 according to the 2000 U.S. Census. Similarly, the 2000 Census revealed the male and female ratio as 53% and 47%, respectively, only a slight change over the previous decade. Ethnically, Nome is composed of 58% Alaska Native, followed by 37% Caucasian, 0.8% African American, 1.5% Asian/Hawaiian Native, 2% Hispanic origin, and 2.4% of other races.

Figure 1-1: Local Art on a Bus Shelter in Nome



The distribution of population in villages across the region is shown in Table 1-1.

Table 1-1: Population of the Bering Strait Region by Community in 2002

Community	Population
Brevig Mission	261
Council	0
Elim	284
Gambell	636
Golovin	161
Diomedede	172
King Island	0
Koyuk	280
Mary's Igloo	0
Nome	3,511
Port Clarence	19
Saint Michael	329
Savoonga	615
Shaktoolik	231
Shishmaref	537
Solomon	0
Stebbins	507
Teller	278
Unalakleet	798
Wales	165
White Mountain	212
Other	89
Total	9,085

Source: Alaska Department of Community and Regional Affairs

In 2005, the population of Nome is primarily a mixture of Inupiat Eskimos and non-Natives. A comparison of 1990 Census data to 2000 Census data shows that these proportions have changed slightly. The Caucasian population went down by 15.6%, and the Alaska Native and American Indian population rose by 11.3%. Increased proportions in other minority groups ranged from a 1.2% increase in Asian/Hawaiians to a .8% increase in African Americans.

Table 1-2: Nome Race / Ethnic Composition 1990 and 2000

	1990	2000
Total Population	3,500	3,505
Male	1,902	1,876
Female	1,598	1,629
Caucasian	1,574	1,328
AK Native or Amer. Ind	68	1,789
African American	6	30
Asian/Hawaiian Native	49	56
Other Race	47	87
All/Part AK Native/Amer. Indian	1,824	2,057
Hispanic Origin*	N/R	72
Not Hispanic**	N/R	3,433
Percent Native***	52.10%	58.70%

N/R=Not Reported

*Residents of Hispanic origin may be of any race.

**Residents of Non-Hispanic origin may be of any race.

***Percent reporting Alaska Native alone or in combination with one or more races.

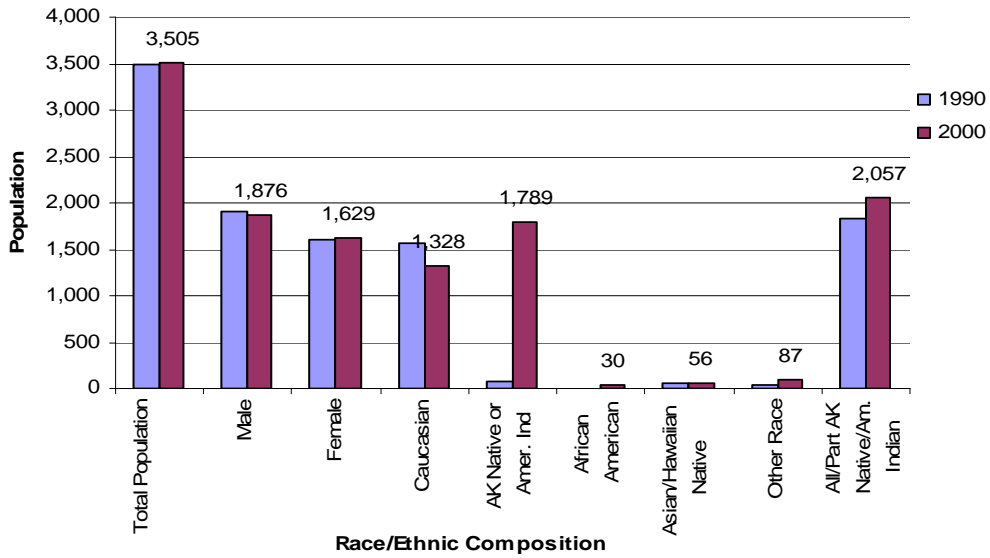


Figure 1-2: Nome Race/Ethnic Composition 2000

*Data from U.S. Census 2000

According to the year 2000 Alaska Department of Labor and Workforce Development estimates, the average age of Nome residents is 32.4 years, which matches the Alaska statewide average. The largest groups of individuals in Nome are between the ages of 25 and 54. There is a small percentage of people over the age of 59 and a relatively small number of individuals between the ages of 20 and 24.

Figure 1-3: Nome Residents Walk Near the Port in April

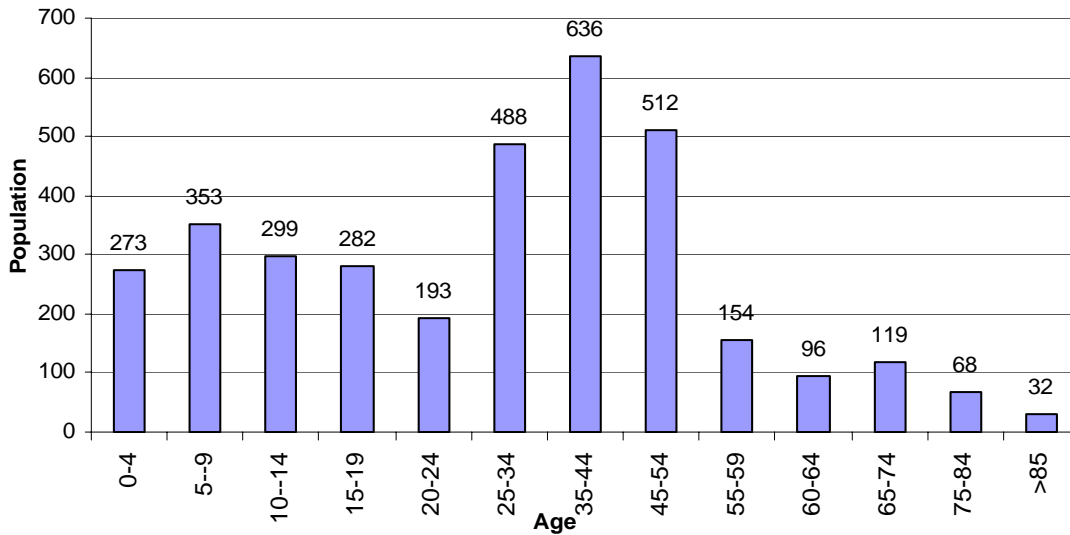


Table 1-3: Nome Population by Age 2000

Age	Total
0-4	273
5--9	353
10--14	299
15-19	282
20-24	193
25-34	488
35-44	636
45-54	512
55-59	154
60-64	96
65-74	119
75-84	68
>85	32
>18	2387
>21	2268
>62	272

Source: Alaska Department of Labor and Workforce Development

Figure 1-4: 2000 Nome Population by Age



Environmental Consequences: Demographics

It is difficult to estimate the origin of in-migration for the new jobs at the proposed Rock Creek Mine; however, interviews with Nome area employment coordinators with regional recruiting responsibilities, coupled with the mine developer's local hire policy, lead to the following projected split. Of the 130 new jobs that the mine would introduce to the community, it is estimated that 42 positions will be filled by Nome residents, 69 positions by residents of other villages within the Bering Strait region, and 18 positions filled by individuals who will come from outside of the region.

In order to extrapolate the total in-migration that would accompany the estimated 87 workers from outside of Nome, it is important to understand 1) average household size in the region's villages, and 2) rental vs. ownership preferences among village residents.

Table 1-5: Average Bering Strait Region Village Household Size in 2000

Bering Strait Region Community	Average Household Size
Brevig Mission	4.06
Diomedede	3.4
Elim	3.73
Gambell	4.08
Golovin	3.2
Koyuk	3.71
Stebbins	4.45
Saint Michael	4.09
Savoonga	4.43
Shaktoolik	3.83
Shishmaref	3.96
Teller	3.53

Unalakleet	3.33
Wales	3.04
White Mountain	2.94
Median	3.72

Source: Alaska Department of Community and Regional Affairs

Of those villages with populations over 100 in the Bering Strait region, average household size ranges from 2.94 to 4.43. The median household size for the villages is 3.72, much higher than Nome's 2.79 persons per household. The size of Nome's households is very close to the statewide average of 2.74 persons per household. Thus, if all of the new workers that come from outside of Nome were to choose to relocate to Nome for either the life of the mine or permanently, then the total population in-migration could be as high as 286 people.

However, it is important to understand the region's new-worker commuter patterns and housing preferences as exhibited since 1980. (These are detailed in the Housing Chapter of this document.) To summarize, interviews with the region's larger employers indicate that many, if not most, of the village workers will likely choose to either stay with relatives or share rent with a co-worker during their shifts in Nome, and then travel back to their home villages during their intermittent time off. In fact, the developer states that the on / off work schedule has been selected specifically in order to be better able to attract workers from the villages who often prefer to maintain their primary households in their village of origin. Based on this local knowledge of workforce preferences, it is estimated that approximately one third of the village workers will choose to relocate to Nome with their families. Based on the operations history of other mines in Alaska, it is estimated that the 18 workers who are likely to move to Nome from outside of the region will make a permanent move with their families accounting for a total of 47 new residents when workers' family members are counted.

Workers New to Nome / Origin	Average Household Size	Estimated Total In-Migration
69 from Bering Strait Villages	3.72 persons/household x 33%	85
18 from Outside of the Region	2.74 persons per household	49
Total New Workers: 87*		134 people

*87 workers new to Nome; 39 mine workers who are already Nome residents

Thus, it is estimated that a total of 134 new residents will make Nome either their permanent or intermittent new home as a result of employment opportunities with the Rock Creek Mine. This would represent a 3.6% population increase for the community of 3,505 residents.

The demographic composition of the new residents is not expected to be unlike the current Native / non-Native composition of the Nome population. If the mine operator is successful in recruiting as many village residents as the company's target goals indicate, then the percentage of Native (63%) to non-Native (37%) in-migration will be greater than the overall Nome population distribution of 58% Native and 42% non-Native.

The final factor affecting the potential for demographic effects on Nome is the life of the mine. Today the mine life for Rock Creek is estimated at 4-to-5 years. However, the company will engage in on-going exploration that may or may not yield additional gold reserves, and thus a longer mine life. Thus, the population increase outlined in this section may be sustained for 4-to-5 years, or it may be sustained for the period of a longer ultimate mine life.

Chapter 2 Economics

Affected Environment: Regional Economics

It is difficult to subsist in an arctic climate, much less make a cash living, but both Native Alaskans and new residents have found means of survival on the Seward Peninsula and have made this land their home. The Bering Strait region encompasses an area of 570 miles of coastline including Norton Sound and portions of the Bering Sea and Arctic Ocean. Over the past 10,000 years, more than 9,000 people have lived at these continental crossroads and have developed region-specific methods of economic survival.

The community of Nome serves as the regional transportation and service hub for 15 surrounding villages, which are mostly situated on the coasts of Norton Sound and the adjacent Bering Straits. The local economy is dominated by the service sector including transportation, trade, finance, and services. In outlying communities the primary source of year round employment is with regional schools, health clinics, and city and village organizations. Other seasonal activities in the region include commercial fishing, fish processing, fire fighting and reindeer herding. Communities on St. Lawrence and Diomed Islands rely primarily on subsistence harvesting of marine mammals and fish.

Figure 2-1: Norton Sound near the Bering Sea



The Bering Strait Region is a mixed cash and subsistence economy. The cash economy is largely derived from tribal, federal, state and local government employment; mining and mineral companies; commercial fishing; Native Corporations; Norton Sound Health Corporation; construction work; reindeer herding; traditional arts and crafts; local retail stores/services; and numerous temporary, seasonal and part-time employment opportunities (Kawerak 1999).

Throughout the region, unemployment rates are extremely high compared to statewide averages with an average of 13.4% in 2002, (Kawerak 2003). July 2003 showed an even higher regional unemployment rate at 17%. The region's unemployment rate was 7.6% higher in 2002 than the national average (Kawerak 2003). Job opportunities outside of Nome are limited where cash employment is a rare opportunity.

On January 15, 1997, Kawerak's Bering Strait Alaska Regional Development Organization (ARDOR) Committee was formed to implement an Overall Economic Development Plan and to represent the region's economic interests in fisheries, transportation, tourism and mining. Specifically, this program assists residents of the region in developing and expanding their local economies through job creation by providing technical assistance in the form of research into funding opportunities, grant applications and the development of business plans.

Traditional Arts and Crafts

Traditional arts and crafts are another marketable commodity that brings supplemental income to Alaskan families. It is estimated that over 2,000 people throughout the region increase their annual cash income through production of arts and crafts (Kawerak 1999). Alaska Natives are the only people in the United States allowed to harvest marine mammals for subsistence purposes. In addition to subsistence, the Natives use the mammals (walrus, seals, whale, and polar bear) to create products such as carved walrus ivory, whale baleen, seal pelts, dolls, masks, grass baskets, dance fans, kayaks,

jewelry, parkas, mukluks, fur mittens, fur hats, sealskin slippers, and other Eskimo crafts. However, these products have proven to be difficult to market given the excessive distances and costs involved with flying to larger cities (such as Fairbanks, Anchorage or Juneau) to sell the goods. For this reason, and with one notable exception in Nome, many of the small arts and crafts producers rely primarily on tourism within their villages in order to sell their products.

Figure 2-2: Arts and Crafts from Across the Region are Sold in Nome



Hunting and Fishing

Many rely on subsistence hunting and fishing for their main food source; however, it is still necessary for them to purchase costly equipment in order to maintain the subsistence lifestyle. The high cost of living expenses in the Bering Strait region often counterbalance attempts to lower costs through subsistence practices. Necessary hunting and camping equipment such as, boats, outboard motors, all terrain vehicles, canvas tents, camping stoves and heavy outdoor clothing, for instance, come at a considerable price in rural Alaska. Villages in the region have a 29%-to-62% higher cost for products (as opposed to services) than does Anchorage. Cost of goods in Nome and the villages are 156%-to-222% higher respectively than products in Atlanta, Georgia, for example. For this reason, many Alaskans have high relative poverty rates and find the need to supplement their subsistence harvests with alternative means of cash income.

Fish in the Bering Straits region are harvested mostly by commercial fishermen, however many of the region's residents also rely on fish as a primary food staple. Alaska king crab is also used heavily by residents and wasn't harvested by commercial fisheries until April 1977 (Kawerak 1999).

Mining

Following the discovery of the 'golden sands of Nome' in 1899 (yielding over \$1 million dollars worth of gold within a two-month period), the Bering Strait region became known for its gold potential. This led to over 17,000 acres of patented mining claims including Alaska's largest producer of placer gold, Alaska Gold Company (Sparks 1998). Despite the mining potential, sixty-five mining employees lost their jobs as gold prices fell in 1998, adding a significant impact on the region's economy (Kawerak 1999). Besides gold, the Bering Straits region also holds other unique mineral deposits beneath the earth. Sulfide deposits (containing lead, zinc, silver, barium and fluorine in layered iron deposits) have been found in the region. In addition, over four million pounds of tin have been mined on the Seward Peninsula, and several other areas contain great prospecting potential.

Figure 2-3: Mining History Commemorated in the Center of Nome



Reindeer Herding

Reindeer were introduced to the Bering Strait region in 1892 after over-harvesting of whales and walrus, decreasing caribou herds, and epidemics threatened the survival of the indigenous people. Since their introduction, reindeer herding has proved itself as a valuable economic resource increasing local employment and fulfilling demands for reindeer products (Kawerak 1999).

Tourism

Despite this region's cold and harsh environment, tourism plays a significant role in the regional economy. Nearly 23,000 people travel from outside the region to Nome each year spending almost 0.4% of the \$598 million spent by tourists in the entire state (Nome Convention and Visitors Bureau). Compared to the rest of rural Alaska, the road system in the southern portion of the Seward Peninsula is relatively extensive. Many tourists are attracted to the region because remote parts of Alaska are accessible from Nome by automobile for wildlife viewing, especially bird watching.

Figure 2-4: Miles of Icy Flats in the Bering Strait Region



Affected Environment: Local Economics in Nome

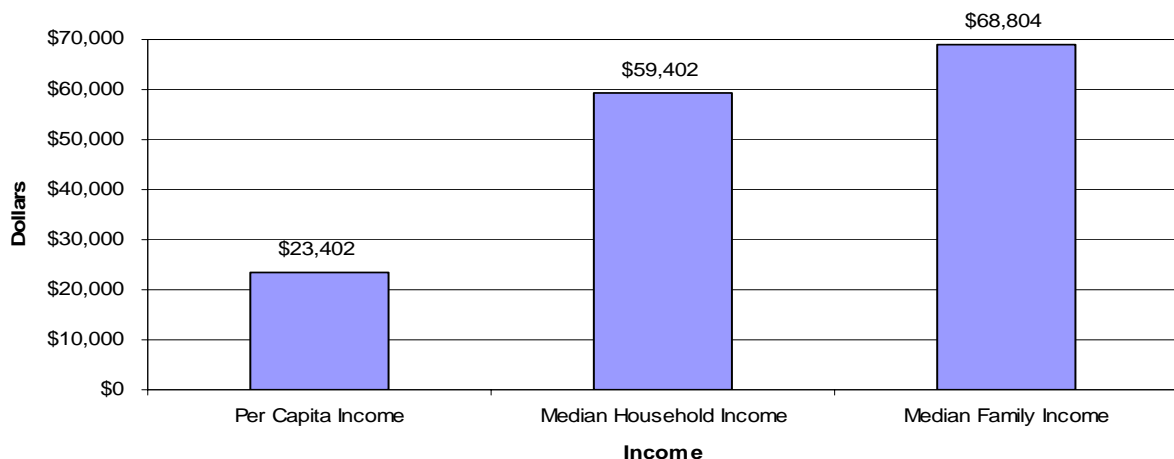
Nome is the supply, service and transportation center of the Bering Strait region. The labor force of Nome is supplemented by residents who travel from villages throughout the region (ranging from Stebbins on the southern portion of Norton Sound to Shishmaref on the northern portion of the Seward Peninsula). This means that a large number of skilled, semi-skilled, and unskilled people are available for work in Nome. The 2000 US Census revealed 6.3% of the Nome population is below the poverty level with an average household income of \$59,402.

