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# MINERAL RESOURCE DEVELOPMENT PRIOR TO THE 1867 ALASKA PURCHASE

*Thomas K. Bundtzen*

## Introduction

The year 2017 marks the 150<sup>th</sup> anniversary of the Alaska purchase, when imperial Russia sold its holdings in North America to the United States. One central argument against the Alaska purchase was the absence of any notable natural resource base to sustain a large region of North America. Exceptions were the historic harvesting of fur-bearing animals (in decline by the mid-19<sup>th</sup> century), limited coal development in the Cook Inlet region, and 'ice mining' ventures on Kodiak Island and near Sitka. This paper summarizes the pre-1867 history of mineral resource development which includes not only Russian exploration but also the often ignored uses of mineral resources by indigenous people for millennia. The next page summarizes the sites of mineral resources developed prior to the 1867 purchase described in this paper.

## Stone and Ceramics

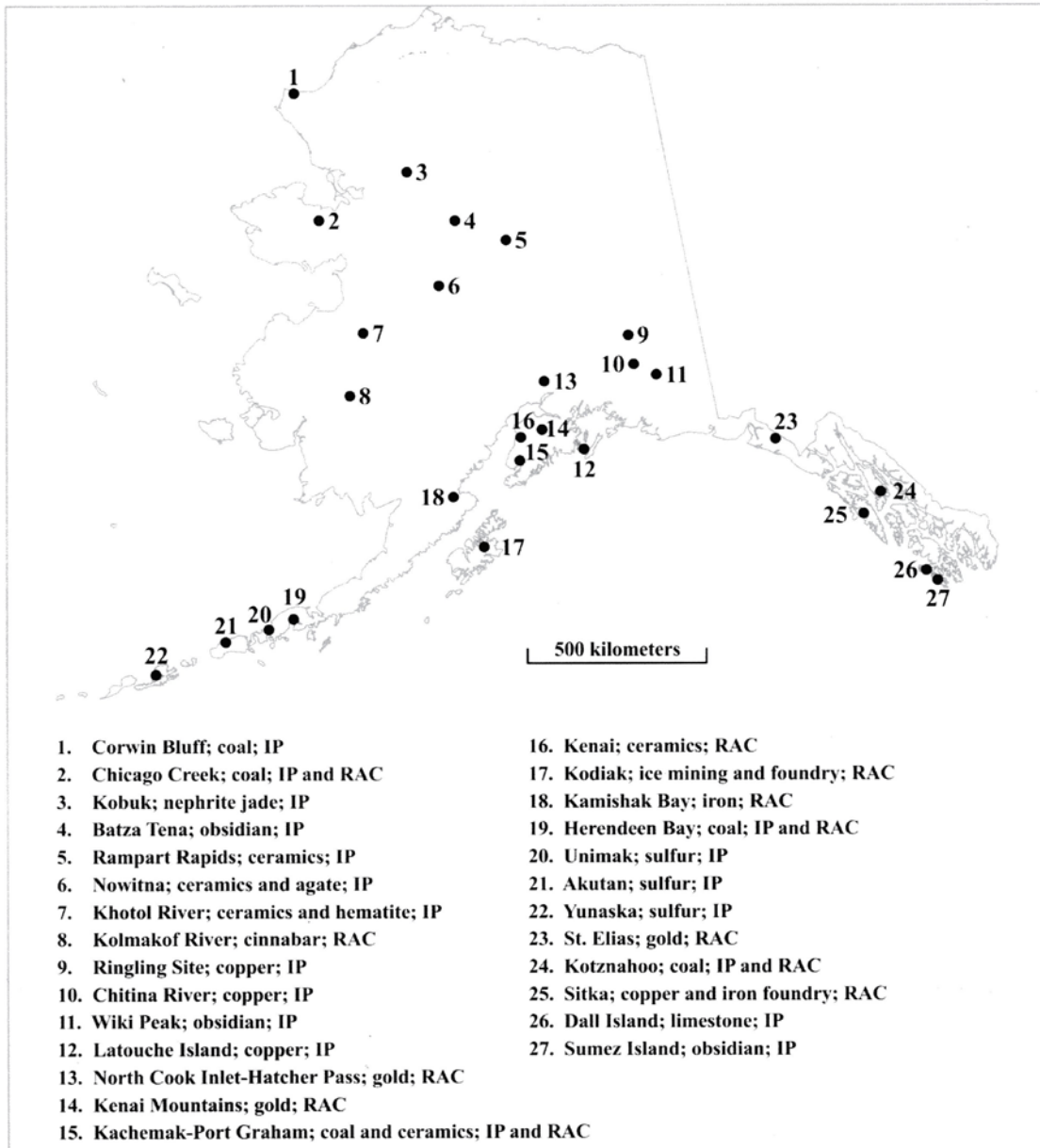
Like many indigenous cultures throughout the world, the Aleut, Eskimo, and Indian cultures utilized non-metallic stone resources for spear points, arrowheads, projectiles for side-slot bow-and-arrow technologies, and other useful application such as stone dishes, whetstones, lamps, and stone saws. Tlingits hollowed out large circular mortars from limestone to grind food stuffs and berries. Many types of stone adzes were used throughout Alaska, and varied in design by location of origin. Native groups met their needs with siliceous sedimentary rocks, chert, hornfels, and obsidian for projectiles, and granitic or volcanic rocks for stone adzes. However, exceptional quality obsidian and chert from a few sites were exported throughout Alaska.

The Batza Tena obsidian site is on a flat-topped ridge between the valleys of the Indian and Little Indian rivers, about 17 miles south of Hughes. The nearly black, volcanic obsidian is derived from a rock section of Early Tertiary age that overlies older volcanic and sedimentary rock of the Yukon-Koyukuk terrane. Comparing the trace-element geochemistry of many early obsidian sites, reveals that material from Batza Tena, first discovered by US Geological Survey geologists Bill Patton and Tom Miller in 1967,<sup>1</sup> was traded throughout



*Examples of spear points manufactured from Batza Tena obsidian, Koyukuk region, Alaska, photo courtesy of Ned Rozzell.*

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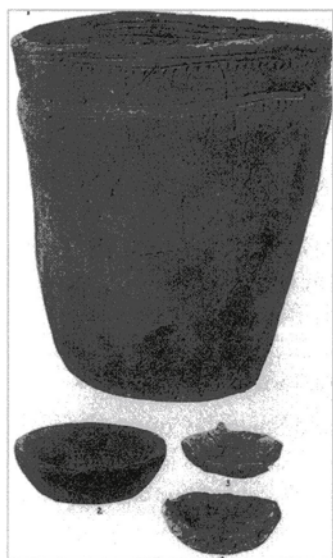
*Selected mineral development localities in (present day) Alaska prior to the 1867 purchase.*

*IP = by indigenous people; RAC = by the Russian-American Company.*

interior and northern Alaska in prehistoric times.<sup>2</sup> One site on the North Slope that contains Batza Tena obsidian has been dated at approximately 11,000 years old. Other important obsidian sources in Alaska include the ‘Wiki-Peak’ site in the eastern Wrangell Mountains and Sumez Island in Southeast Alaska. Tlingits and Aleuts carved figurines, cups, and plates from hardened argillite from several sites in Southeast Alaska and at least one on the Alaska Peninsula.<sup>3</sup>

Ceramic articles were manufactured throughout Alaska before European times, with the greatest concentration and diversity within the Yukon River basin. At a site near Rampart Rapids on the

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a



b



c

*a - Ceramic pots and cups made from a bluish clay near Grayling;*

*b - Oil lamp with human figure found on Khotol River, Yukon basin, similar to forms found on the Kenai Peninsula.*

*c - Bowl made from argillite from Sitka. Credits: De Laguna<sup>7</sup> and I. G. Voznesensky collection, 1844.*

Yukon River, fireable clays were quarried from a sedimentary section of unknown age and used for pottery making. De Laguna<sup>4</sup> reported that the Koyukon people that made the pots there traded them all the way up the Tanana River to Delta, a distance of 450 miles. De Laguna also reported that pottery was found several hundred miles up the Nowitna River near its head. Villages of the Koyukuk River basin had their own places to get clay for pots and cups. Clay deposits near Old Louden above the present town of Galena as well as at the mouth of the Tozitna River contained clay used in ceramic production.

Pottery made upriver from the mouth of the Koyukuk River contains few or no decorations, whereas pottery found below the Koyukuk, especially near Grayling, shows increasingly numerous and elaborate designs inside and outside of the vessels; i.e., spoked wheels, circles, dots, and colored embroidery. Perhaps the nearby Eskimo culture influenced the ceramic products of the lower Yukon.

De Laguna found one unusual ceramic lamp on the east bank of the Khotol River, a tributary of the Yukon. The lamp was fired from red clay and featured a human figure carved in the center of the bowl, which was filled with animal oils. Although de Laguna<sup>5</sup> originally thought the lamp was of local origin, she later judged it originated on Yukon Island in Kachemak Bay, where similar lamps were found, and later traded to Interior Alaska. Although the use of ceramics was not well developed in Southcentral or Southeastern Alaska or in British Columbia,<sup>6</sup> the unique oil lamps manufactured from clays in the Kachemak Bay area are an important exception.

Whereas indigenous people created pottery, the Russians created bricks fired from clay deposits on Kodiak Island to construct buildings at the Kodiak town site. Alexander Baranov, the first manager of the Russian-American Company (RAC), created a limited brick manufacturing industry. According to Tikhmenev,

Every year, from three to six thousand bricks were made on Kodiak Island and their production might have been increased to fifteen thousand if there had been more lime, which had to be burned from sea shells, with clay deposits suitable for the brick making.<sup>8</sup>

Decades later, beginning in the 1840s and continuing at least until 1863, brick manufacturing took place on the Kenai Peninsula. About 50,000 bricks of good quality were manufactured annually in the community of Kenai, with the help of the local Native community and a Creole work force.



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Problems with the liming process Baranov's previous brick-making experienced on Kodiak Island were solved by the later generation of brick makers on the Kenai Peninsula with the use of local limestone sources. Most of the Kenai-manufactured bricks were shipped to Sitka (New Archangel), and some to Kodiak.

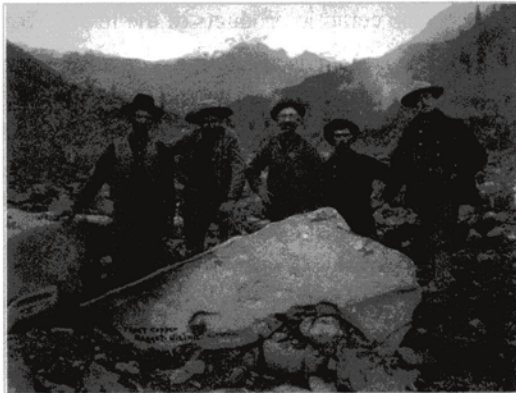
### Copper

European explorers immediately noticed that indigenous people in what became Russian America acquired and used copper. When Vitus Bering's expedition landed near Cape St. Elias on the southern tip of Kayak Island, Georg Steller and Vitus Bering recorded the following observation: "On the (Kayak) Island, we encountered a whetstone on which it appeared copper knives had been sharpened ... and deserted huts, a fireplace, a copper arrowhead, and edge tools of copper."<sup>9</sup>

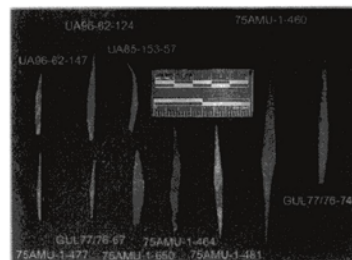
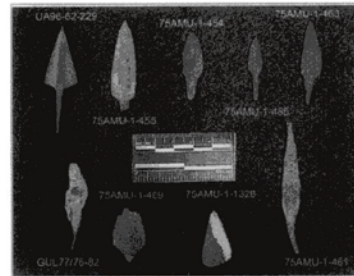
The Galacian explorer, Francisco Antonio Maurelle, while serving the Spanish Crown, made the following observation during his 1779 voyage near Mount St. Elias: "The natives carry arrowheads made of copper, and spear points manufactured from copper ... which caused the Spaniards to suspect mines of this metal nearby."<sup>10</sup>