Table 2-1: Income and Poverty Levels, Nome Alaska

Per Capita Income	\$23,402
Median Household Income	\$59,402
Median Family Income	\$68,804
Persons in Poverty	212
Percent Below Poverty	6.30%

*Source: 2000 US Census

Figure 2-2: Income and Poverty Levels, Nome Alaska



The largest contributor to the Nome economy is government services followed by additional key basic industries including fishing, retail, transportation, mining and medical services. The Nome area has an 11% unemployment rate for individuals who are seeking work opportunities, and a 39.4% unemployment rate when individuals who are unemployed and not seeking cash employment are counted as well.

Table 2-3: Employment in Nome, Alaska

Total Potential Work Force	2,547
Total Employment	1,544
Civilian Employment	1,535
Military Employment	9
Civilian Unemployed (And Seeking Work)	189
Percent Unemployed	11.00%
Adults Not in Labor Force (Not Seeking Work)	814
Percent of All 16+ Not Working (Unemployed + Not Seeking)	39.40%
Private Wage and Salary Workers	971
Self-Employed Workers (in own not incorporated business)	0.94
Government Workers (City, Borough, State, Federal)	456
Unpaid Family Workers	14

*Source: 2000 US Census

Additional Local Economic Contributors

Several local construction businesses in Nome employ a total of 137 individuals. These businesses include the following: Anvil Construction, Edsearco Backhoe and Drilling Services, Miller Construction, Outsider's Construction Inc., and Pomeranz Construction.

Figure 2-5: Heavy Equipment Active Year-round



During 2002, local business occupations contributing to the Nome economy rendered 530 individuals with employment. An additional 310 jobs were in the service sector, and 403 individuals were employed with sales or office work. In this sector, the largest employers in the Nome Census area were the Bering Strait School District with 567 employees and the Norton Sound Health Corporation with 420 employees. One hundred fifty-three people found jobs in production, transportation and material moving, and 137 were employed in construction, extraction and maintenance. Very few individuals cited farming, fishing or forestry as their primary occupation.

Figure 2-4: Employment by Occupation, Nome, Alaska.

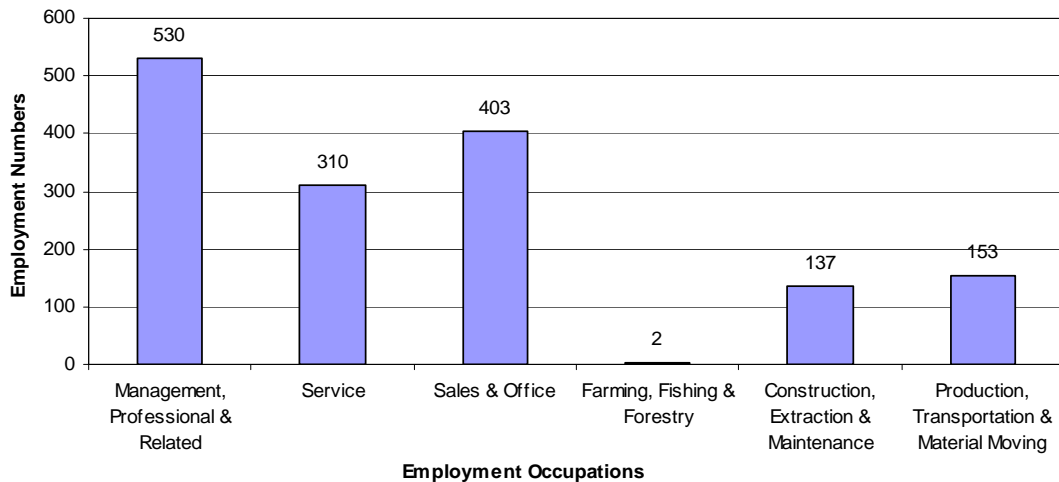


Table 2-5: Employment by Industry, Nome, Alaska

Agriculture, Forestry, Fishing & Hunting, Mining	36
Construction	55
Manufacturing	9
Wholesale Trade	3
Retail Trade	156
Transportation, Warehousing & Utilities	183
Information	53
Finance, Insurance, Real Estate, Rental & Leasing	40
Professional, Scientific, Management, Administrative & Waste Management	24
Education, Health and Social Services	474
Arts, Entertainment, Recreation, Accommodation & Food Services	170
Other Services (Except Public Admin)	109
Public Administration	223

*Source: 2000 US Census

Commercial Fishing and Hunting

Sixty residents held annual commercial fishing permits during 2000 according to the US Census. However, according to US Census statistics, only 2 individuals were employed under farming or fishing occupations during 2000; this confirms the State of Alaska's contention that U.S. Census data gathering in rural Alaska does not always yield accurate information. The commercial salmon fishing season for Chinook and chum was closed by regulations due to poor runs during 2003 (Alaska Department of Fish and Game 2003). King Crab harvest also contributes to the economy. The Norton Sound Seafood Products processing center has made a significant contribution to the local economy by providing value-added products to the retail market. Several other Nome businesses licensed to provide either fish and meat products or guiding services include: Teller Fish and Meats, Steve's Guide Service, Solo Creek Guide Service,

Smitty's Fishing Service, and Alaska River Camps. Alaska's reindeer industry is centered in the Nome area. Historically, the local reindeer industry has added significantly to the local cash economy. During the 1990's, for instance, 15 herds were active producing nearly \$1 million annually in economic contributions (Kawerak 2003).

Government Services

Government services provide the majority of employment for residents, accounting for a total of 456 workers in the Nome area. Nearly 30% of Nome's workers were employed by the city, borough, state or federal government during 2000.

Mining

Mining began in the Nome area in 1865, but it wasn't until 1898 that literally thousands of miners came to the region during the gold strike on Anvil Creek. That year yielded over \$1 million dollars in the summer season. The discovery led to the construction of the Nome-Anvil Creek railroad in 1900. By 1902, the claims that were easily accessible to individuals without substantial equipment had been mined out, and larger mining companies with better equipment took over the area. Since the gold strike on Anvil Creek, Nome's gold fields have yielded a recorded \$136 million. The gradual depletion of gold (and a decline in gold prices in the 1990's) contributed to the decline in population and available work in this sector since the initial discoveries. Several smaller gold mines continue to provide some employment opportunities in this sector. Today, the Nome District contains over 17,000 acres of patented mining claims (Sparks 1998). State of Alaska records indicate, and locals confirm, that in addition to Alaska Gold Company, the following mining operations were active in the 2004 season:

Anderson & Sons Mining

APP Mining

Carlisle / Benchoff Mining

Gumear Mining Stout Mining
Hanson Mining
K&S Leasing
Kelliher Family Mining
Kralik Mining
Krutsch-Johnson Mining
N.B. Tweet and Sons
Northcoast / Martinson Mining
Outdoor Channel
Pomerenke Mining

Other local businesses with mining operations in Nome include: Bering Straits Native Corporation, Chukchi Mining, Gray's Mining Company, Golden Glacier, Inc., Innovation Mining, McHenry Mining, and Sitnasuak Native Corporation.

Retail

Carved ivory and other Eskimo crafts are a significant part of the trade in Nome and provide a year-round income for many locals. Local businesses AC Value Center and Hanson Trading Company are important centerpieces of Nome's grocery and general merchandise industry. Other local retail businesses include: Alaska Goods, Arctic Trading Post, Anvil City Sporting Goods, Anvil Electronics, Builders Supply, Chuhotka-Alaska, Inc., Country Store, Fossil Ivory Sales, Foster Gun Company, Jorgensen ATV Repair, Maruskiya's of Nome, Lovell Toy Sales and Webster Arts and Crafts, among others. Local restaurants and service providers round out the retail sector.

Figure 2-6: AC Value Center in Nome, Alaska



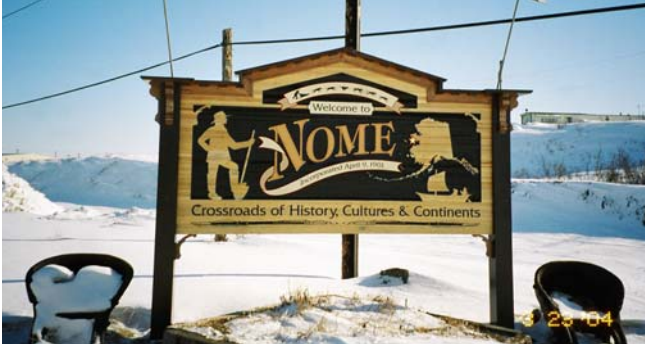
Figure 2-7: Hanson Trading Company in Nome, Alaska



Tourism

Tourism has increased in importance in recent years. Approximately 20-23,000 visitors are lured to Nome each year, largely due to its gold rush history (Nome Convention and Visitors Bureau). Forty-six percent of these individuals purchase a package tour and travel on major airlines; seventeen percent are independent travelers. Exit surveys show that 84% travel to Nome for vacation and pleasure; 11% come to Nome for business and pleasure; and only 6% come for business purposes only. Nome's visitors spent \$2.3 million in 1993. Local tour operators, hotels, bed-and-breakfast accommodations, restaurants, bars, retailers and transportation providers all yield economic benefit from this market sector.

Figure 2-8: Welcome Sign Near the Nome Airport



Most visitors spend less than one night in Nome, while the average stay in Alaska is 13 days (Alaska Tourism Marketing Council, 1999). During 2001, there were 10,449 total visitors to the Bering Strait region (Kawerak 2003). Increasing the tourism industry in Nome would largely depend on reduction of high travel costs, expansion of annual activities, and improvement of accommodations, local businesses and services. Additionally, the Nome Visitor Center is discussing plans to promote Nome as an emerging bird watching destination, as well as other potential tourism development opportunities. During summer 2003, four cruise ships of 100+ passengers docked in Nome; seven cruise ships are expected during summer of 2004 (Kawerak 2003).

Figure 2-9: Interpretive Site of Historic Mining Equipment, Nome



Nome is the finish line for the 1,100-mile Iditarod Sled Dog Race from Anchorage that is held each March. It is known as "The Last Great Race on Earth," attracting participants and spectators from all over the world to race the 1,049 miles from Anchorage to Nome. The sport is also popular throughout the winter and is used by many locals as a means of transportation for carrying supplies to and from areas without road access.

Figure 2-10: Marker for the Official End of the Iditarod Sled Dog Race, Nome



Future Economic Development Prospects

In addition to the proposed Rock Creek Mine, Nome has several other relatively large projects on the near horizon at this writing.

- The Norton Sound Health Corporation is building a new hospital. No net gain in hospital beds is anticipated. The current hospital facility will be used as a Qu yana Elder Care facility.
- The National Guard is building a new armory. The existing facility is scheduled for reuse by another entity.
- The Bureau of Land Management is building a new Iditarod Race interpretive visitor center.
- The school will undergo a major renovation.

- DOT&PF will proceed on on-going road improvements and possible airport expansion.
- Construction has begun on a new port and causeway.

The cost / benefit analysis for the new port project reported a strong 2.5 multiplier for the region. But this project is the exception among those that are creating a construction boom in Nome at present; all of the other projects are either replacement facilities or are expected to take advantage of staff resources that are already in Nome for the most part.

Goal 5 of the Nome Comprehensive Plan (NCP) is “Create economic opportunities for residents and businesses in Nome compatible with the local lifestyle.” Specific objectives listed under this goal include:

Objective 5.1: Research strategies for attracting new industry and investment.

Action 5.1.2 Ensure that there are adequate land use areas for industrial and economic development.

Objective 5.5 Encourage resource exploration and development.

Action 5.5.5 Mining: sand, gravel, gold

The NCP’s Goal 7 states “Allow growth to occur in a manner that protects the quality of land, water, air, open space and critical habitats. Under this goal, specific objectives include:

Objective 7.2 Guide development to areas which will produce the least adverse impacts.

Objective 7.3 Protect existing open spaces, natural drainage patterns, and subsistence use areas.

Environmental Consequences: Economics

The potential economic consequences of the Rock Creek Mine coupled with its satellite operation at Big Hurrah, should both be permitted to operate, would derive from the following factors:

- direct employment
- indirect and induced employment
- displacement potential
- capital expenditures
- operating phase expenditures

Employment at the mine will be approximately 130 full-time jobs for the currently identified 4-to-5 year life of the mine. Job categories and corresponding wage rates are detailed on the following page in **Table 2-6: 2003 Western Alaska Wage Rates as Compared to Rock Creek Mine Wage Rates**.

While it is not possible to accurately predict exactly how many of the jobs at the mine would be filled by Nome residents, by village residents or by workers from outside the region, an estimate has been developed for purposes of this analysis. A strong local hire effort by the developer and the experiences of other large regional employers who recruit locally and within the region, combine to suggest that the local / regional / beyond-the-region distribution will likely yield:

- 42 mine workers who are already Nome residents,
- 69 mine workers from outlying villages, and
- 18 workers from outside of the region.

Detailed econometric modeling (which is beyond the scope of an EA or EIS) of both Nome's local economy and the Bering Strait regional economy would be required to definitively determine the exact multiplier that will result from the introduction of 130 new

jobs within the region. At the Fort Knox Mine, which is within 20 road miles of the highly developed Fairbanks economy, the multiplier is 2.0; that is, for every new job that was introduced at the Fort Knox Mine, another new job was created in Fairbanks in order to adequately support the new jobs at Fort Knox. (**True North Mining Project Economic Impact Study**, McDowell Group, 2001.) On the other hand, in Delta Junction, which has a relatively underdeveloped service and support sector, the multiplier effect of the Pogo Gold Mine was only 1.3, that is .3 new jobs were created locally in Delta to support each new mining job at Pogo. (**Pogo Gold Mine Environmental Impact Study**, Baker Engineering & Energy, Inc., 2002). Easy access to the Fairbanks marketplace by Pogo mine workers resulted in far less induced employment in nearby Delta Junction.

Nome's remote location means that construction materials and heavy equipment must be imported from as far away as Fairbanks, Anchorage or the Lower 48. These latter communities, in turn, become the locations that benefit from the dollars spent by the Rock Creek Mine developer / operator. While it is true that the manufacturing sector of the Nome economy is not well developed, the service and supply sectors that support existing mining activity in the area are relatively well developed. Thus, it is safe to assume that this sector, coupled with the retail service and supply sector that would support the new employees and their families, would drive the local multiplier effect in Nome, conservatively, to 1.6. It is important to note that there is room in the Nome economy for even greater growth in the industrial service and supply sector that could support a mine the size of the proposed Rock Creek Mine operation. Two examples of retail sales income that currently flow directly out of the region are heavy industrial hardware and industrial tire supply; if local distributorships were established in Nome for these and other industrial supplies, the local multiplier effect could be raised approximately .1-to-.2 per cent higher. Based exclusively on the conservative 1.6 multiplier, the 130 new jobs at Rock Creek Mine would create an additional 78 jobs in the service and supply sectors. Almost all of these additional jobs (unlike the direct employment at the mine) would be in Nome as opposed to other villages in the region. This would render the total new employment impact at 208 new jobs.

Due to the fact that both the 11% unemployment rate in Nome (compared to 6.5% statewide and 5.7% in the U.S) and the 17% unemployment rate in the Bering Strait region (Kawerak, 2003) are extremely high, the economic impact of 208 new jobs would have a significant positive effect.

Project operating costs for the Rock Creek Mine will average about \$22 million per year. Eight and a half million of this total dollar amount will be spent locally in salaries and wages; the total economic benefit of \$8.5 million in direct wages, when combined with the indirect and induced local expenditures, result in a total annual economic benefit in wages and salaries to the region of \$13.6 million. In addition, an estimated 11.5% of the remaining \$13.5 million in annual materials and supplies expenditures (or \$1.5 million) will be spent by Alaska Gold within Alaska each year.

The comparative wage analysis in **Table 2-6** is critical to analyzing the displacement potential of the Rock Creek project. Rock Creek salaries, with the exception of the one Mine Accountant/Controller position, do not fall above the mid-range of similar positions in Western Alaska (Department of Labor & Workforce Development, Research and Analysis Section). This means that Nome and the Bering Strait region will be able to avoid the potential workforce displacement that is often termed the “Pipeline Effect”; that is, wages at the mine will not be inordinately high for the region which means that these new jobs would not likely have the potential to lure residents away from existing jobs that are critical to maintaining structure in communities. Thus, a potential negative impact is avoided.

Initial capital expenditures on construction of the mine are detailed in the table below.

Table 2-7: Summary of Initial Capital Cost

Category	Cost (\$ millions)
Infrastructure	1.7
Buildings and Support	2.5
Major Mining Equipment	10.4

Ancillary Support Equipment	1.0
Milling and Processing	16.5
Tailings	0.8
EPCM: Engineering & Procurement	1.1
Indirects	1.0
Owners Cost	2.1
Allowances	2.1
Total	39.2

Most of these construction materials, manufactured buildings and equipment are not currently available for purchase through any existing business entity within the region; if local entrepreneurs do not grow the supply sector of the economy, then almost all of the economic benefit from construction phase capital expenditures will accrue to businesses both outside of the region and outside of Alaska. Alaska suppliers and distributors are currently in a position to capture an estimated \$4.5 million (through portions of the infrastructure, buildings/support, ancillary support equipment and indirect expenditures) of the total \$39.2 million construction phase economic benefit; however, here too, both the direct economic benefit and the multiplier effect could be greater should the Fairbanks market stage itself to supply more of the equipment and materials needed for construction of the Rock Creek mine.

Chapter 3– Community Facilities and Services

Health and Social Services

Nome is located in Emergency Medical System (EMS) Region 5A in the Norton Sound Region and is classified as a large town/regional center. The emergency services have limited highway, airport and coastal access; therefore, most of the emergency and health care services are provided by either the 911 telephone service or volunteers.

Health care services within the Nome region are provided by primarily volunteer and non-profit entities. Auxiliary health care is provided by Nome Volunteer Ambulance Department and the Norton Sound Health Corporation. Hospital and health clinic services are provided at Norton Sound Regional Hospital which is privately owned and City operated. The clinic was renovated in 1994 and is a qualified acute care facility that provides Medivac service. The hospital provides 34 beds (including those in non-participating or non-licensed areas), and 19 beds that are totally certified. The range of care includes five full time on-staff physicians, one dietician, one inhalation therapist, one licensed practitioner nurse, and 65 other salaried personnel. There are 12 registered nurses and 2 registered pharmacists on staff. Additionally, Nome has 1 outpatient clinic, 2 dental clinics, 1 eye clinic, 1 pharmacy and 1 chiropractor. Acute renal dialysis, anesthesia, radiology, and alcohol and/or drug services are provided under contract at the hospital. The average cost for a hospital room in Nome is \$878, nearly 22% higher than a hospital room in Anchorage, and 63% higher than a hospital room in Atlanta, Georgia.

Figure 3-1: Norton Sound Regional Hospital, Nome Alaska



Figure 3-2: Health Care Services Building, Nome Alaska



Special Care Facilities

The only long term care facility in Nome is the Quyaana Care Center. Norton Sound Community Mental Health Center is another care facility within Nome in addition to Saquigvik, a turning point and transitional living facility available for special care services. The Nome Senior Center rounds out the local profile of special care services.

Figure 3-3: Senior Center in Nome, Alaska



Child Care, Family and Youth Services

Nome Child Care Center funds child care and youth services through a variety of businesses. Childcare service providers in Nome include: All My Children, Children and Elders Special Advocacy Services, Debra's Home Care, Elsie's Care Home, Granny's Child Care, Horton's Daycare, Jamie Kyle's Daycare Home, Little Saints Daycare, Lois Mcmanus Daycare, Marie's Child Care, Mini Start Daycare, Minnie A Tucker, Njels Daycare, Nome Daycare, Paukan's ABC's and 123's, Paniataaq's Place, Pooh's Corner Childcare, Quizuna's Day Care, Tender Care, Tina Weyiouanna, Uncle Sam's, Wee Care, and Yvonne's Child Care.

Figure 3-4: Nome Child Care Center



Mental health services, a safe home program, alcohol rehabilitation center and alcohol treatment community services are provided in Nome. Additional community assistance programs include village health services, water quality services, environmental health services, and an infant learning program. Several family and household assistance programs are available through the State of Alaska including: Alaska Temporary Assistance Program (ATAP); welfare-to-work services; food stamp program' adult public assistance (APA); heating assistance program (HAP); and general relief assistance (GRA).

The Nome Comprehensive Plan Phase I states as its eighth goal: Coordinate with health and social service agencies to provide adequate health and social services to Nome area residents.

Figure 3-5: Alaska State Troopers supplement the Local City Police



The Nome Comprehensive Plan states in Objective 3.7 “Ensure that the Police Department, Nome Volunteer Fire Department, Nome Ambulance Department and Search and Rescue have adequate resources to provide for the safety of Nome and area residents.”

Mail and freight arrive Monday through Saturday in Nome. Mail is sorted at a United States Postal Service mail processing annex. The Nome Comprehensive Plan speaks to this public service in Action 5.7.2 “Pursue potential freight or mail hubs for the region.”

Figure 3-6: Postal Services, Nome, Alaska



Education

There are six schools located in the Nome City School District, attended by 739 students. Forty-eight teachers are present in Nome yielding a student/teacher ratio of 15.2. Nome has a dropout rate (9-12 grade) of 1.2% and has an average expenditure of \$8,424 per student (FY 2001). The geographic cost differential multiplier for residence in Nome is 1.16. The schools range in size from 9 students at a pre-school to 401 at the high school. Private schooling is offered through the Seventh Day Adventist Church from grades 1 through 9 with a total of 40 students taught by 3 teachers.

Figure 3-7: Nome Elementary School



From 1990 to 1998, the Nome Public Schools increased by 30 students. High school education attainment for the Bering Strait Region, however, lagged behind both the state and national averages. In fact, 34% of the region's total population lacks a high school diploma. However, nearly 75% of the population 20 years and older within Nome, have a high school diploma.

Table 3-1: Schools Located in Nome

Nome School District School Name	Grades Taught	Number of Students*	Number of Full-Time Teachers*
Anvil City Science Academy	5 thru 8	44	2.5
Nome Elementary School	P thru 6	373	19

Nome Youth Facility	9 thru 12	10	1
Nome-Beltz Jr./Sr. High School	7 thru 12	341	20

* Current as of October 2004.

Within the Nome Comprehensive Plan is Objective 13.1 which states “Coordinate with Nome Public Schools to strategize improvements to the educational system, including the curriculum used in the schools.”

Fifteen instructors teach 500 students at the University of Alaska, Fairbanks, Northwest Campus in Nome. It is located on the east end of town and maintains a conference room and three classrooms available for meetings and breakout sessions. Additionally, the Campus has audio conference bridges and media equipment available on a rental basis.

The Nome Comprehensive Plan states in Objective 5.9 “Support expansion and promotion of the Northwest Campus of the University of Fairbanks.” It also addresses vocational training in two objectives:

Objective 5.8 which states “Support the human resources of the region with training programs that promote workforce development.”

Objective 13.3 Facilitate the establishment of a regional training center in Nome for the Bering Strait area.

Figure 3-8: Northwest Campus, University of Alaska, Nome, Alaska.



Parks and Recreation

The Nome Recreation Center has a meeting capacity of 700 and banquet space for up to 650. The center is used regularly for conventions, trade shows, banquets, performances, and other large functions. There is an adjoining multi purpose room available for exhibit space or breakout sessions. Additionally, the Recreation Center has a kitchen, small restaurant, 9,000 square foot gymnasium, two racquetball courts, a bowling alley, and game room.

Figure 3-9: The Recreation Center, Nome Alaska.



The Bering Land Bridge National Preserve is located near Nome and is only accessible by float/ski plane, small boat, dogsled or snowmobile. The park offers hiking, backpacking, hunting, fishing and boating during summer months and skiing, dog

sledding, snowmobiling and cross-country skiing during the winter. (National Park Service).

Additional facilities used in the community for public gatherings include the Mini Convention Center which is located within walking distance of downtown; it has banquet space for 200, meeting space for 250, as well as two adjoining conference rooms. The Pioneer Igloo is a 2-story turn-of-the-century style building that seats 250 people and maintains a full kitchen on the main floor; it is used for exhibits, displays or musical performances. Old St. Joseph's Hall, seating 140, is a restored turn-of-the-century church now used for community services, meetings, trade shows, catered dinners, performances, weddings, and receptions.

Community goals and objectives related to recreation are abundant in the recently adopted Nome Comprehensive Plan.

Goal 2: Enhance the quality of life in Nome.

Objective 2.10 Actively pursue grants that will increase the quality of life in Nome through more recreational facilities, environmental restoration, enhancements, or access to subsistence resources.

Goal 4: Guide the use of land in a manner that provides for orderly and efficient community growth, including adequate opportunities for recreation.

Action 4.10.4 Develop a land use plan for City properties outside municipal boundaries, including Sunset Firing Range.

Goal 9: Increase recreational opportunities for all user groups.

Included under Goal 9 (above) is a series of four programmatic objectives supported by twenty-four specific action directives for the community thus demonstrating the community's commitment to enhancing the recreation in Nome.

Public Utilities

Water and Sewer

Public infrastructure such as piped water and indoor plumbing are a rare commodity in most of Alaska's rural communities. In 1990, of the 2,371 homes in the Norton Sound region, 86% (2,039) lacked complete plumbing facilities (US Census Bureau 1990). However, this percentage does not hold true in Nome. Today, 95% of the homes in Nome have complete plumbing where sewage is piped away from the home; however, some residences still haul their own honey buckets (haul service is not provided) and have water delivered to home tanks. Major expansion of sewer and water lines was completed in 1984 accommodating an additional 1,500 people, not accounted for on the previous system. Additionally, the sewer/water lines in the Icy View Subdivision were installed in 1995. Current sewage treatment has been converted from anaerobic digestion in a lagoon system, to a more updated aerobic digestion system. Three wells at Moonlight Springs serve as the primary water source for the community. The water undergoes treatment at the Snake River Power Plant and is stored in a 1,000,000 gallon tank. An additional million-gallon tank downtown is also available for back-up use. The water is heated and pumped to residences through a direct buried scclaircore piping network that replaced a 1960-era wooden utilidor. Another option for more remote residences is water delivery. Nome Joint Utilities System (NJUS) completed a 6-phase construction upgrade in 2003 including drilling of additional wells at Moonlight Springs and construction of an underground utilidor replacement with arctic piping. Other projects within NJUS' 5-year planning horizon include replacement of the pumping station and water storage tank, and development of a water source closer to town.

A separate section of the comprehensive plan is devoted to the Nome Joint Utilities System. It contains:

Objective 12.1 Coordinate with NJUS to continue providing utilities to the Nome area.

Action 12.1.1 Participate in preparation of a NJUS Master Plan.

However, the importance of public utilities to residents of this rural community is evident in the number of additional references to the provision of additional utilities in the rest of the comprehensive plan:

Objective 2.7 Extend NJUS water, sewer and electrical services to all residential areas.

Objective 3.4 Extend city water and sewer as warranted by local conditions and resident preferences.

Action 3.4.1 Link the extension of public services to land use developments.

Action 3.4.2 Adopt a NJUS Master Plan.

Objective 3.5 Expand electrical service into areas not currently provided with electricity.

Objective 4.10 Develop a land use plan for City properties outside the municipal boundaries, including Moonlight Springs.

Solid Waste

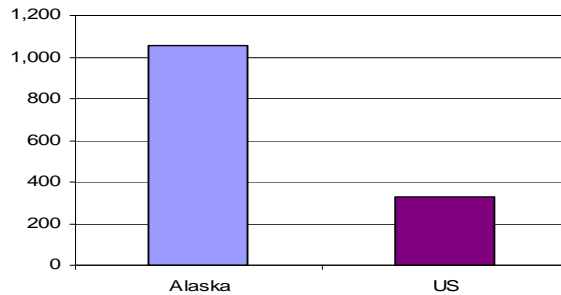
Refuse collection services are provided by a private contractor and hauled to the local Class 2 Nome landfill for a cost of \$17.25 per month. The landfill is located on Beam Road within Nome. The Green Star, Inc. non-profit organization has a branch in Nome, which works with local businesses to incorporate waste reduction, energy conservation, and pollution prevention techniques into their business plans.

Energy

In 1990, the national average for energy consumption was 326 million BTU's. Due to long, cold winter seasons, Alaska uses 1,058 million BTU's per year, nearly triple the national average, making it the number 1 in the nation for energy consumption (Kawerak 1999). Electricity services are offered through Nome Joint Utility Systems for an average cost per day of \$0.15 per kwh. Nome Joint Utility produces 60% of the energy

in the Nome Census area (Kawerak 2003). Other primary heating sources in Nome include the following: bottled, tank, or LP gas; and coal or coke.

Figure 3-2: Alaska's Energy Consumption per Person in 1990 (in million BTU's)



Communications

Throughout the Bering Strait Region, data transfer and communication technologies were not installed until 1995 when earth station and T-1 frame relay circuits were established in Nome (Kawerak 1999). In state phone service is through the Mukluk Telephone Company / TelAlaska (\$26/month business rate, \$20/month residential), with AT&T Alascom and GCI as long distance providers. GCI and Nome.net offer internet service within Nome. A competitive wireless infrastructure is currently being planned that will allow further internet connectivity among the region's remote villages (Kawerak 2003).

Three television stations can be received in most Nome households: ARCS, KUAC and KYAC. Additionally, Nome has three video rental businesses and a weekly newspaper, The Nome Nugget. Anchorage and Fairbanks daily papers arrive by plane with a half-day delay. Radio stations include KICY-AM/FM and KNOM-AM/FM, and GCI provides cable services with 49 channels. Teleconferencing is available through Alaska Teleconferencing Network and through the Legislative Information Office.

Environmental Consequences: Community Facilities and Services

The incremental service burden imposed on local and regional community services and facilities (other than housing which is discussed in detail in Chapter 6 of this document) by the proposed mine project would appear to be marginal. This is attributable to the fact that a large majority of the mine employees will be recruited from within the region. Specifically, interviews with other large employers in Nome, coupled with Alaska Gold's documented commitment to hire from within the region for most job descriptions, suggest that the breakdown will approximate the following:

- 42 mine workers who are already Nome residents,
- 69 mine workers from outlying villages, and
- 18 workers from outside of the region.

It is not expected that the workers coming from the unemployed population within the region will add any burden to the health and social service infrastructure – again, with the exception of some additional pressure on the housing market. In fact, it is expected that providing this level of unemployment relief to the region's population will lessen the demand for multiple health and social services. Experience among regional employers in this area suggests that of the 69 workers that come in from the outlying villages, most if not all of them will choose to either stay with relatives or rent apartments during their on-shift in Nome and then return to their families in their own villages in between their on-duty shifts. Thus, the mine workers recruited from outlying villages are likely to wield measurable impacts in three areas in this sector: health care, education and utilities.

Health and Social Services

Impacts on the health and social service sector will be felt when villagers seek health care services from the facilities in Nome rather than waiting to see the health care providers in their own village clinics. A new hospital will be completed in 2006 but it will replace services already provided by the existing facility with updated infrastructure, rather than adding net new capacity to the health care system. Thus, demand for hospital services by the mine employees who are recruited from villages within the

region will likely increase slightly. Statistically, demand for health and social services by the 18 new employees from outside the region and their families is likely to be relatively low given the age and economic status of those employees with specialized and/or management skills that must be recruited from outside the region.

Education

The anticipated 18 workers that come from outside of the region will likely bring with them an estimated 20 new students to enroll in the Nome City School District. A recent interview with the Nome City School District Business Manager suggested that an average of 1 student per family can be expected to accompany a professional worker moving to Nome. Thus, for purposes of this analysis, it is projected that a conservative total of 20 new students may enroll in the Nome City School District as a result of new Rock Creek employees. This number of new students is not expected to significantly impact the school district; Nome City schools have assimilated an additional 29 students over the past 6 years without disruption.

Utilities

Demand on the Nome Joint Utility System (NJUS) will increase as a result of the Rock Creek mine project. Two factors will contribute to the increased demand: the increase in housing market demand, and the need for power at the mine site. Residential demand will drive the need for upgrades to existing power lines. Proposed new subdivisions will be served by the existing power grid, but will need upgrades.

The need for 7-8 megawatts of power at the mine site will require 1) installation of a new 25 kv power line from the NJUS power plant in town to the mine site approximately 3 miles west of town, and 2) a step-up transformer at the NJUS generating plant in town. In addition, a new power line will need to be installed along the Glacier Creek Bypass Road to the mine site. **The satellite facility at Big Hurrah will require**

Chapter 4- Transportation

Nome serves as a regional transportation hub for 15 villages on the Seward Peninsula.

Air Traffic

The most reliable and common mode of year-round transportation throughout the Bering Strait region is air services. Although Alaskans compose only 2% of the nation's population, Alaskans use 13% of all commuter airlines and air taxi trips in the US, including commercial goods shipped via airfreight. Residents, consequently, use airlines 65 times more often than the average US citizen (Alaska Department of Transportation and Public Facilities 1997). There are two State-owned airports in the Nome area to accommodate the large demand on the airports. The Nome Airport has two paved runways, one 6,000 feet in length, and the other 5,500 feet. There is also a 1,950 foot long gravel airstrip referred to locally as "City Field". Nome is one of three surrounding communities that has runways 4,500 feet or longer. The most common type of aircraft in the region are small, single or twin engine commuter airplanes. Scheduled jet flights are available to and from the Nome Airport, as well as charter and helicopter services. Airline service in Nome is available through the following companies: Alaska Airlines; Frontier Flying Service; Artic Transportation Service; Baker Aviation; Bering Air; Cape Smythe Air Service; Grant; Hageland; Olson; Evergreen Helicopters; Lynden Air Cargo, and Northern Air Cargo.