That same year (1779), the French explorer Jean-Francois La Perouse observed: "The natives (of the Cook Inlet and Prince William Sound region) know how to forge iron and work copper."<sup>11</sup>

Abundant native copper was located and developed by indigenous people on tributaries of the Nizina, Kuskulana, Nabesna, and White rivers in the Wrangell Mountains and in other scattered locales, including Unalaska Island and on Copper Island (the last being one of the Komandorski Islands now in Russia). Much of the copper came from placer deposits in the Wrangell Mountains, where copper was recovered by a primitive sluicing process not unlike that used by the placer gold mining industry today. Copper mining was an important, minor activity carried out mainly by the Ahtna, who often measured wealth by the number of copper possessions. Geologically, the native copper source was the Nikolai Greenstone, a regional geologic unit of Triassic age composed of a metamorphosed basalt with a high copper background. During the Alaska-Yukon Gold Rush large



*Three-ton copper nugget found in Nizina district, Wrangell Mountains area, circa 1899. This nugget is believed to be the one on display at the University of Alaska Museum of the North. The man in the center is Rueben McClellan, one of the original locators of the famed Kennecott copper-silver lodes. Placer nuggets were a major source of copper among indigenous people in Alaska prior to and during European contact. Source: Anchorage Museum.*



*Copper artifacts recovered from the Ringling Site, near Gakona, Alaska; from Hanson.<sup>13</sup>*

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copper nuggets were found, which illustrate the principle source of the copper indigenous peoples of the region recovered.

One of the best examples of early Native Alaskan use of copper is found in the Ringling archeological site near Gakona, in the Copper River Basin.<sup>12</sup> A wide variety of copper artifacts have been excavated there for more than 20 years, including copper knives, awls, bi-points, arrowheads, rings, plates, cones, fish hooks, and several types of copper tools. Radiocarbon testing of charcoal associated with the site yielded dates ranging from AD 925 to 1475, consistent with the 'Athabaskan Tradition.' Metallurgical analysis indicates all of the copper came from a similar source, and not, for example, from imported materials.

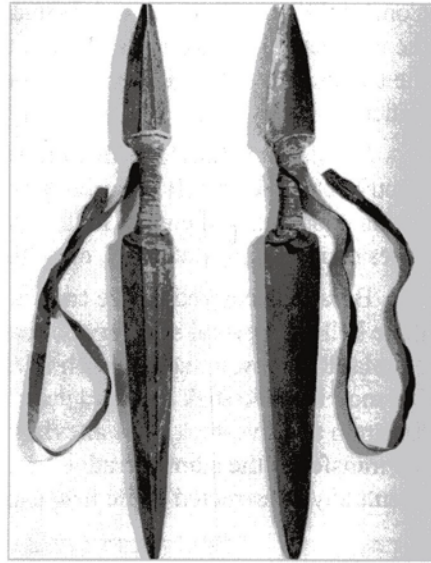
In the Southeastern Panhandle and Prince William Sound, canoes, blankets, and carved wooden dishes were symbols of wealth, but elaborate necklaces and bracelets of copper and copper weapons such as knives, shields, and spears were also important items of property. Engraved sheets of copper acquired immense prestige. In one example cited by Woodcock, a local chief in the Alexander Archipelago traded 16,000 blankets for a single, large, engraved copper plate.<sup>14</sup> According to de Laguna, pre-1867 Natives knew that green alteration (malachite) generally led to a successful search for native copper. An elder she interviewed observed:

Our people used to find pieces of native copper up to three feet long and one foot wide. Old natives dug for it. If you get a foot long piece, you were a rich man, and you could buy four or five slaves.\* You didn't have to do anything anymore.<sup>15</sup>

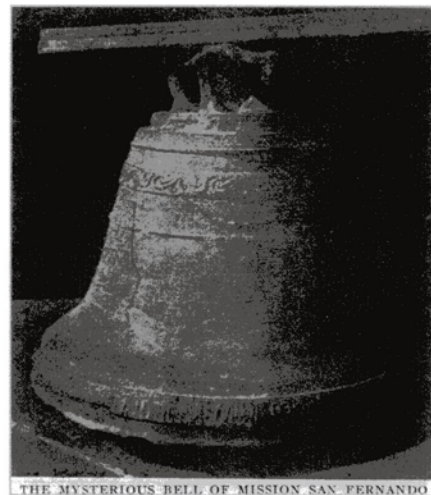
Copper from the Wrangell Mountains became a major trade item between the Eyak and Ahtna people and the RAC. As related by Golder: "Each year, the natives would come down the Copper River and sold sometimes substantial quantities of copper to the Russians, but would not show them the places where the metal came from."<sup>16</sup>

The copper trade between the Ahtna people and indigenous coastal groups, especially the Eyak, predated Russian interest. Later, the Ahtna Chief Nikolai described to the explorer William Abercrombie the origins of the trading relationship between RAC and indigenous miners. Birket-Smith and de Laguna and Hunt<sup>18</sup> report that an early copper trade route out of the Wrangell Mountains was Keystone Canyon (to present-day Valdez), then across Prince William Sound to Nuchek (Fort

\* The Tlingit nation did have slaves, just like the US until 1865. Slavery was abolished in the Tlingit culture shortly afterwards.