Figure 4-1: Alaska Airlines Terminal at the Nome Airport.



Regional Roads

No road system connects Nome to any of Alaska's major cities; however this area does contain more roads than any other rural location in Alaska. There are three main roads leaving Nome: Nome to Teller (73 miles west); Nome to Council (72 miles east); and the Taylor Highway which extends 83 miles north from Nome.

Local Roads

A relatively small grid system of seven east/west collectors and about 17 north/south local roads provides interconnections within downtown Nome. Seventh Avenue, or "Bypass Road" as it is called by locals, runs along the northern perimeter of town and allows direct transport from the port or the airport on the west end of Nome all the way to the eastern edge of development in the community.

Glacier Creek Road can be accessed off of Bypass Road; this dirt road provides important industrial and recreational linkages for Nome residents and resource developers. Glacier Creek Road traffic is comprised of: 1) placer mine operators and workers; 2) Native corporation shareholders and non-shareholders going to leased campsites; 3) Native corporation shareholders involved in subsistence activities (primarily berry picking and hunting) south of Rock Creek; 4) tourists and tour group operators; and 5) local residents on recreational or sight-seeing outings (R&M Consultants 2003). Improvements to the road that will lessen environmental impact, improve access and annual maintenance concerns are expected by 2005. Public testimony at a Department of Transportation & Public Facilities hearing on Glacier Creek Road suggested that the traffic volume on Glacier Creek Road is 30-40 vehicles per day during the peak summer season travel period. During summer months, it is common to see heavy equipment along the road south of Rock Creek. This narrow, winding portion of the road lacks shoulders and is considered to be the most dangerous part of Glacier Creek Road (R&M Consultants 2003). Additionally, a spur road off the Taylor Highway leads to the old Pilgrim Orphanage, which is the site for the peninsula's most accessible Hot Springs (Kawerak 1999).

During the winter the only maintained road system around Nome is the area directly in town. However, with a dog team, mushers can access winter recreational cabins and other nearby villages on established mushing trails.

Vehicles

Several taxi companies provide transportation service in town: Checker, Nome Cab, Gold Rush, and Alaska Cab. Additionally, there are several car rental companies: Budget, Stampede and Bonanza. Privately owned snowmachines, all terrain vehicles, dog sleds, trucks and automobiles are the primary modes of land transportation in this area. ATV's and snowmachines are treated very similarly to automobiles given their use to haul drinking water, food, trash, and hazardous waste materials. Additionally, they are utilized for hunting, trapping, fishing and for visiting and bartering with other communities (Kawerak 1999).

Port

Community residents along the coast use rivers and coastlines as important transportation routes during summer months (Kawerak 1999). Residents frequently use boats with outboard motors to travel to fishing, hunting, and whaling camps. Nome Harbor contains an entrance channel and an inner harbor with berthing facilities. These facilities are annually dredged to an 8-foot depth. Nome's Port Facilities have a 2,700 foot causeway with offloading and berthing facilities available for use accommodating vessels with up to 18 feet of draft. Designed and built for 400 foot cargo and petroleum off-loading vessels and cruise ships with embarkation and disembarkation, the facilities maintain an average water depth of -20 feet. Marine freight to the Bering Strait Region is seasonal, but still offers a good way to haul bulk goods and materials and offers a more economic solution to hauling freight than air travel. Goods such as gasoline, heating oil, canned and dry goods, construction equipment, automobiles, boats, snowmobiles and houses are transported via marine freight services after the ice breaks up in late May (Kawerak 1999).

A 3,350-foot-long sea wall of granite boulders surrounds Nome on its seaward side protecting it from large waves and high tides. Costing over a million dollars these huge rocks were trucked in from Cape Nome, spanning a total distance of 13 miles. Currently, The Corps of Engineers is designing a new entrance and breakwater harbor channel. Additional future improvements include City funded harbor dredging, two seasonal floating docks, and a boat launch.

Figure 4-2: Businesses with Facilities at the Port of Nome



The Transportation section of the Nome Comprehensive Plan begins with the following goal statement: Promote a well-designed and safe transportation system within and serving Nome in order to support business, industry, and residents' needs and Nome's growing tourism industry. It is supported by the following objectives.

Objective 11.1 Actively pursue that Nome and surrounding region receive sufficient and appropriate share of State DOT transportation funding.

Objective 11.2 Seek ADOT funding for TRACK projects.

Objective 11.3 Support transportation improvements to and within Nome for various modes of travel including automobiles, pedestrians, and all terrain vehicles.

Objective 11.4: Provide for the efficient and reasonable transport and transfer of airplane passengers and cargo.

Objective 11.5 Provide for the efficient movement of cargo at the Port of Nome.

Environmental Consequences: Transportation

The Rock Creek Mine and its satellite operation at Big Hurrah will employ a total of 130 people. It is anticipated that 6 of these people will work in Nome proper and therefore will not make a daily round trip to the mine site. Eleven of these employees will be management personnel who will each make one round trip between town and the mine site an average of 6 days per week. The remaining 113 will be divided into four crews with rotating on/off schedules.

The traffic effect per day generated between town and the Rock Creek mill site will be two 26-person crews. In the most impactful scenario, each person could result in one round trip per day between the mine site and town. This impact does not take into account any mitigation that may occur as a result of carpooling, the initiation of a van transportation service by the local business community or bussing. In addition, an estimated three medium trucks and two large trucks per hour would be expected to make trips to-and-from the mine site each hour.

It is important to note the potential public safety impact implied by the mine traffic that will pass by the public high school on a rural collector (classification) road. While some students are bused to school, others walk, bike or snow machine to school from residential areas that require crossing to road that would be carrying the increased traffic to the mine. If timed strategically, this potential impact could be avoided by setting the 12 hour mine work shifts such that they would not interfere with the typical 7-to-9 hour school day.

In addition, at this stage in the mine planning process it is anticipated that the satellite operation at Big Hurrah will operate 12 months per year and include two ore trucks hauling loads 24 hours per day seven days per week in 90-minute round-trip cycles. For 3-to-4 months per year there will be a crew van going to the property and returning each day. The occasional truck will carry supplies to the mine site from town and/or the airport

or port. In addition, minimal unscheduled pick-up truck traffic will travel back and forth with emergency repair parts, staff, etc. Employee traffic could range from 40 personal vehicle trips between Nome and the Big Hurrah site 50 road miles south of town at the most impactful, to 2 personnel bus round trips per day at the least impactful.

Chapter 5- Local Government Organization, Powers, Finances

Local Government Organization

Unlike the lower 48 states, Alaska law provides for a variety of local government organizational options to accommodate the wide range of social, cultural, political and physical environments that comprise this state. The result is a mixture of local government and other community, regional and tribal organizations operating under separate authorities (Department of Community and Economic Development).

City and borough municipal governments provide services to community and regional locations, respectively. City governments are municipal corporations and political subdivisions of the State that generally encompass single communities. Services and powers are intended to be provided on a regional basis through organized boroughs, which are larger than cities. (Department of Community and Economic Development)

Alaska's Constitution requires that the entire state be divided into boroughs, organized or unorganized. As a result, a large portion of the state that has not incorporated as an organized borough is designated "the unorganized borough". Nome is one of the many communities that do not fall within an established, organized borough in Alaska; thus, Nome is in the Unorganized Borough.

The Municipality of Nome is organized as a First Class City under Alaska Statute, Title 29, and as such has regularly elected and appointed officials. The table on the next page shows the breakdown of government positions within the City of Nome, Alaska.

Table 5-1: Local Government Organization, City of Nome

Job Title	Number of Positions
Mayor	1
City Council	6
School Board	5
Planning Commission	6
Assessor	1
Attorney	1
Admin. Assistant	1
City Clerk/Treasurer	1
Controller	1
Fire Chief	1
Manager	1
Museum	1
Police Chief	1
Port Director	1
Recreation Director	1
Supt. of Schools	1
Utilities Manager	1
Visitor Center Dir.	1

*Source: Department of Community & Economic Development

Municipal Powers

The City of Nome is a first class city government in the unorganized borough. The two fundamental units of municipal government within Alaska: 1) cities, and 2) organized boroughs, both act as political subdivisions and municipal corporations within Alaska. The unorganized borough has not incorporated a borough form of government or county equivalent. The unorganized borough is not a municipal corporation or political

subdivision of Alaska, but is an instrumentality of the State...a unit of state government (Bockhorst 2000).

Nome is located within the Bering Strait Regional Education Attendance Area; however educational services are not the responsibility of the local public due to Nome's status as a First Class City (Bockhorst 2000). Although Nome is located within The Bering Strait Coastal Resource Service Area (CRSA), the City has been excluded from that CRSA, which would have allowed it to recommend for State approval a coastal management plan for the area within the boundaries of the CRSA (Bockhorst 2000).

Nome Municipal Finances

Nome, incorporated in 1901 as a first class City. Located in the Cape Nome Recording District, it encompasses 12.5 square miles of land and 9.1 square miles of water valued at \$203 million, according to a 1996 property assessment. According to state law, \$85 million worth of that property is exempt from taxation and \$118 million is taxable. The remaining \$23 million falls in the personal taxable category. The City maintains an area-wide 12.6 mill property tax and a 4% accommodation tax. In addition, Nome has a 4% sales tax. All land in the Bering Strait Region is owned by one of the following entities: the federal, state or municipal governments; Native corporations; Alaska Native tribes (conveyed through the 1971 Alaska Native Claims Settlement Act); individual Native allottees (through the 1906 Allotment Act and the 1926 Township Act), or other private sector land owners subject to municipal taxation by the City. With more than 14,000 acres of land holdings locally, Alaska Gold Company, Inc. is the single largest private sector land owner in or near Nome.

The approved 2001 municipal budget for the city of Nome was \$23 million. \$6.9 million of that revenue came from enterprise funds, \$6.2 million came from education funds, \$5 million from taxes, and \$2.5 million from other state and federal revenue.

Table 5-2: Nome Municipal Budget, Year 2001

Revenues (in \$000)	2001
Taxes	5,004,339
License/Permits	449,357
Service Charges	641,896
Federal Operating	10,114
State Revenue Sharing	131,307
State Safe Communities	87,463
Other State Revenue	45,175
State/Federal Education Funds	6,210,083
Other State and Federal Revenue	2,357,658
Other Local Revenue	1,032,673
Enterprise funds	6,995,939
Total Revenues	22,966,577

Source: Alaska Department of Community and Economic Development
Research and Analysis Section

A significant decrease in municipal revenue sharing funds from the state level to the municipal level of government has caused many Alaska municipalities to panic over the past five years. A review of Nome's municipal budget shows a variety of revenue sources, many of which are generated locally. While the loss in coming years of what was almost 2.4 million "other state and federal revenue" in 2001 will certainly be felt by Nome, it has already taken much local responsibility for operating its own local government services.

The city expenditures for 2001 totaled \$18.2 million, with the largest amount (\$7.8 million) geared towards education. The city's budget for education during 2001, however, was only \$6.2 million. The city used \$1.6 million more on education than was

budgeted. Nome had no expenditures during 2001 for council/assembly, planning/zoning, ambulance, roads, ice roads, refuse/landfill, phone utility, or the clinic/hospital. Electric utility and other public works ranked as the second and third highest Nome expenditures, with \$3 million and \$2.5 million, respectively.

Table 5-3: Nome Municipal Expenditures, Year 2001

Expenditures By Function (\$000)	2001
Admin/Finance	869,865
Other Government	345,364
Police	1,089,855
Fire	199,575
Harbor/Dock	283,721
Electric Utility	3,023,599
Water/Sewer	784,935
Other Public Works	2,536,111
Library/Museum	304,979
Parks & Recreation	528,569
Misc. Public Services	178,996
Education	7,891,541
Capital Project Expenditures	161,097
Total Expenditures	18,198,207

Source: Alaska Department of Community & Economic Development Research and Analysis Section.

The Municipal Government section of the Nome Comprehensive Plan includes Objective 3.8 : “Investigate expanding the City municipal boundaries to encompass developed land contiguous to municipal limits.” Under this objective is Action 3.8.1 “Identify appropriate areas and proceed with state process.”

Environmental Consequences: Local Government

The primary impact in the municipal finance sector would be a result of local government taxation of 1) new residential development, and 2) increased personal spending, driven by the Rock Creek mine project employment and spending levels.

According to the assumptions contained in the housing market analysis in Chapter 6 of this document it is feasible and necessary that approximately 27 new housing units be constructed in Nome in order to accommodate the increased demand for housing that will accompany the development of the Rock Creek mine project. Assuming an average new home value of \$280,000 (see Chapter 6) in this remote and highly subsidized housing market, the net new property tax revenue to the City of Nome at the existing mill rate of 12.6% would be \$952,560 per fiscal year.

As noted in the economic analysis contained in Chapter 2 of this report, \$8.5 million will be spent locally by Alaska Gold on the Rock Creek project in salaries and wages; the total economic benefit of \$8.5 million in direct wages, when combined with the indirect and induced local expenditures, result in \$13.6 million in annual wages and salaries to the region. Forty-six percent of this economic effect will be realized by wage earners living full-time in Nome. This could result in approximately \$6.256 million worth of expenditures in the municipality of Nome; typically in a remote economy like Nome's approximately 40% of these expenditures, or \$2.502 million, would be in the retail sector and thus would be subject to the local 4% sales tax. Thus, the net increase in municipal revenues would equal an average of approximately \$100,096 per fiscal year of mine operation. In addition, it is assumed that the daily living expenditures by the 54% of the Rock Creek work force from the villages would spend no more than 20% of their salaries and wages to purchase taxable local goods and services in Nome during their work shifts. In other words, of the total salaries and wages earned by regional residents renting in Nome coupled with the indirect and induced effects of these earnings (\$7,344,000.00) only 20% (1,468,800.00) would likely be spent on local goods and services subject to Nome's 4% sales tax. This would result in an additional \$58,752.00

annually in municipal tax revenue to the City of Nome. Thus, the total estimated municipal tax revenue generated by Rock Creek mine project direct and indirect employment and induced effects is predicted to be \$158,848.00 per year of mine operation.

The fact that Rock Creek Mine and the Big Hurrah satellite operation are both located outside of the municipal boundary of the City of Nome means that no new tax revenues would be generated directly from the mine operations.

Chapter 6 Housing

Substandard housing conditions exist throughout most of Alaska. Rural Alaska is in need of new housing development due to the deterioration of marginal homes. Many of the homes in Nome were hastily constructed during one of the community's several boom cycles, and have not fared well in the long run given the Arctic conditions. Much of the housing stock is reaching the end of its useful economic life. Constructing new homes, however involves costly construction in an economy that does not have the economic access to affordable building materials that the state's more urban areas do. (Alaska Housing Finance Corporation 1995). Cold temperatures, alternative plumbing systems, and the presence of permafrost also contribute to the high construction costs (Kawerak 1999). Rural Alaska also has a lack of competition among suppliers which nearly doubles the cost of construction materials in rural parts of the state.

The availability of low interest mortgage loans from the state-founded Alaska Housing Finance Corporation created explosive growth in the demand for and construction of apartments, condominiums, and single family dwellings between 1981 and 1985 in Nome as it did in the rest of Alaska. However, new housing construction slowed in the latter part of 2000 due in large part to a significant rise in construction costs. This condition continues to depress the Nome housing market. Currently, market prices of single family homes have reached a level that provides insufficient profit for local builders to speculate on new construction. According to the 2000 U.S. Census, the homeownership rate in the Nome region was 58%, reflecting the housing shortage that exists within the community.

Figure 6-1: Multi-family and Single Family Homes near the waterfront in Nome



Existing Housing Stock

The housing stock in Nome was studied by 1) on-site reconnaissance, 2) interviews with local builders, realtors, and housing providers, 3) study of photographs and maps, and 4) a statistical review of all local, state and federal assessments of the Nome housing stock. Many housing units in Nome are considered substandard and include many units of subsidized housing in various conditions of repair. The median age of the housing stock in Nome is 34 years.

Construction Costs

Compared to Juneau, Anchorage, Kenai, Wasilla, Sitka, Fairbanks, Kodiak, Bethel and Barrow, Nome has the second highest housing Construction Costs (AK Department of Labor). The cost of housing in Alaska is directly related to the transportation costs, with rural sites tending to have the highest costs (AHFC 1995). Additionally, high housing costs in Nome are associated with the few suppliers in rural Alaska, and high freight costs. Numerous estimates from local builders, realtors, and housing providers, indicated that construction costs currently range from \$140 SF to \$166 SF for residential construction.

During 1990, 57% of the homes in the Bering Strait Region were owner-occupied. Residential housing is available for both sale and rent in the Nome area, however rental units are limited during the summer season. During 2000, 654 people resided in renter-occupied homes while only 530 resided in owner-occupied homes. A 2002 survey showed 58.1% of the population owning homes and only 41.9% in rentals, a large decrease from 2000 (Kawerak 2003). The average rent paid in 2000 was \$939, compared to the much lower average in 1990 of \$665.

Table 6-1: Housing Characteristics, Nome, Alaska.

	2000 Census	1990 Census
Total Housing Units	1,356	1,334
Occupied Housing (Households)	1,184	1,119
Vacant Housing	172	215
Owner-Occupied Housing	530	487
Median Value Owned Homes	\$110,600	\$79,900
Renter-Occupied Housing	654	632
Median Rent Paid	\$939	\$665
Avg. Household Size	2.79	2.9
Family Households	750	751
Non-Family Households	434	368
Population Living in Group Quarters	202	30

*Source: 1990, 2000 US Census

Figure 6-2: Single Family Homes in Nome



Table 6-3 shows the number of housing structures in Nome during both 1990 and 2000. Single family detached homes are most prevalent with a total of 750 structures.

Table 6-2: Housing Structure Types, Nome, Alaska.

Housing Type	2000 Census	1990 Census
Single Family (Detached)	750	766
Single Family (Attached)	27	22
Duplex	98	130
3 to 4 units	207	152
5-9 units	104	106
10-19 units	120	66
20 plus units	5	26
Trailers/Mobile Homes	57	45
Boats/Other Types	0	21

*Source: 1990, 2000 US Census

The second largest group by structure type is 3-4 unit complexes with a total of 207 counted during the 2000 Census, an increase of 55 units from 1990. Figures 6-5, 6-6, and 6-7 show some of the available 3-4 unit complexes available in Nome.

Figure 6-3: High-end Multi-family Housing, Nome



Apartment rentals are in very short supply in Nome. The vacancy rate is under 3%. A vacancy rate under 5% is considered a shortage. Perhaps because of the limited

housing rental options, hotels and bed and breakfast accommodations within Nome are fairly abundant given the 180 available units in Nome.

Table 6-3: Housing Rental Rates, Nome

	Rental Cost
1 Bedroom Apartment	\$500-\$850/month
3 Bedroom Apartment	\$1000-\$1500/month
3 Bedroom House	\$62,000-\$180,000/month

Source: City of Nome

Figure 6-4: Trails End Apartments, Nome



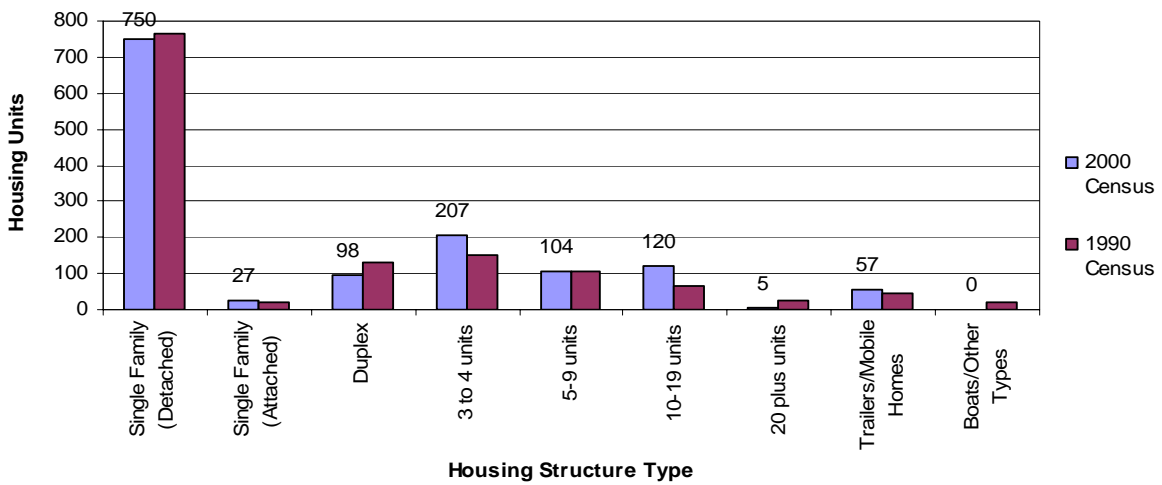
Housing density levels within the Bering Strait Region exceed both the state and national levels, probably due to the number of children born per household, extended family member residence, and high costs involved with purchasing and shipping construction

materials to build new residences. As a result, many homes are large single family housing structures.

Figure 6-5: Large Single Family Home in Nome



Figure 6-7: Housing Structure Types, Nome, Alaska.



*Source: 1990, 2000 US Census

During the 2000 Census, 93% of the homes described above used fuel oil and kerosene as their primary heating source. Phone service had gone down nearly 22% since 1990, probably due to the increased use of cellular phones. Additionally, homes that lacked complete plumbing and complete kitchens have gone down almost 4% since 1990.

**Table 6-4: Utilities (Plumbing, Kitchen, Phones, Heating)
Nome, Alaska**

Characteristic	2000 Census	1990 Census
Lack Complete Plumbing	5.3%	9.1%
Lack a Complete Kitchen	5.2%	9.1%
Lack Phone Service	2.5%	25.6%
Electricity	2.6%	1.5%
Fuel Oil, Kerosene	92.9%	95.3%
Using Wood	0.3%	0.6%
Piped Gas (utility)	0.3%	0.0%
Bottled, Tank, LP Gas	1.8%	0.0%
Other Fuel	2.2%	2.6%

*Source: 1990, 2000 US Census

Housing Financing

In the Nome area, there are many housing finance programs that assist Alaska Natives with subsidy for new housing purchase, construction and remodel. The Bering Strait Housing Authority targets low to moderate income households with its down payment and closing cost assistance programs. A down payment subsidy of \$40,000 for an Alaska Native purchaser can be used to “buy down” the purchase price of a \$280,000 house thus making the house affordable at a purchase price of \$240,000.

An estimated 80-90% of all real estate sales in Nome have been connected with NAHASDA / USDA financing. This is a subsidized market that allows for turnover of small substandard units to qualified Native households. Subsidies available serve to buy down the cost of housing for qualified buyers. A new house constructed in 2005 and sold for \$280,000 could be affordable to an Alaska Native household with access to a subsidy program; however, this amount would be above what the median household in Nome can currently afford.

Figure 6-6: Subsidized Duplex Units in Nome



Figure 6-7: Alaska Finance Housing Corporation, Nome Alaska



The Alaska Housing Finance Corporation (AHFC) participates in financing more than 80% of the homes in Nome. The policies set by AHFC regarding whether or not they will accept cost-of-construction as the cost basis for a loan (as opposed to the more conventional appraised value cost basis) could greatly contribute to relief for the housing shortage in Nome.

Market Demand

The real estate market in the Nome Census Area was in a stable mode throughout the 1990's. The Nome Area has traditionally experienced a high level of governmental employment which continues to provide a stable year-round base, and which buffers cycles in other industries. Nome did not experience the dramatic real estate downturn suffered in other parts of Alaska in the 1980's because of its relatively slow growth rate.

Still, today the Nome housing market offers few choices to residents or newcomers seeking new housing, upgrades or rental properties.

Nome Comprehensive Plan: Housing

An entire section of the Nome Comprehensive Plan is devoted to the subject of housing. The primary goal statement is “Provide high quality and affordable housing with a diversity of housing options to meet the needs of all citizens.” This is followed by detailed objective statements.

Objective 10.1 Improve the quality of Nome’s existing residential housing inventory.

Objective 10.2 Develop a diverse and high quality housing supply with affordable options for all income levels.

Objective 10.3 Coordinate with state and federal agencies to provide high quality housing.

Environmental Consequences: Housing

Today, there is an extreme housing shortage in Nome. Although the population growth has been flat for 30 years, (U.S. Census, 1980, 1990, 2000) housing remains in short supply. As reported in this section, many of the houses in Nome are in extremely poor to very poor condition. Over half of the housing stock is over 40 years old and reaching the limits of functionality. With the important exceptions of Icy View and Devereux, subdivision growth that occurred in the mid 1990's has reached its limits in terms of infill. Very few vacant lots remain. New housing is expensive to build, and historically infrastructure development lags behind the demand curve.

While the economic development opportunity presented by the development of the Rock Creek Mine project is substantial, new worker demand on the already stressed housing market could be significant, if not mitigated. In order to better understand the details of the Nome housing market, and then devise a plan to work with the community to meet the demand for new housing, NovaGold, Inc. commissioned Kelley Hegarty & Associates, LLC and Alaska Enterprise Planning to conduct an assessment of the Nome housing market in July 2004.

This research demonstrates the need for very specific housing for three distinct populations: people currently living in Nome who will go to work on the Rock Creek mine project; those persons from villages within the region who most likely will seek rental housing when they relocate to Nome for jobs; and finally, a relatively small number of people who will move to Nome from outside the region for jobs. The target population expected to have the greatest need are those persons relocating from villages who are low-income, and persons new to the region.

In order to determine the amount and type of housing necessary to meet the demand of the Rock Creek workforce, it was necessary to determine income levels sufficient to pay for housing. According to the 2000 U.S. Census, over 20% of the homeowners in Nome pay over 35% of their income in housing costs. Almost 19% of rental households pay over 35% of income for housing.

Table 6-5. Household Income Characteristics

Percentage of household income	Owner Costs	Rental Costs
Less than 15 percent	35.3	29.2
15 to 19.9 percent	16.3	15.8
20 to 24.9 percent	14.7	7.8
25 to 29.9 percent	7.5	6.1
30 to 34.9 percent	4.8	7.4
35 percent or higher	21.0	18.4
Not computed	0.3	15.3

Source: U.S. Census 2000

Specific to Nome is the high percentage of homeowners who do not have a mortgage (49.9%). This high figure is indicative of the preference in the Nome community not to mortgage debt, but to pay for their homes out-of-pocket as they are being built. It is also reflective of the high number of owner-built substandard housing units in Nome that depress the market values overall, and are difficult to resell. This unique characteristic of the Nome housing market greatly influences which housing development options are viable locally.

In order to mitigate the impact that the Rock Creek workforce would have on the Nome housing market, Alaska Gold (in addition to building five houses for management personnel in the summer of 2005) has submitted three subdivisions for platting approval at this writing.

Chapter 7 Noise and Land Use Sensitivity

This chapter profiles the noise environment in Nome, and the areas around the proposed Rock Creek Mine and the Big Hurrah satellite site, as this noise relates to land use. The first section of this chapter provides details on noise levels, noise regulations, project impact criteria, adjacent land uses, and ambient noise level projections. An introduction to acoustics and noise level descriptors is included for reference and to assist in the understanding of this analysis. The second section discusses the noise impact analysis and future noise levels with the Rock Creek and Big Hurrah mines in operation. Potentially affected land uses were analyzed using information from on-site visits, aerial photography and maps, as well as additional information provided by the Bristol Environmental and Engineering Services Corporation (BEESC) Project Manager who has a long-standing working familiarity with land use in the project area. Ambient noise levels used in the analysis were projected using measured noise levels taken at nine different locations in and around Nome and along the haul route to the Big Hurrah satellite mine, and from noise measurements taken in similar areas in Alaska. The noise data from similar areas used to assist in the projection of the existing ambient noise levels were taken from the *Ft. Knox Noise and Vibration Analysis, Cleary Summit, Alaska*, CH2M Hill, 1993; *Ryan Lode Affected Environment Noise Monitoring, Ester, Alaska*, Michael Minor & Associates 1998; and the *True North Noise and Vibration Analysis, Cleary Summit, Alaska*, Michael Minor & Associates, 2000. In addition to the referenced sources for measured data, information contained in *Community Noise*, US Environmental Protection Agency (EPA), 1971, was also used to assist in deriving and verifying the projected ambient noise levels.

Introduction to Noise

Human response to noise is subjective and can vary greatly from person to person. Factors that can influence individual response include: the loudness; frequency; the amount of background noise present before an intruding noise; and the nature of the work or activity (i.e., sleeping) that the noise affects.

The unit used to measure the loudness of noise is the decibel (dB). To better approximate the sensitivity of the human ear to sounds of different frequencies, the A-weighted decibel scale was developed. Because the human ear is less sensitive to higher and lower frequencies, the A-weighted scale reduces the sound level contributions of these frequencies. When the A-weighted scale is used, the decibel levels are denoted as dBA.

The smallest change in noise level that a human ear can perceive is about 3 dBA, and increases of 5 dBA or more are usually noticeable. A 10-dBA change in noise levels is judged by most people as a doubling in the perceived loudness of the sound level. Normal conversation ranges between 44 and 65 dBA when speakers are 3 to 6 feet apart.

Noise levels in a quiet rural area at night are typically between 32 and 35 dBA. Quiet urban nighttime noise levels range from 40 to 50 dBA. Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Noise levels above 110 dBA become intolerable and then painful, while levels higher than 80 dBA over continuous periods can result in hearing loss. Constant noises tend to be less noticeable than irregular or periodic noises.

There are several factors which determine how sound levels reduce over distance. Under ideal conditions, a point noise source in free space will attenuate at a rate of 6 dB per doubling of distance (using the inverse square law). An ideal line source (such as constant

flowing traffic on a busy highway) typically reduces at a rate of approximately 3 dB per doubling of distance. Under normal conditions however, noise source reduction with distance is usually some combination of the two examples resulting in sound attenuation which lies somewhere between the two *ideal* reduction factors. Other factors that affect the attenuation of sound with distance include existing structures, topography, foliage, ground cover, and atmospheric conditions such as wind, temperature, and relative humidity. The following list provides some general information on the potential affects of each of the factors on sound attenuation.

- Existing Structures: Existing structures can reduce noise by physically blocking the sound transmission. In some circumstances, structures can cause an increase in noise levels if the sound is reflected off the structure and transmitted to a nearby receiver location.
- Topography: Topography includes existing hills, berms, and other surface features between the noise source and receiver location. As with structures, topography has the potential to reduce or increase sound depending on the geometry of the area.
- Foliage: Foliage, if dense, can provide slight reductions in noise levels. The Federal Highway Administration (FHWA) provides for up to a 3 dBA reduction in traffic noise for locations with at least 30 feet of dense foliage that contains leaves year around.
- Ground Cover: The ground cover between the receiver and the noise source can have a significant affect on noise transmission. For example, sound will travel very well across reflective surfaces such as water and pavement, but can be attenuated when the ground cover is field grass, lawns, or loose soil. Appropriate ground coverage was used in the analysis including powder snow, granular snow, and field grass.
- Atmospheric Conditions: Atmospheric conditions that can have an effect on the transmission of noise include wind, temperature, humidity and precipitation.

Noise Level Descriptors

General mining operational noise levels used in this analysis (with the exception of blast noise) are stated as sound pressure levels, in terms of decibels on the A-scale (dBA). The A-scale is used in most ordinances and standards including the applicable standards selected for this project. To account for the time-varying nature of noise, several noise metrics are useful. The equivalent sound pressure level (L_{eq}) is defined as the following: the average noise level, on an energy basis, for a stated time period (i.e., hourly).

Other commonly used noise descriptors include the L_{max} , L_{min} , and L_n . The L_{max} and L_{min} are the greatest and smallest root-mean square (RMS) sound levels, in dBA, measured during a specified measurement period. The sound level descriptor L_n is defined as the sound level exceeded “n” percent of the time. For example, the L_{25} is the sound level exceeded 25 percent of the time; therefore, during a 1-hour measurement, an L_{25} of 60 dBA means the sound level equaled or exceeded 60 dBA for 15 minutes during that hour.

Table 7-1 shows sound levels for some common noise sources and compares their relative loudness to that of an 80 dBA source such as a garbage disposal or food blender.

Table 7-1: Sound Levels and Relative Loudness of Typical Noise Sources

Noise Source or Activity	Sound Level ¹	Subjective Impression	Relative Loudness ²
Jet aircraft takeoff from carrier (50 ft)	140	Threshold of pain	64 times as loud
50-hp siren (100 ft)	130		32 times as loud
Loud rock concert near stage or Jet takeoff (200 ft)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 ft)	110		8 times as loud
Jet takeoff (2,000 ft)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft)	90		2 times as loud
Garbage disposal, food blender (2 ft), Pneumatic drill (50 ft)	80	Moderately loud	Reference loudness
Vacuum cleaner (10 ft) or Passenger Car at 65 mph (25 ft)	70		1/2 as loud
Large store air-conditioning unit (20 ft)	60		1/4 as loud
Light auto traffic (100 ft)	50	Quiet	1/8 as loud
Bedroom or quiet living room Bird calls	40		1/16 as loud
Quiet library, soft whisper (15 ft)	30	Very quiet	
High quality recording studio	20		
Acoustic Test Chamber	10	Just audible	

Sources: Beranek (1988) and EPA (1971)

1. Maximum sound level in dBA
2. Human judgment of different sound levels based on the reference level of 80 dBA.

Noise and Vibration Criteria

This section describes the noise standards and regulations used for evaluation of potential impacts associated with the proposed Rock Creek Mine and the Big Hurrah satellite site. Several regulations and ordinances were examined and used to derive the project impact criteria. These included those from the Federal Highway Administration (FHWA), EPA, the U.S. Bureau of Mines (BOM), and the US Department of Transportation (USDOT). Details and general information on the individual noise and vibration criteria are contained in Appendix A. The severity of noise impacts will be determined by the project-related increase over the existing average ambient noise level and the project-related energy average hourly noise level (L_{eq}). As previously stated, human sensitivity to changes in noise levels will vary depending on certain conditions. Normally, the smallest change in ambient (broadband) noise levels that a human ear can perceive is about 3 dBA. Increases of 5 to 7 dBA or more in noise are usually noticeable to most people, and a 10-dBA change is judged by most people as a doubling of the sound level. Given this information, the measured existing noise levels, and information from the EPA and BOM, the impact criteria used to determine significance for the Rock Creek and Big Hurrah satellite mine projects are given in Table 7-2.