*Tlingit copper war knives from the Alsek River, Yakutat region, southern Alaska. Source: De Laguna.<sup>17</sup>*



*The copper bell from the mission of San Fernando, California, which was engraved in Russian: 'Island of Kodiak – Alexander Baranov – Month of January, 1796.' The bell's origin was discovered by Andrew P. Kashevaroff, curator of the Alaska Museum in Juneau during the 1920s. From Englehardt.<sup>20</sup>*



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Constantine) on Hinchinbrook Island, where either Russians or other indigenous peoples acquired the red metal. Another trade route was down the Copper River in boats to the village of Alaganik on the Copper River Delta; thence to Nuchek. In both cases, the ‘middlemen’ for the Ahtnas were Eyak traders.

Russians eventually found out where the placer concentrations of native copper were sourced. Pyotr (Peter) Petrovich Doroshin provided approximate geographical locations for areas where Ahtna people mined copper in the Chitina Valley.<sup>19</sup> One locale is on present Nikolai Creek about 25 miles southeast of McCarthy, close to where the nugget depicted on page 90 was found.

Baranov acquired native copper from Ahtna traders to make church bells in the colony. One large bell and several smaller ones cast in Kodiak during 1796 have interesting histories. In 1805, Nikolai Rezanov, a major shareholder of the RAC visiting the colony, took copper bells cast by Baranov from Kodiak and sold them and other goods, including furs, to the Spanish in San Francisco for grain and livestock, thus alleviating a crippling food shortage in both Sitka and Kodiak.<sup>21</sup> With the transfer of the administrative functions of the colony to Sitka, a copper and iron foundry was eventually constructed at the new capital.<sup>22</sup>



*The Beatson Copper Mine on Latouche Island, circa 1917. Photo taken by Helen Van Campen. Photo Credit: Alaska and Polar Regions Collections #74-27-313.*

Although most Alaskan copper was from stream placers, some lode mining of the metal by pre-contact residents also took place.<sup>23</sup> When geologists for predecessors of Kennecott Corporation described the Beatson Mine on Latouche Island, they found evidence of indigenous mining activities. According to Lincoln:

The present Indian population was acquainted with the Big Bonanza before the advent of the white man.... Several wheelbarrow loads of stone hammers were discovered in the yellow soils at the base of the cliff where the deposit outcrops .... Most of the hammers were badly broken through use, and had been employed to pound native copper out of crevices in the rocks. Indians also picked up fragments of sulfide ore and used it to produce a black stain .... It was the use of chalcopyrite (copper sulfide) by Indians for the blackening of bidarka paddles that first aroused the interest of the white man and led to the discovery of copper in Prince William Sound.<sup>24</sup>

Tlingit and Eyak people used the copper carbonate minerals malachite and azurite for paints for use in masks and art forms. When mixed with salmon eggs, these paints withstood weathering and preserved their green and blue luster.

Whether or not Alaskan native cultures manufactured alloys of copper (i.e., bronze) remains an open question. According to de Laguna, Yakutat locals related to her: “There is a belief that the old people knew how to handle the soft native copper and make it as hard as steel for knives. Now they can’t do it anymore.”<sup>25</sup>



*Aleut iron knife recovered by the Russian trader E. M. Solovev in 1764 from Unalaska Island; from Korsun and Berezkin.<sup>26</sup>*

## Iron

There is no firm evidence that Alaska's indigenous people mined iron, although iron became very popular and superseded copper as the desired metal for knives, spear points, and in some fishing applications. Most iron used by Natives was scrap from abandoned ships and infrastructure brought to the Alaskan colony by Europeans, often referred to as 'drift iron.' The antiquity of some iron artifacts has led some to question whether 'drift iron' or 'iron ore' was the material source.

In contrast, considerable effort was made by the RAC to smelt iron ores developed on the west side of Cook Inlet and forge iron products at Resurrection Bay near present-day Seward.<sup>27</sup> In 1793, Baranov and James Shields forged iron to construct the 180-ton *Phoenix*, the first marine vessel built entirely on the west coast of North America. Two smaller vessels, the *Dolphin* and *Olga*, were launched the following year. Although iron processed for the ship building included 'drift iron,' Bancroft writes that Baranov smelted iron ores from the Alaska Peninsula region using an imperial furnace.<sup>28</sup> Brooks states: "Some of the copper ores of the Alaska Peninsula Region (near Kamishak Bay) contain a large percentage of magnetite, and it is possible that this was the ore used during the smelting process by Baranov."<sup>29</sup>

Richter and Herreid describe copper-bearing magnetite (iron oxide) skarn deposits in the Paint River area near Kamishak Bay, a logical potential source of iron smelted at Resurrection Bay; these researchers noted that modest historic production of copper-bearing magnetite deposits occurred during early or pre-20<sup>th</sup>-century time.<sup>30</sup> Alternatively, Barry states that remains of an old iron smelter were found at 4<sup>th</sup> of July Creek on Resurrection Bay during the 1870s, presumably the one used by Baranov and Shields to construct the *Phoenix* and other ships during the late 18<sup>th</sup> century. She further states that 'iron ore' was found up nearby 4<sup>th</sup> of July Creek.



*Russian shipyard at Resurrection Bay, Kenai Peninsula, with the Phoenix under construction during 1792. Remains of an iron reduction plant are located nearby. At the time, this was the only shipyard in operation on the west coast of North America. From Barry.<sup>33</sup>*



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Smelting efforts proved difficult as the colony lacked the skilled labor to smelt iron with hand-operated hearths. The first clays used as a flux during smelting were hauled from Bechevin Bay in 1791. The clays were of poor quality and tended to become loamy and guttered at high temperatures.

After Sitka became the capital, both iron and copper products were manufactured into finished goods from a foundry built in the community. Sources for the iron feed for the Sitka foundry, whether from iron ore or 'drift iron,' are unknown. The copper was from Ahtna sources. Although the metal product output was modest and designed to serve RAC needs, it provided finished copper and iron products to the Spanish on the West Coast and briefly boomed during the California Gold Rush. According to Brooks:

Previous to the 1848 (California) rush, the little foundry at Sitka supplied some of the few implements needed by Spanish ranchers in California. Copper church bells previously produced in Kodiak were again produced in Sitka for the Roman Catholic Missions of California. The first iron plows of the California ranchers were made in Sitka, as well as other simple tools. After the Mexican War, California, a newly acquired possession of the United States, looked to Sitka for additional implements. With the influx of gold seekers (in 1848-49), there was a demand for all kinds of articles produced in Sitka, and warehouses were emptied of all available materials.<sup>32</sup>

When goods arrived in San Francisco via Panama from the East Coast, the boom in Sitka ended.

## Gold

Native Americans did not mine gold prior to 1867 although their local knowledge of where the precious metal occurred became important to early prospectors during post purchase years leading up to the Juneau discoveries, the emerging gold-bearing lodes of southern Alaska, and later, the placers and lodes discovered during the Alaska-Yukon Gold Rush.

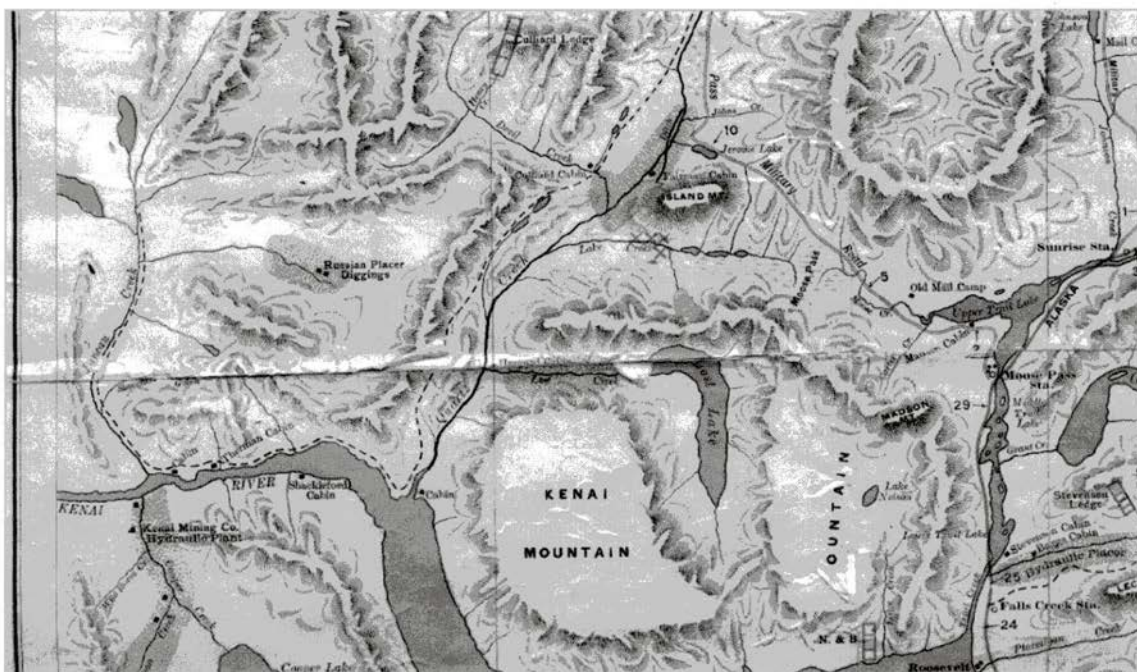
During the late 1820s and 1830s, the RAC conducted expeditions into regions such as the Nushagak and Kuskokwim rivers mainly to assess fur trading opportunities with the local indigenous peoples. In 1832, in conjunction with these activities, Ivan Vasiliev and the Creole Fyodor Kolmakov found placer gold near the head of the Aniak River. In 1834, the Russian Creole Pyotr Malakhov may have discovered placer gold near the mouth of the Kenai River.<sup>34</sup> Later, in 1834, Governor Ferdinand Petrovich von Wrangell directed Mikhail Tebenkov and Vasiliev to search for lode gold resources in the colony. According to Postnikov and Falk, in 1832, Wrangell received specific instructions from 'the head office' to initiate a search for gold:

Of course, the time is not ripe for us to begin gold extraction ... At present, it is not a case of immediately commencing gold mining, but gradually exploring for lodes. You have already achieved the beginning, as can be seen from the instruction you issued to Mr. Vasiliev to split off small pieces of rock from the coastal cliffs and to note what samples have been taken and where.<sup>35</sup>

Because the California gold rush was still two decades away, the writer speculates that the interest in exploring for gold in Russian America was spurred in part from the gold discoveries made in the Ural Mountains during the late 1820s.

The Russian Mining Engineer Doroshin is credited with Alaska's first, albeit modest, gold output. His gold mining career in North America, however, began in California, when, under orders from Governor Tebenkov, he investigated the newly discovered California goldfields. After reaching

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Part of the topographic map published by David H. Sleem (1910) which shows the location of 'Russian Placer Diggings' north of Kenai Lake and near the headwaters of the Kenai River. Placer gold fields shaded on the map.

California in December, 1848, he dug for gold with four Russians and six Creoles on the Yuba River and, from February to April, 1849, recovered several hundred ounces of gold – enough to purchase the 234-ton marine vessel *Shelekhov* for the RAC and return to Sitka.<sup>36</sup>

From 1849 to 1851, he prospected stream basins in the Kenai Mountains with crews of up to 12. He began near the mouth of the Kenai River, working his way upwards to the Kenai Mountains. He reported that everywhere he tested had color. In 1851, commercial gold concentrations were found in a small stream basin about five miles north of the western limit of Kenai Lake. The specific location of Doroshin's largest gold mining operation is shown on Sleem's private map depicting the Kenai Mining district.<sup>37</sup> Maps published by Barry show that Doroshin's group also located placer gold on Resurrection Creek on the north side of the Kenai Mountains and at several locales east of Kenai Lake.<sup>38</sup> Doroshin's efforts eventually produced about 20 ounces of placer gold. Although he noted that gold grains increased in size toward the mountain front, the Kenai Lake prospects eventually were abandoned.