Table 7-2: Significance of Noise Impacts

Generally Significant	Not	Possibly Significant	Generally Significant
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<p>No noise-sensitive sites are located in the project area, or the increase in noise levels with project implementation is projected to be less than 3 dBA at noise sensitive sites.</p>	<p>Increases in noise levels with project implementation are expected to be between 3 dBA and 10 dBA, and the overall project related hourly average noise level does not exceed 50 dBA Leq. Determination of significance also considers existing noise levels and the presence of noise-sensitive sites.</p>	<p>Project activity would cause an increase in the existing noise levels of over 10 dBA, and overall project-related hourly average noise levels of over 55 dBA Leq. Determination of significance also considers existing noise levels and the presence of noise-sensitive sites.</p>
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Source: Environmental Protection Agency and Bureau of Mines.

In addition to the criteria given in Table 7-2, noise sensitive receivers along haul routes that exceed the FHWA 67 dBA residential impact criteria will be considered as having a traffic noise impact. Additionally, noise sensitive receivers that are projected to have a 10 dBA increase in noise levels due to mine related traffic will be considered as having a significant traffic noise impact. Details on the traffic noise criteria are given in Appendix A.

Project Area Land Use

Land uses within a 50-mile radius of the Rock Creek mine and the Big Hurrah satellite mine project sites were investigated to identify land use with sensitivity to noise and vibration. The large 50-mile radius was used to include potential future haul and access routes to the proposed location of the Rock Creek processing plant, the Big Hurrah satellite site and other potential future satellite sites. Current land use in the study area includes recreational, residential, commercial, light and heavy industrial, as well as undeveloped lands.

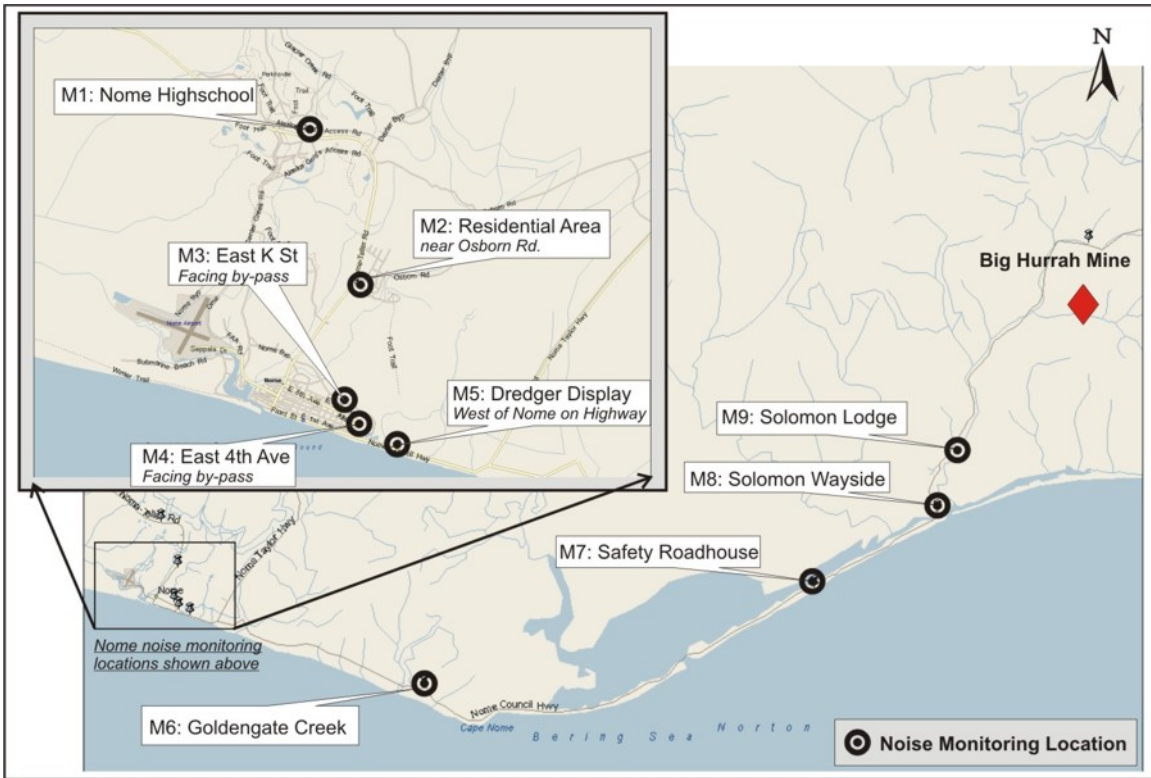
Residential land uses that could potentially be affected by the mine operation were identified near Nome, along the Nome/Teller Highway and along Glacier Creek Road,

which is the primary access route to the Rock Creek mine site. There were also some noise sensitive land uses identified near the proposed Rock Creek mine site. Noise sensitive land uses were also identified along the Nome Council Highway, which is the haul route from the Big Hurrah satellite site to the Rock Creek processing plant. Other noise sensitive land uses would include cabins, residential land uses and designated recreational areas located within the 50 mile radius.

Ambient Noise Level Data

Ambient noise levels were measured at nine locations in and surrounding Nome, Alaska between June 14 and June 17, 2005. The on-site noise monitoring data and measured noise data from similar areas was used to project existing noise levels in those areas that may be affected by the operation of the Rock Creek mine and the Big Hurrah satellite mine. Figure 7-1 provides an aerial view of the greater Nome area and the approximate locations where noise monitoring was performed.

Noise measurements were taken in accordance with the American National Standards Institute (ANSI) procedures for community noise measurements. The equipment used for noise monitoring were Bruel & Kjaer Type 2238 Sound Level Meters. The meters were calibrated prior to, and after the measurement period using a Bruel & Kjaer Type 4231 Sound Level Calibrator. Calibration varied by less than 0.1 dB during the measurement period. Complete system calibration is performed on an annual basis by Bruel & Kjaer Instruments. System calibration is traceable to the National Institute of Standards and Testing (NIST). The sound level meters meet or exceed the requirements for an ANSI Type 1 noise measurement system.



Measured Noise Levels

Noise levels were measured at the nine locations shown on Figure 7-1. Two locations, the Goldengate Creek and the Safety Roadhouse, were monitored using an unattended noise monitoring terminal. The other seven locations were monitored for short-term periods of 15 to 20 minutes, at least different three times over a three day period. A summary of the measured noise level by time of day is given in Table 7-3.

Table 7-3: Measured Ambient Noise Levels for Nome and Surrounding Area

Mon #	Location	Daytime ¹ Leq	Evening ² Leq	Nighttime ³ Leq
1	Nome High school (facing Nome/Teller Highway)	53.0	46.0	42.8
2	Residential Development (on Osborn Rd.)	55.1	55.2	44.5
3	East K Street (facing Nome by-pass)	55.6	54.0	47.9
4	East 4th Avenue (facing Nome by-pass)	46.0	51.3	44.1
5	Dredger Display (on Nome/Council Highway)	60.0	57.5	49.5
6	Goldengate Creek (on Nome/Council Highway)	52.6	51.9	49.5
7	Safety Roadhouse (on Nome/Council Highway)	54.4	51.1	47.5
8	Solomon Wayside (on Nome/Council Highway)	44.8	52.1	47.8
9	Solomon Lodge (on Nome/Council Highway)	38.5	49.7	38.0

1. Daytime is defined as 7:00 am to 7:00 pm
2. Evening is defined as 7:00 pm to 10:00 pm
3. Nighttime is defined as 10:00 pm to 7:00 AM

Noise levels in and near Nome ranged from 46 to 56 dBA L_{eq} , with short-term peaks during vehicle pass-bys of 70 to 80 dBA L_{max} . The higher noise levels were recorded near major roadways, such as the Nome By-Pass and the Nome/Teller Highway. No

monitoring was performed in the city center, where noise level are projected to be 5 to 7 dBA higher than the locations used for the monitoring. These locations were selected because they are likely to be main travel routes for workers traveling to and from the Rock Creek mine and could also be used to evaluate noise from vehicles on the haul route from the Big Hurrah satellite mine to the Rock Creek mine processing center.

Noise level along the Nome/Council Highway ranged from 39 to 60 dBA L_{eq} , with short term maximums of 72 to 90 dBA L_{max} . Again, the highest noise levels were recorded at monitoring sites closest to the highway. The noise monitoring station at Goldengate Creek was set to record 1-second data and thereby could be used to estimate the number of vehicles passing the meter on the Nome/Council highway. During a 22 hour period, the system recorded approximately 94 peak readings of over 60 dBA that lasted longer than 3 seconds each, which is typical for a vehicle pass-by. Based on this data, approximately 4.3 vehicles per hour or 102 vehicles per day travel the Nome/Council Highway past Goldengate Creek.

Supplemental Noise Data

In addition to the on-site noise measurements, supplemental measured noise levels taken from the *Ft. Knox Noise and Vibration Analysis*, CH2M Hill, 1993; *Ryan Lode Affected Environment Monitoring*, 1998; and the *True North Noise and Vibration Analysis*, Michael Minor & Associates, 2000 were used to verify and predict noise levels based on the very similar rural development patterns. The Ft. Knox and True North data was measured at several different locations near Cleary Summit and the Olnes sub-division. The Ryan Lode data was measured near the town of Ester, Alaska. Measurements were taken at several times throughout the day during both winter and summer months. Noise levels for the Rock Creek project were projected with assistance from the project community & regional planner who conducted the socioeconomic baseline analysis, and is very familiar with the project area.

In addition, traffic volume information from the Alaska Department of Transportation was used to project traffic noise levels that were also used to assist in determining the existing noise environment. Finally, information contained in *Community Noise*, US Environmental Protection Agency (EPA), 1971, was used to verify the projected ambient noise levels. The actual measured noise levels along with the supplemental noise information was used to derive and verify the existing noise levels for different times of the year in the project area.

Existing Noise Levels for Nome, Nome/Teller Highway and Nome/Council Highway

For the purpose of describing the existing ambient noise environment, several different noise sensitivity areas were identified::

- Nome and general vicinity
- Nome/Teller Highway, Nome to Rock Creek Mine Access
- Nome/Teller Highway, West of Rock Creek Mine Access
- Glacier Creek Road & Rock Creek Mine Access
- Rock Creek Mine Site and Immediate Vicinity
- Nome By-Pass Road along the western edge of Nome
- The Solomon Lodge, fishing camps and residences along the Nome/Council Highway between the Nome By-Pass Road and the Big Hurrah satellite mine

For each of the identified areas, noise levels and existing noise sources were identified from on-site inspections, land use information and a general understanding of the activities in the given areas. Major noise sources common to most areas include existing mining and exploration operations, local area snow machines and all-terrain vehicles (both recreational and local access use), occasional aircraft over-flights and vehicle traffic

on the Nome/Teller Highway, Nome By-Pass Road, and the Nome/Council Highway. Additional noise sources close to Nome include miscellaneous residential, recreational and commercial activities including: chain saws; generators; localized construction; and other associated noise sources common to populated areas in Alaska. Noise related to on-going mining exploration and other industrial activities is also expected to be noticeable in some locations. Other less noticeable sources include: wind and wildlife, such as birds; and water noise near moving creeks and rivers. The following sections provide details on the projected ambient noise levels and existing noise sources.

Nome Alaska and General Vicinity



Figure 7-2: Front Street in Downtown Nome, Alaska

Major noise sources near and in Nome include: traffic; commercial and industrial activities; and aircraft and other noise sources present in towns and cities the size and composition of Nome.

Figure 7-3: Industrial Buildings and Activity within Icy View residential subdivision, Nome



Other noise sources include residential and recreational activities. During winter months, major noise sources also include snow machines and all terrain vehicles and active dog teams.

Noise levels during the summertime are projected to range from 42 to 65 dBA L_{eq} with the lower noise levels at the more rural locations. Winter noise levels are projected at 39 to 62 dBA L_{eq} . Table 7-4 contains the range of noise levels projected for this area during summer and winter months for daytime and nighttime hours in and around the City of Nome.

Table 7-4: Ambient Noise Levels for Nome and Surrounding Area¹

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	Rural Areas	Inner City	Rural Area	Inner City
Winter Months ³	37 – 52	53 – 62	32 – 37	48 – 53
Summer Months ³	40 – 55	56 – 65	35 – 40	50 – 55

1. Data derived from on-site noise monitoring in Nome, and data from similar rural areas near Chena Hot Springs, the Olnes subdivision and similar areas along with

data from the EPA

2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Nome/Teller Highway, Nome to Rock Creek Mine Access

The Nome/Teller Highway would be a main commute route to and from the Rock Creek Mine . Major noise sources along this travel route would include vehicle traffic, recreational activities, and aircraft along with miscellaneous residential activities. Table 7-5 provides a summary of projected ambient noise levels at different distances from the highway. Noise levels are presented for a structure located within 150 feet, and for structures between 150 and 300 feet of the Highway. Actual noise level will depend on the topography and shielding between the roadway and receiver location. The noise levels were predicted from on-site noise monitoring, existing traffic information and noise data from similar locations in Alaska. Noise levels during the summertime are projected to range from 45 to 61 dBA L_{eq} . Winter noise levels are projected at 41 to 61 dBA L_{eq} .

Table 7-5: Ambient Noise Levels for Nome/Teller Highway – Nome to Rock Creek Access¹

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	50 to 150ft	150 to 300ft	50 to 150ft	150 to 300ft
Winter Months ³	54 – 62	48 – 53	47 – 54	41 – 47
Summer Months ³	56 – 62	53 – 56	49 – 54	45 – 49

1. Data derived from on-site noise monitoring at Nome High School and Osborne Road in Nome and supplemental data from Chena Hot Springs, the Olnes subdivision, Ester and similar areas along with traffic noise modeling and data from the EPA

2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Nome/Teller Highway, West of Rock Creek Mine Access

Even though the mine may not have a significant effect on traffic west of the mine access road, baseline noise levels were projected for the western part of the Nome/Teller Highway to ensure that baseline data would be available should satellite ore deposits be developed in the future. Should this occur, then it is likely that the ore would be hauled from the satellite ore deposit sites (north and west of the proposed Rock Creek mine site) to the processing plant at the Rock Creek site. Today, major noise sources along the travel route include vehicle traffic, recreational activities, aircraft and some miscellaneous residential activities. Table 7-6 provides a summary of projected ambient noise levels at different distances from the highway. Noise levels during the summertime are projected to range from 35 to 51 dBA L_{eq} . Winter noise levels are projected at 31 to 51 dBA L_{eq} .

Table 7-6: Ambient Noise Levels for Nome/Teller Highway – West of Rock Creek Access¹

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	50 to 150ft	150 to 300ft	50 to 150ft	150 to 300ft
Winter Months ³	44 – 51	38 – 44	37 – 44	31 – 37
Summer Months ³	46 – 51	43 – 46	39 – 44	35 – 39

1. Data derived from on-site noise monitoring at Nome high School and supplemental data from Chena Hot Springs, the Olnes subdivision, Ester and similar areas along with traffic noise modeling and data from the EPA
2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Glacier Creek Road and Rock Creek Mine Access Area

Major noise sources along Glacier Creek Road include on- and off-road vehicles for local area access, existing mine activities, recreation activities and occasional aircraft over flights. Noise levels are projected to be the highest in the winter months with recreational snow machine activity along this route. Although in the summer months active placer mining activity in the area as well as traffic on the Nome/Teller Highway contribute to existing noise levels.. Ambient noise levels are projected at 32 to 54 dBA L_{eq} during winter months and 35 to 56 dBA during the summer months, with the higher noise levels occurring near the Nome/Teller Highway. Noise levels away from the highway are projected to be up to 10 dBA lower than those close to the highway. Table 7-7 provides a summary of projected ambient noise levels for the Glacier Creek area.

Table 7-7: Ambient Noise Levels for Glacier Creek Road and Rock Creek Mine Access Area¹

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	Rural Area	Near Highway	Rural Area	Near Highway
Winter Months ³	39-43	48 – 54	32-37	41 – 47
Summer Months ³	42-45	53 – 56	35-40	45 – 49

1. Data derived from on-site noise monitoring and data from Ester, northern Fairbanks, traffic noise modeling and from the EPA
2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May

Rock Creek Mine Site and Immediate Vicinity

This section describes ambient noise levels near the proposed Rock Creek Mine Site. Noise sources include existing placer mining and exploration activity, as well as recreational activities, including some motorized vehicles, such as all-terrain vehicles in the summer and snow machines in the winter. Winter noise levels are projected to range from 27 to 35 dBA L_{eq} , with summer months ranging from 30 to 37 dBA L_{eq} . These are minimal noise levels and it is expected that there are times when noise levels are substantially higher than those given, such as during mine exploration and at areas that see recreational use of snowmachines. Table 7-8 provides a summary of the expected range of nominal noise levels for the summer and winter months near the proposed mine site.

Table 7-8: Ambient Noise Levels for Rock Creek Mine Site and Immediate Vicinity

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	Min	Max	Min	Max
Winter Months ³	30	33	27	35
Summer Months ³	32	37	30	37

1. Data derived from on-site noise monitoring and data from the Olnes subdivision and the Ft Knox area before the mine was constructed, along with information from the EPA
2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Nome/Council Highway, Nome By-Pass to Big Hurrah Mine Access Road

The major noise source along the Nome By-pass and the Nome/Council Highways is vehicle traffic, including all-terrain vehicles in the summer and snow machines in the winter. Other noise sources include light and heavy construction and general residential activities. Noise levels along the Nome By-pass were measured at 38 to 56 dBA L_{eq} . Noise levels along the Nome/Council Highway ranged from 38 to 60 dBA L_{eq} . Table 7-9 provides a summary of the projected noise levels along the Nome By-pass and the Nome/Council Highway. Noise levels at the Solomon Lodge, which was undergoing renovation at the time of the noise monitoring, ranged from 38 to 50 dBA L_{eq} .