Lode gold exploration work in the colony was sometimes accomplished through the use of Creole prospectors. In 1852, Doroshin discovered quartz veins with visible gold in "the mountain range north of Cook Inlet." This might be the Hatcher Pass area, where lode gold would be developed in the 20<sup>th</sup> century. Later that year, Creole prospectors from Yakutat brought him specimens of gold-bearing diorite thought to originate near Mount St. Elias.<sup>39</sup>

Doroshin's efforts to establish a gold mining sector in Russian America fell short. Hence, in 1852, then-Governor Nikolai Rozenberg redirected the mining engineer to assess other mineral wealth in the colony, especially coal. Reflecting upon his Alaskan gold-seeking ventures after his return to Russia, Doroshin wrote:

When I started searching for gold (in Alaska), I knew that the obstacles would be formidable. But I never extinguished hope. Perhaps I have paved the trail for a more successful mining



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engineer or geologist ... who will have available to him more facilities and information ... and will be happier than me.<sup>40</sup>

Gold prospecting by Russians continued after Doroshin left Russian America. During 1861-1862, Enoch Hjalmar Furuhjelm sent a party to the mouth of the Stikine River after gold had been discovered upstream in Canada. Although commercial quantities of the yellow metal eluded the searchers, the Russian explorers did manage a detailed hydrological survey of the lower portion of the Stikine River.<sup>41</sup>

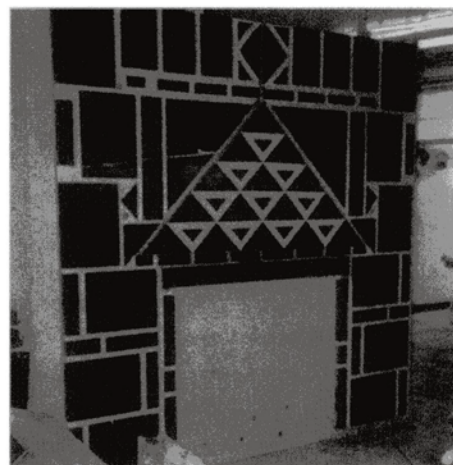
A final note on gold exploration prior to the 1867 purchase was the accidental discovery of gold on the Seward Peninsula by members of the Western Union Telegraph Expedition in 1866. A party led by Baron Otto Von Bendeleben, which included D. B. Libbey, reported the presence of placer gold from the Fish Creek basin to Port Clarence in excavations dug for telegraph poles. These were the first reported gold occurrences from the Bering Sea area. Thirty years later, Libbey returned to the Seward Peninsula during the Alaska-Yukon Gold Rush and participated in gold mining near Council.

### Jade

Nephrite jade in the Kobuk River Basin of North-western Alaska has been utilized and traded by Inupiat Eskimos for millennia. Jade has been found in a number of archeological digs in the region. Uses by area Inupiat Eskimos included ornamentation and tools, including hammer and axe heads, due to the material's extreme hardness. According to Anderson:

Present day Eskimos maintain that much of the nephrite jade used for millennia by ancient peoples of the Kobuk River region as tools and articles of trade came from present-day Jade Creek as well as from Shungnak River.<sup>42</sup>

Jade Mountain Products, Inc, and small Anchor-age-based companies would develop the jade resources during the 20<sup>th</sup> and early 21<sup>st</sup> centuries.



*Fire hearth made from Kobuk nephrite jade by Jade Mountain Products Inc.*

### Other Non-fuel Minerals

Table 1 lists a number of non-fuel mineral materials explored for and utilized prior to the 1867 purchase. These materials were used various ways by both Native groups and the Russian colony, sometimes overlapping. Some were exclusively traded to the RAC. Indigenous people from the Cook Inlet region offered sheet mica to Russian traders but, like the case of copper, refused to disclose the source of supply. People from Kodiak used sulfur to preserve pelts and red ochre and powdered hematite to artificially change the colors of furs. Kodiak Natives obtained amber from the 'mainland,' i.e., 'Alashka,' by bartering other goods – the amber being used in ornamentation. Carnelian agate was acquired by Koyukon people from the Nowitna River region for trade items. Graphite was used by both Aleuts and the RAC for lubrication. Volcanic pumice was used as an abrasive, i.e., as 'sand paper.' In 1838, the Creole Pyotr Kolmakov (son of Fyodor Kolmakov), discovered cinnabar, the principle ore of mercury, on the north bank of the Kuskokwim River a few miles downstream from Kolmakov Redoubt (Fort), which was named after his father.<sup>43</sup> Although Russians did not develop the Kolmakov cinnabar deposit, American miners produced mercury there intermittently

**Table 1****Other nonfuel commodities extracted in Alaska prior to 1867**

<i>Commodity</i>	<i>Users</i>	<i>Uses</i>	<i>Location (s)</i>	<i>Reference (s)</i>
Volcanic pumice	Indigenous	Abrasives	Alaska Peninsula; Prince William Sound	De Laguna, 1972; Golder, 1922; Falk, 2003
Hematite	Indigenous	Paints	Yukon River Basin; Cook Inlet Region	De Laguna, 2000; Barry, 1997
Red and Yellow Ochre	Indigenous and RAC	Paints; artificial color changes to furs	Yukon River Basin; Krenitzin Islands; Cook Inlet Region	De Laguna, 2000; Golder, 1916; Falk, 2003; Barry, 1997
Sulfur	Indigenous	Fur skin preservation	Alaska Peninsula- Aleutian Arc	Golder, 1916; Falk, 2003
Galena (lead ore)	RAC	Metals	Lower Yukon River	Shiels, 1967
Garnet	RAC	Semi-precious stone	Alaska Peninsula; Southeast Alaska	Golder, 1916
Graphite	RAC	Lubricant	Atka Island	Golder, 1916; Falk, 2003
Tourmaline	RAC	Gemstone	Kotzebue Sound	Golder, 1916; Falk, 2003
Roof Quality Slate	RAC	Construction	SE Alaska Regionwide	Doroshin, 1866a
Dimension Stone	RAC	Construction	Kodiak, Sitka	Doroshin, 1866a
Massive Pyrite	RAC	Chemicals	Many Locales	Golder, 1916; Falk, 2003
Cinnabar	Indigenous and RAC	Paints and medicines	Kuskokwim River, SE Alaska	Michael, 1967; De Laguna, 2000
Amber	Indigenous	Semi-precious stone	Alaska Peninsula-Aleutians	Golder, 1916; Falk, 2003
Carnelian agate	Indigenous	Semi-precious stone	Nowitna River	Various author records
Sheet Mica	Indigenous and RAC	Mirrors; reflecting surfaces	Kenai Bay, Cook Inlet Region	Golder, 1916; Tikhmenev, 1863
Limestone	Indigenous and RAC	Dimension stone and mortar construction	Southeast Alaska; Sitka Island	Tikhmenev, 1863