Figure 7-4: Solomon Lodge, Nome/Council Highway, Alaska

Table 7-9: Ambient Noise Levels along the Nome By-pass and the Nome/Council Highway.

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	50 to 150ft	150 to 300ft	50 to 150ft	150 to 300ft
Winter Months ³	46 – 60	40 – 46	42 – 49	38 – 42

Summer Months³	49 – 60	43 – 49	44 – 49	40 – 44
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1. Data derived from on-site noise monitoring at 6 locations along the Nome By-pass and the Nome/Council Highway, along with information from the EPA
2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Big Hurrah Mine Site and Immediate Vicinity

This section describes ambient noise levels near the proposed Big Hurrah Mine Site. Noise sources include existing mining and exploration activity, as well as recreational activities, including some motorized vehicles, such as all-terrain vehicles in the summer and snow machines in the winter. Winter noise levels are projected to range from 27 to 35 dBA L_{eq} , with summer months ranging from 30 to 37 dBA L_{eq} . These are minimal noise levels and it is expected that there are times when noise levels are substantially higher than those given, such as during exploration and at areas that see recreational use of snowmachines. Table 7-10 provides a summary of the expected range of nominal noise levels for the summer and winter months near the proposed mine site.

Table 7-10: Ambient Noise Levels for Big Hurrah Mine Site and Immediate Vicinity

Season	Daytime ² Hourly L_{eq}		Nighttime ² Hourly L_{eq}	
	Min	Max	Min	Max
Winter Months ³	30	33	27	35
Summer Months ³	32	37	30	37

1. Data derived from on-site noise monitoring and data from the Olnes subdivision and the Ft Knox area before the mine was constructed, along with information from

the EPA

2. Daytime is defined as 7am to 10pm, and nighttime is defined as 10pm to 7am
3. For the analysis, summer is April through August, and winter is September through May.

Project Noise Impact Analysis

This analysis of project-related noise levels is discussed in the context of the project's noise impact criteria. The project criteria were derived from the EPA noise guidelines for residential areas and from U.S. Federal Highway Administration (FHWA) traffic noise abatement criteria. The noise and vibration criteria are described in Appendix A (Additional Noise and Vibration Information). These guidelines and regulations provide specific, measurable criteria by which project-related noise impacts can be determined, and they are used in this analysis as the basis for determining significance of noise impacts. General information on reference equipment noise levels, noise level predictions, and impact projection methods also are provided.

No Action Alternative

Under the No Action Alternative, no significant changes in project area noise levels are projected. Dominant noise sources would continue to include existing mining and exploration operations, local area snow machines and all-terrain vehicles (both recreational and local access use), local fixed-wing aircraft and helicopter over-flights and heavy truck traffic on the Nome/Teller Highway. Other less noticeable noise sources that would continue under this alternative include passenger vehicle traffic and miscellaneous residential, recreational, and commercial activities, including chain saws, dog teams, generators, and occasional small weapons firing.

Proposed Rock Creek Mine Project

Noise impacts, as they are related to the Rock Creek mine project, are primarily considered for human noise sensitive receivers. This includes permanent residences and areas where people frequent, such as nearby recreational areas. Noise impacts to animals, although rarely an issue, are also discussed at the end this section.

There are several major noise producing components of mining projects. The three main noise components for the Rock Creek and Big Hurrah Satellite Mine projects would be general mining activities (those activities related to ore retrieval and processing), blasting to free the ore from hard rock for processing, and mining-related traffic on the mine access routes, including the Nome/Teller Highway; the Nome/Council Highway and the Nome By-pass. The following section describes the modeling methods and the general results of the calculations.

Noise Level Calculations

Operational noise level projections were made using the methods described in EPA (1971b), as well as with information from other acoustical sources related to the type of potential noise producing activities expected for this project. Reference noise levels for equipment were taken from measured noise levels of equipment in use at actual construction sites or mining operations, and from EPA and FHWA sources. Table 7-11 provides some reference noise levels for mining and construction equipment that could be used during construction and operation of the mine. For a sound level perspective, refer to Table 7-1.

Table 7-11 Reference Mining and Construction Equipment Noise Levels

Description ¹	Hourly Use (Minutes ²)	Sound Level ³
Blasting	Daily, 5 days per week	105 to 120 dBC @ 100 feet ⁴
Haul Trucks, 4 to 5 100 ton off-road haul trucks	45 – 60	72 – 88
Hydraulic mine shovel	20 – 40	84 – 88
Front-end loader, Cat 992 or equivalent	20 – 40	84 – 88
Rock Drill, IR-DM-M2, TEI Jumbo or equivalent	10 – 15	90 – 92
Dozer, Cat D10/11 or equivalent	20 – 40	88 – 92
Motor Graders, CAT 24H or 16H or equivalent	20 – 40	78 – 82
Backhoe, CAT 325 or equivalent	20 – 40	76 – 80
Medium duty trucks, such as fuel trucks, water trucks and fork lifts	30 – 60	72 – 86
Light duty trucks, service trucks, compressors, pumps, light plants and other small engine powered equipment	45 – 60	65 – 81 ⁵

¹ Normal equipment used for mining operations like those proposed for the Rock Creek project.

² Average use per hour during normal mining activities.

³ Range of noise levels under normal operation as measured at a distance of 50 feet. For haul trucks, both the idle and nominal maximum operational noise levels are provided.

⁴ Typical blast levels for this type of mine taken from on-site measurements at other sites

⁵ Assumes a mixture of compressors, light plants, small engine powered generators, welders and other operational and maintenance equipments. This is a minimal component of sound under normal operation and is not expected to result in significant changes in the overall noise levels.

Noise levels are expected to be the highest during the initial construction of the mine site and support facilities. Once the construction is completed, and most of the noisiest equipment are in the mine pit, noise levels for mine operation would stabilize and would be dominated by haul trucks, loaders, maintenance facilities, and other mine related ancillary facilities. This will be the case for both the Rock Creek Mine and Big Hurrah

Satellite Mine. Noise from ore processing at the Rock Creek Mine will not be a significant source when compared to the mining process.

General Operational Noise

For the purpose of determining the project noise levels and potential noise impacts, a general “distance versus sound level” graph was derived for general activities during the construction and operation of the mine. An additional “sound level versus distance” graph was also developed for mine traffic on the different access routes. The simple graphs of noise levels do not assume any additional noise reduction from topographical shielding or foliage, and can therefore be considered a conservative projection of noise levels that would be produced from the mine and haul routes.

For the Rock Creek and Big Hurrah Satellite Mine projects construction and operation, two separate calculations were performed, one representative of the summer months, and another for the winter months. The two calculations were performed to account for the more efficient sound propagation in cold air during winter months.

The winter calculations are representative of the operational noise levels that may be experienced at distances greater than 500 feet from the mine site during periods when temperatures are below 20 degrees Fahrenheit. The calculations assume soft ground cover, such as snow, and do not provide for actual noise reductions from area topography.

The summertime calculations are similar to the winter noise level calculations, but assume a higher temperature and slightly softer ground cover. These levels would be typical during summer months when temperatures are more moderate and ground cover consists of field grass or other foliage. Again, a direct line of sight between the receiver and the mine is assumed in the calculations. Figure 7-5 provides the worst case mine

related construction noise levels. Figure 7-6 is a graph of noise levels from typical mining activities once the pit is completed and much of the noise producing equipment is moved inside the pit. Each of the graphs contains two different temperature and ground cover scenarios that were used to perform the noise calculations.

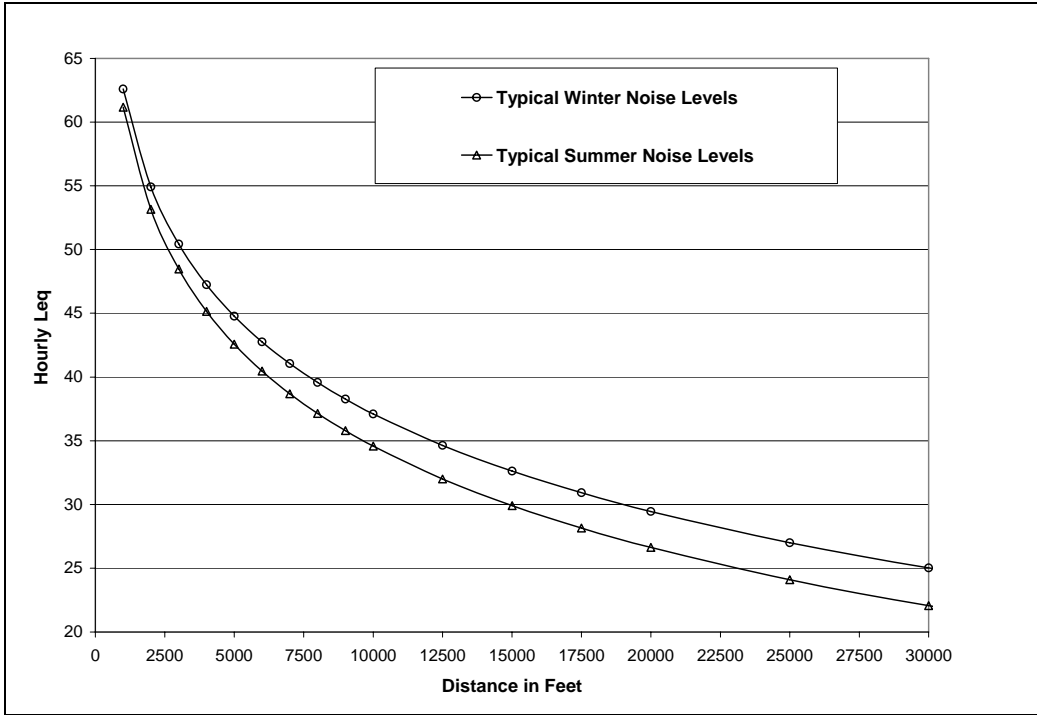


Figure 7-5 Typical Mine Construction Noise Levels

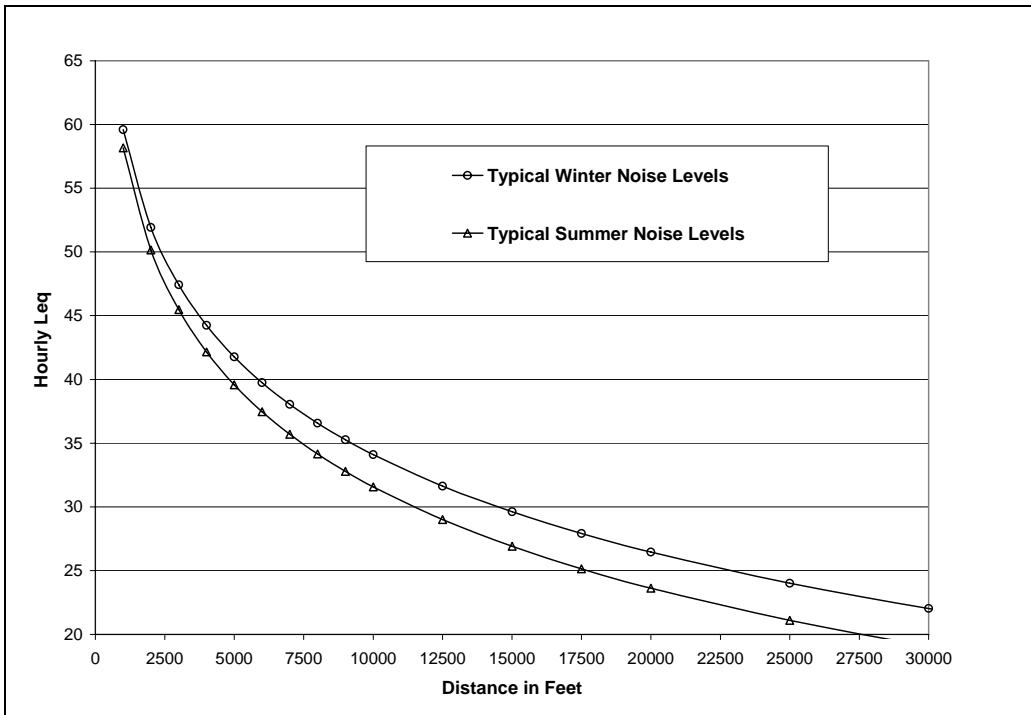


Figure 7-6 Typical Operational Noise Levels

For noise sensitive receivers located in the vicinity of Nome and the immediate surrounding areas, noise from general construction or operations at the Rock Creek Mine site are not projected to result in any change over the existing noise environment. These locations are a long distance from the mine site, and with the additional topographical reductions, noise levels from mine construction and operations are projected to remain below maximum hourly L_{eq} noise levels of 31 to 40 dBA. There may be times, however, when atmospheric conditions make some noise from mine activities audible at certain locations. Even under extreme conditions, however, no impacts are projected.

Noise from general construction and operation at the Big Hurrah Mine is not expected to result in any change in noise levels at noise sensitive receivers in the Nome area. The linear distance from the Big Hurrah Mine to Nome is over 40 miles, and therefore the operation of the mine will not be audible in Nome. There may be times when mining

operations are audible at the Solomon Lodge and Solomon Wayside; however, the noise reduction with distance are projected to reduce mine related noise to below 30 dBA L_{eq} .

During the initial construction phase of the Rock Creek Mine, noise levels in the Glacier Creek Road and Bypass areas, near the Nome/Teller Highway are projected to range from 42 to 45 dBA. Mine operational noise levels in the same area are projected to range from 39 to 42 dBA. Because this area is primarily used for recreation, and frequented with noise from motorized vehicles such as ATVs and outboard motors in the summer, and snow machines in the winter, no significant noise impacts are projected.

During the initial construction phase of the Big Hurrah Mine, noise levels in the Solomon Lodge, Solomon Wayside area and at fishing camps along the Nome/Council Highway near the mine are not projected to exceed 40 dBA. Mine operational noise levels in the same area are not projected to exceed 30 to 40 dBA. Closer to the Big Hurrah mine site, near Quigleys Camp, noise levels during construction and operation of the Big Hurrah are projected to range from 36 to 44 dBA L_{eq} . Because this area is primarily used for recreation, and frequented with noise from motorized vehicles such as ATVs in the summer, and snow machines in the winter, no significant noise impacts are projected.

In addition to the general mining equipment noise, noise from blasting was also investigated for potential noise impacts. Blasting would also be required at both mine sites for normal mine operation and is expected to occur 5 days per week, once per day. The EPA allows for up to one blast per day with noise levels of 125 dBC at the nearest noise sensitive receiver location. During the initial construction phase, when blasting is performed near, or on the surface, noise from the blasts will likely be audible at some recreational and residential locations near the mine site. However, once the blasting activities move in to the mine pit areas, noise from the occasional blast is not projected to result in any significant noise impacts as defined by the EPA blasting standards (see

Appendix A). No blasting related noise impacts are projected during the construction or operation of the Rock Creek and Big Hurrah Satellite Mine projects.

No vibration impacts are projected under any of the alternatives because the distances between the mine, potential haul routes, and vibration-sensitive receivers are sufficiently large that vibration levels are not projected to be noticeable.

Mine Access Noise

Mine access noise has several components, including a mixture of passenger vehicles as well as medium and heavy trucks. Noise along the access routes was projected for operation of the Rock Creek Mine only, and for operation of the Rock Creek Mine and Big Hurrah Satellite Mine simultaneously, with the ore from Big Hurrah being trucked to the Rock Creek mine for processing.

Both analyses assume the maximum projected traffic conditions during normal operation.

As with the operational noise level calculations, these traffic noise calculations also assume a direct line of sight to the roadway, and do not assume any topographical shielding or reduction due to foliage.

Noise from traffic would occur during shift changes, from hauling supplies to and from the mine, transferring ore from the Big Hurrah mine to the Rock Creek mine for processing, and from other general mine related traffic. The assumptions for Rock Creek and Big Hurrah mine-related traffic used in the noise calculations is discussed below.

Rock Creek Mine Traffic Assumptions: The Rock Creek Mine will employ 120 people. Six of these people will work in Nome proper and therefore will not make a daily round trip to the mine site. Eleven of these employees will be management personnel

who will each make one round trip between town and the mine site an average of 6 days per week. The remaining 103 will be divided into four crews with rotating on/off schedules. The traffic effect per day will be two 26-person crews; under the worst case scenario, each person could result in one round trip per day between the mine site and town. This impact does not take into account any mitigation that may occur as a result of carpooling, the initiation of a van transportation service by the local business community or bussing. In addition, an estimated three medium trucks and two large trucks per hour would be expected to make trips to-and-from the mine site each hour.

Big Hurrah Mine Traffic Assumptions: Under the worst case conditions there will be a crew van making daily round trips to the Big Hurrah mine. In addition, occasional large supply trucks, unscheduled pickup trucks and emergency repair vehicles will also access the mine on an as needed basis. These vehicles will use the Nome/Council Highway from Nome to the mine site. Ore will be sent to the Rock Creek Mine for processing using tractor trailers capable of hauling dual trailers with maximum legal loads. Ore hauling will occur 24 hours per day, seven days a week using two haul trucks operating in cycles of approximately 90 minutes. The haul route for the ore and other traffic between the two mine sites would be the Nome/Council Highway to the Nome Bypass, to the Nome/Teller Highway to the Rock Creek Mine.