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### Coal and Petroleum Resources

Coal was well known to indigenous peoples throughout Alaska and locally extracted as an energy resource. It also was a focus of exploration and development by the RAC. In 1795, Baranov experimented with the use of coal from Port Graham on the Kenai Peninsula as a heat source for his metal foundry at Resurrection Bay. In 1815, the Estonian mariner Otto Von Kotzebue observed Inupiat Eskimos extracting coal from Cape Corwin, about 27 miles east of Cape Lisburne, on Alaska's North Slope. Many years later, in 1881, Captain C. L. Hooper would take in coal for his vessel, the *Corwin*, from the same seams earlier mined by Inupiat people – hence the present name. Russians observed coal extraction by indigenous people at Chicago Creek on the Seward Peninsula, near Herendeen Bay on the Alaska Peninsula, and at Kootznahoo Inlet on Admiralty Island.

**Table 2**

**Selected testing results of coals from the 1852 exploration conducted by Doroshin.<sup>46</sup>**

<i>Deposit</i>	<i>Volatile Matter (percent)</i>	<i>Fixed Carbon (percent)</i>	<i>Ash (percent)</i>	<i>Coke (percent)</i>	<i>Heat Units (calories)</i>
Port Graham	45.87	42.91	12.22	45.13	4,294
Kachemak	48.53	38.91	12.55	51.47	4,131
Kukak (Ak. Peninsula)	34.45	52.44	13.11	65.55	5,774
Atka Island	52.41	45.28	2.53	NA (*)	4,893
Chatham Strait	38.08	50.73	11.19	NA	4,800
Winter Harbor (Canada)	38.67	44.00	17.03	NA	5,009

(\*) Not analyzed

In 1848, Tebenkov requested that the RAC send a mining engineer or geologist to the colony to assess the mineral resource potential of Russian America, and Doroshin, a graduate of the St. Petersburg Mining Institute, arrived in late 1848. After spending parts of three years prospecting for gold and other commodities, Doroshin turned his attention to coal resources. During 1852 he explored much of Russian America and actually located a number of mines that would later produce coal.

I have reported a detailed summary of Doroshin's coal exploration efforts, which are summarized here.<sup>45</sup> At each site, bulk samples of up to 100 kg were collected and shipped to the St. Petersburg Mining Institute, where they were analyzed. Selected analytical results are shown in Table 2. From the perspective of a professional geologist, the author notes that the physical properties of coal analyzed in St. Petersburg during the mid-19<sup>th</sup> century are the same used to determine coal quality today.

Coal seams sampled and investigated by Doroshin included:

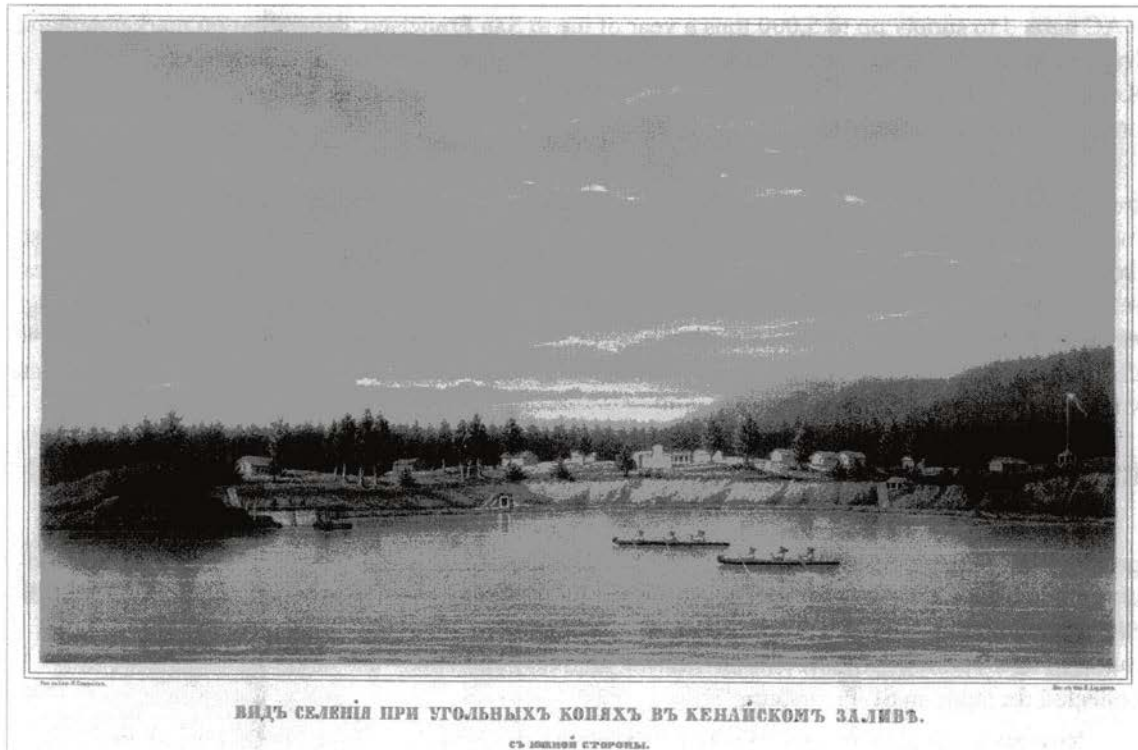
- An 8-foot-thick seam at Port Graham on the Kenai Peninsula (later mined);
- Coal seams at Kukak Bay in the Katmai Region;
- Coals at Chignik Lagoon on the Alaska Peninsula;
- Coals on Unga Island;
- Coals near Cape Moller;
- Coals from the Norton Sound Region;

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- Coals from the Northern Seward Peninsula; i.e., Chicago Creek;
- Coals from the North Slope region; i.e., Cape Corwin;
- Coals from Kootznahoo Inlet on Admiralty Island; and Coal from RAC's chief competitor at Nanaimo on Vancouver Island, Canada.