Hourly L_{eq} noise levels were calculated along the Rock Creek Mine access route north of Nome using the worst case scenario of 26 passenger vehicles, 3 medium and 2 heavy trucks per hour from Nome to the Rock Creek Mine, along with 2 tractor trailers from the Big Hurrah Mine transferring ore to the Rock Creek Mine. Additional calculations were performed for the Nome By-Pass assuming 4 passenger vehicles, 1 medium truck and 2 tractor trailers traveling between the two mines. Traffic noise calculations were also performed for traffic accessing the Big Hurrah Mine from Nome along the Nome/Council Highway assuming 2 passenger vehicles, 2 medium trucks, 1 heavy truck and 2 tractor trailers per hour.

Traffic Noise Levels between Nome and Rock Creek Mine: Hourly noise levels along the route to the Rock Creek mine ranged from 62 dBA Leq at 20 feet to approximately 50 dBA Leq at 400 feet and are shown on Figure 7-7. The FHWA criterion for traffic noise is 67 dBA Leq and therefore no traffic noise impacts are projected for the travel route between Nome and the Rock Creek Mine.

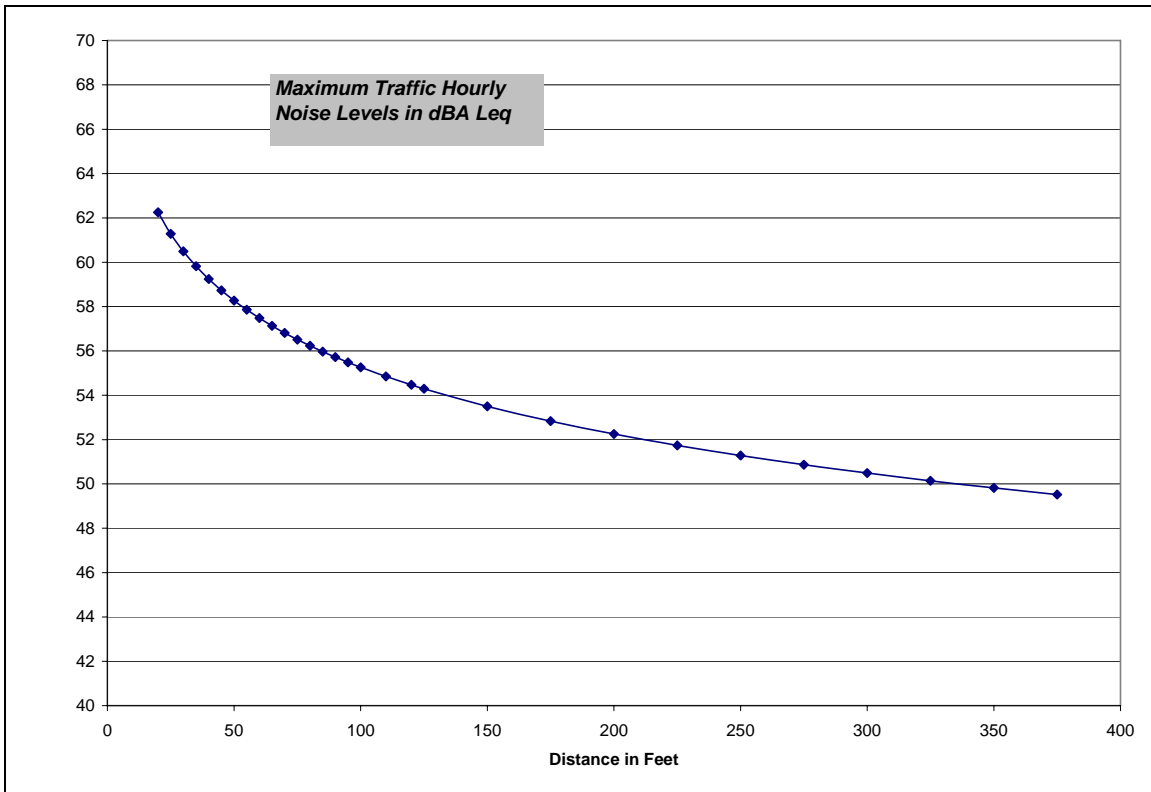


Figure 7-7 Traffic Noise Level versus Distance from Roadway: Nome to Rock Creek Mine

Traffic Noise Levels along the Nome By-Pass: Hourly mine related noise levels along the Nome By-pass mine ranged from 57 dBA Leq at 20 feet to approximately 45 dBA Leq at 400 feet and are shown on Figure 7-8. The FHWA criterion for traffic noise is 67 dBA Leq and therefore no traffic noise impacts are projected along the Nome By-Pass.

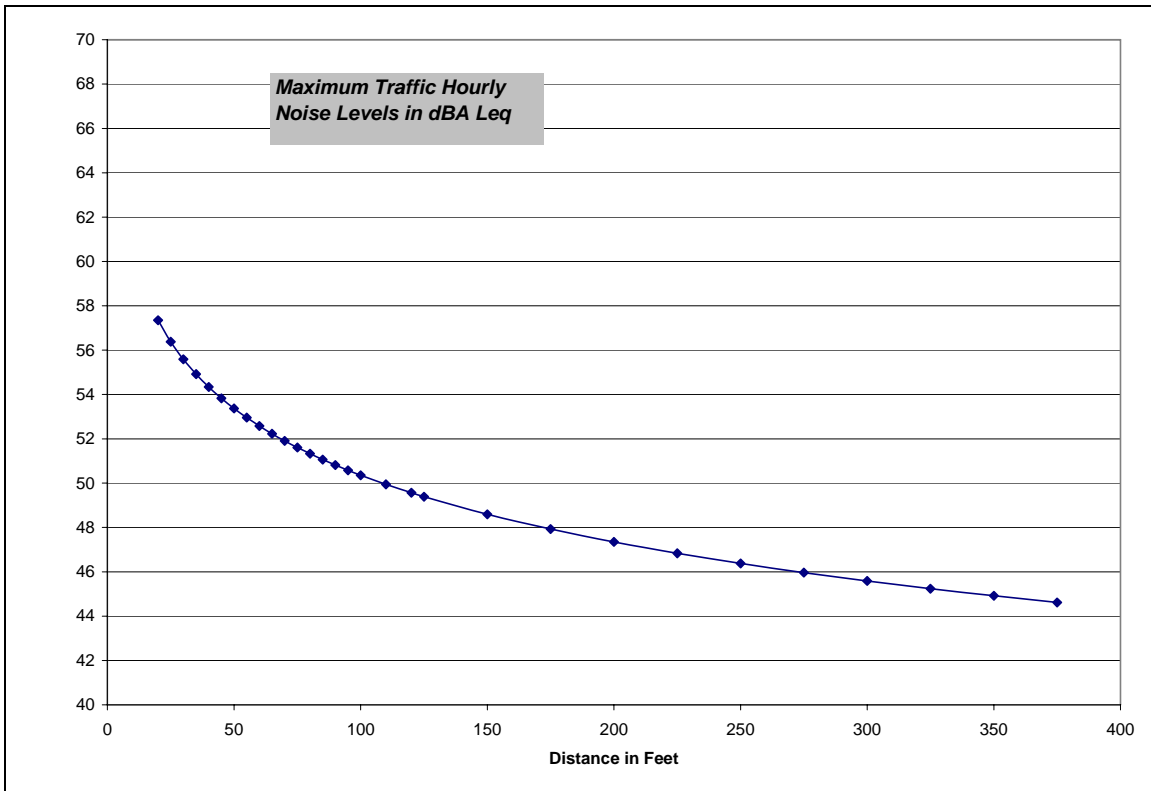


Figure 7-8 Traffic Noise Level versus Distance from Roadway: Nome By-Pass

Traffic Noise Levels between Nome and Big Hurrah Mine: Hourly noise levels along the Nome/Council Highway to the Big Hurrah mine ranged from 59 dBA Leq at 20 feet to approximately 46 dBA Leq at 400 feet and are shown on Figure 7-9. The FHWA criterion for traffic noise is 67 dBA Leq and therefore no traffic noise impacts are projected for the travel route between Nome and the Big Hurrah Mine. Furthermore, the majority of noise sensitive land uses along the Nome/Teller Highway are at least 100 feet from roadway, and therefore maximum one-hour L_{eq} noise levels or 52 dBA or less are projected.

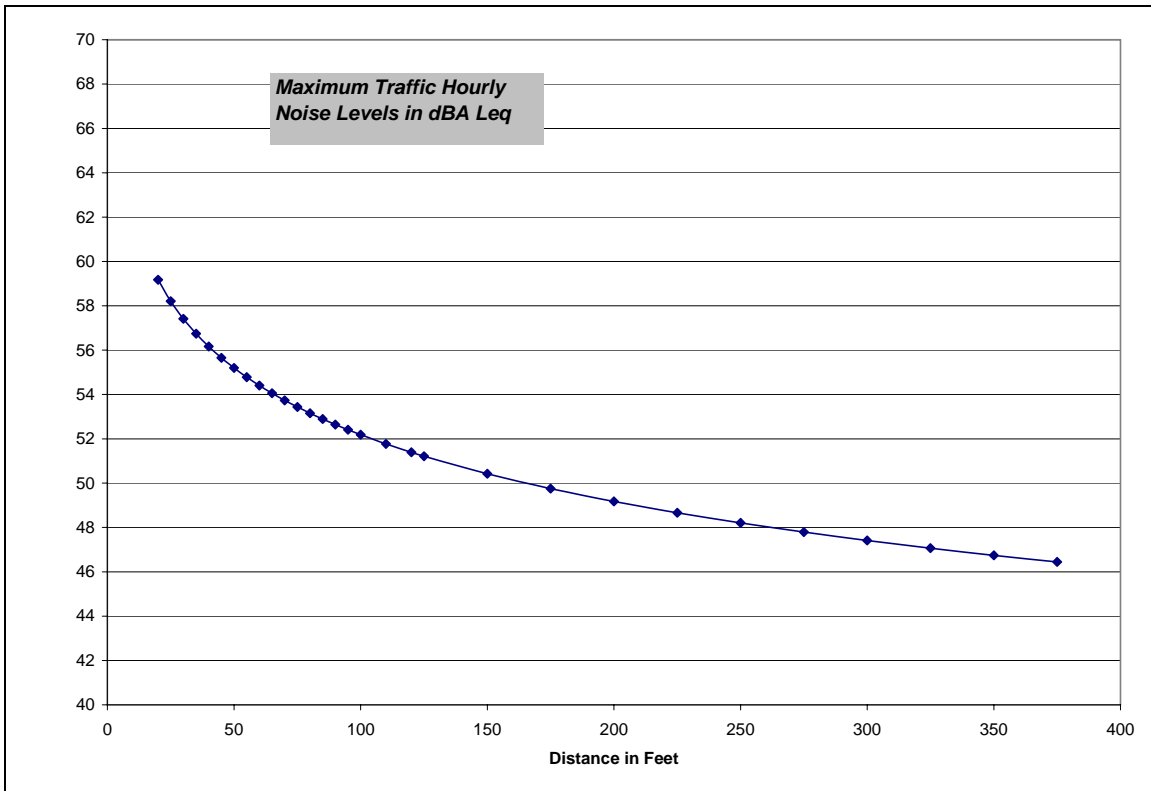


Figure 7-9. Traffic Noise Level versus Distance from Roadway: Nome/Council Highway to Big Hurrah Mine

Cumulative Noise Levels

Because most of the additional noise sources would be sporadic in nature, and would occur over a large area, it is not possible to accurately quantify and provide cumulative noise levels. Existing and future noise sources, however, when combined with noise levels from Rock Creek Mine operation, are not projected to result in any significant local *long-term* noise impacts. There may be times, in certain areas, where the combined noise from different sources might result in a noise level increase of greater than 3 dBA, which has been defined as probably significant. Such an increase, however, most likely would be short-term in nature, and would not result in more than a short-term noise impact.

Finally, as is shown in Figures 7-5 through 7-9, there is the potential for noise level increases within 2 to 3 miles of the Rock Creek and Big Hurrah mines during construction and 1-to-2 miles of the mine during operations. In addition, noise level increases can be expected within 1000 feet of the haul routes. Because this is a wilderness area, with low existing noise levels, there is the potential for noise level increases along trails and other areas that are frequented by non-motorized users, such as cross country skiers, hikers, and dog sleds. The actual increase in noise would depend greatly on the distance from the mine to the trail, weather conditions, and topography between the trail and the mine or haul route. However, unless the trail is within 2 miles of the mine, the noise level increase is projected to be less than 3 to 5 dBA, and therefore no significant noise impact would be identified. There will be times, however, when the mining operations may be audible at greater distances due to atmospheric conditions, but as stated, noise level increases are still projected to be within the EPA criteria, and overall, mine related noise levels would remain at or below 32 to 35 dBA.

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Appendices

Appendix A: Additional Noise and Vibration Information

This appendix contains some specifics on noise and vibration regulation and guidelines used for the Rock Creek Mine Noise Technical Analysis.

Noise Regulations and Guidelines

FHWA Traffic Noise Criteria

The traffic noise impact criteria for federal funded road and highway projects are taken from Title 23 of the Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, FHWA, Washington, D.C. The criterion applicable for residences, churches, schools, recreational uses, and similar areas is an exterior hourly equivalent sound level (L_{eq}) from the project that approaches or exceeds 67 dBA. The criterion applicable for other developed lands, such as commercial and industrial uses, is an exterior L_{eq} that approaches or exceeds 72 dBA. In addition to the absolute levels of 67 dBA for residential and 72 dBA for commercial, the FHWA also considers a traffic noise impact to occur if “future noise levels substantially exceed the existing noise levels.” Most states consider a 10-dBA increase over the existing noise levels sufficient to identify the increase a *substantial increase impact*. No criterion exists for underdeveloped lands or construction noise. A summary of the FHWA noise regulations is contained in Table A-1.

Table A-1: FHWA Roadway Noise Abatement Criteria

		Hourly Leq
Land Use Category		(dBA)
Type A:	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose	57
Type B:	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, (exterior) motels, hotels, schools, churches, libraries and hospitals	67
Type C:	Developed lands, properties or activities not included in the above categories	72
Type D:	Undeveloped land	--
Type E:	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums	52

EPA Noise Guidelines

Table A-2 contains the U.S. Environmental Protection Agency (EPA) standards that can be used as a guideline for expected community reaction to a noise increase above existing ambient levels.

Table A-2: EPA Guidelines for Expected Noise Impact

Increase in Noise over Existing Level	Expected Community Reaction
0 - 5 dBA	Few complaints if gradual increase
5 - 10 dBA	More complaints, especially if conflicts with sleeping hours
Over 10 dBA	Substantial number of complaints

Blasting Noise and Noise Level Descriptors

Evaluation of blast noise was performed using the C-weighting scale. For short-term and impulsive noises, such as surface blasting, the C-weighted filter is normally used. The C-weighted filter helps to account for the short time period and low frequency content characteristic of blasting. Measurements taken with the C-weighting filter are denoted dBC. Table A-3 provides information on blasting, blast levels in dBC and community response based on the number and relative sound level of the blast.

Table A-3 EPA Limits on Number of Blasts for Different Blast Levels

Blast Level in dBC	Permissible Daily Number
Above 125	0
123 - 125	1
121 - 122	2
120	3
119	4
118	5
117	6
116	8
115	10
114	12
113	16
112	20
111	25
110	32
109	40
108	51
107	64
106	80
105	100

Vibration Impact Criteria

Vibration from mining related activities, such as mechanical digging, rock breaking and vehicle traffic are only expected to be perceptible within a few hundred feet of the activity, and no impacts are expected. However, criteria were developed for the project to assure that there would not be any vibration related impacts. The vibration criteria are derived from the US Department of Transportation (USDOT) guidelines for the evaluation of impacts due to vibration. The criteria are given in Table A-4. The criteria given in Table A-4 are not applicable to blasting due to the short duration and lower frequency associated with blasts. Vibration levels from general operation and traffic does not have the same level of annoyance as the vibration produced from blasting.

The US Bureau of Mines defines a vibration-blasting criterion in *Bulletin 656, Blasting Vibrations and Their Effects on Structures*, United States Department of Interior, 1971. The safe blasting vibration criterion is given in terms of particle velocity in inches-per-second at the frequency where most blasting energy is normally located (approximately 40 Hz). The level of vibration, considered the threshold of the “safe blasting criteria,” is 2.0 inches-per-second.

Table A-4: General Vibration Peak Particle Velocity Guidelines

Velocity (in/sec)	Effects on Humans	Effects on Building
0 to 0.01	Imperceptible by people--no intrusion.	Vibrations unlikely to cause damage of any type.
0.04 to 0.08	Threshold of perception--possibility of intrusion.	Vibrations unlikely to cause damage of any type.

0.15	Vibrations perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
0.64	Level at which continuous vibrations begin to annoy people.	Virtually no risk of "architectural" damage to normal buildings.
1.27	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relatively short periods of vibrations).	Threshold at which there is a risk of "architectural" damage to normal dwellings - houses with plastered ceilings and walls.
2.54 to 3.81	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possible minor structural damage.

Source: United States Department of Transportation Guidelines