In a final report to the RAC, Doroshin concluded that several Alaskan coal deposits, especially at Kukak, could compete with the Vancouver Island deposits, but probably the best Alaskan locale for a coal mine because of various logistical issues would be at Port Graham on the Kenai Peninsula.<sup>47</sup> Doroshin sent a bulk sample of coal from Port Graham to a San Francisco buyer, who reported favorable results upon completing combustion tests, thus confirming his preference for the future Kenai Peninsula coal mine site. Doroshin left Russian America in 1853 and pursued a very successful career in Russia, eventually becoming the chief mining engineer of the Russian Naval Mining Office and an 'Actual State Councilor,' the latter rank roughly equivalent to a governor of a geographic region, before his death in the 1870s.

Coal mining at small scales by the RAC in Port Graham began as early as the 1790s. By the mid-19<sup>th</sup> century, RAC marine vessels had converted to coal for power. In addition, because of high prices for coal in American territories on the west coast, the RAC decided to develop a coal mine at Port Graham for both its own energy needs and for export. Pierce<sup>48</sup> and Barry<sup>49</sup> provide summaries of these activities. In 1855, Peter Kostromitinov, the RAC agent in San Francisco, opened up a small mine at Port Graham and shipped about 500 tons of coal to San Francisco. The RAC financed mining equipment and infrastructure and brought in a German labor force to mine the coal. Later, during 1857, the coal deposits were developed by a series of shafts, and water pumping commenced



Coal Cove by Port Graham, the site of RAC's coal mine, which operated intermittently from 1857 to 1867. Source: *The Russian-American Company annual report for 1860*, posted online by the National Library of Russia via the World Digital Library; public domain image.<sup>50</sup>



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to keep the workings dry. During the height of the development, a gallery 1,678 feet in length was developed from the high tide mark. Over the course of the mining enterprise, which lasted intermittently until the 1867 Alaska Purchase, approximately 1,000 tons were produced annually. This latter mine development at Port Graham was designed by the Finnish mining engineer Furuhjelm.

By the time the enterprise began shipping coal, cheaper coal became available from mines at Nanaimo. In terms of steaming purposes, 10 tons of Port Graham coal was equivalent in energy to about 7 tons of coal from Nanaimo, suggesting that quality was also an issue for the operation. In 1865, the Port Graham coal mine shut down.

During his coal investigations, Doroshin reported oil seeps and naphtha in several coal-bearing sections along the Alaska Peninsula during 1852 as well as oil seeps on the Iniskin-Chinitna Peninsula on the west side of Cook Inlet in 1853. His observations of petroleum indicators were scrutinized by government and private sector petroleum geologists during their search for oil and gas generations later.<sup>51</sup>

### Ice Mining Activities

The gold-rush boom town of San Francisco provided new opportunities for the RAC. San Francisco was soon full of manufactured goods, but still needed raw natural resources to sustain its growing population. Companies formed to import ice from the north. Note that in this summary, I include ice as a mineral resource development, because the RAC referred to their operations as ‘ice mining.’<sup>52</sup> The first experiment of this new trade took place in 1852, when the steamer *Bachues* exported 250 tons from Sitka to San Francisco, paying the RAC \$75 per ton of ice. Eventually the RAC agreed to supply up to 5,000 tons a year of ice to San Francisco, depending on market demand. Ice came from freshwater resources both on Kodiak Island and near Sitka. Woody Island near Kodiak became the largest single source, and eventually produced about 3,000 tons per year of ice until the 1867 purchase.

From the beginning of the ice trade in 1852 to July 1, 1863, 27,500 tons of ice were exported from the Russian colony to San Francisco.<sup>53</sup> Company profits from ice sales amounted to approximately \$250,000. An estimated 10,000 more tons of ice was exported from Alaska to the west coast from 1864 to the consummation of the 1867 purchase. During the debate about the purchase, critics referred to Alaska as *Seward's Ice Box*, a humorous notion with origins in the successful ice mining enterprises. A final note concerns the Alaska purchase price. According to Keithahn, negotiators determined that \$200,000 was to be added to the original purchase price of \$7 million to compensate various private liens, including the ice mining.<sup>54</sup>

### Russian America Contributions to Economic Geology and the Geosciences

Knowledge of the geology and mineral resources of the Russian America colony benefited greatly from interactions of Native cultures and then expanded thanks to several notable professionals held in high esteem by their colleagues in the international arena. As related by Brooks, Grigorii Shelikhov laid the groundwork for acquiring information by the RAC: “In the course of the exploration of new hunting grounds (for fur-bearing animals), minerals, ores, and fossil shells are to be collected for study in St. Petersburg.”<sup>55</sup>

Russian scientists collected materials that were subsequently archived in St. Petersburg. As part of the 1826-1828 Litke expedition to Russian America, geologist Alexander Postels amassed a large collection of minerals and botanical specimens for deliver to the Imperial Academy of Sciences in St. Petersburg – believed to be the first collected by the RAC.<sup>56</sup>

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Reliable mineral resource and geological information came from the writings of Father Ioann Veniaminov; from accounts of several Russian Navy officers; from the bulletins of agents for the Russian Academy of Sciences, especially the renowned Ilya G. Voznesensky during 1839-1849;<sup>57</sup> and from special reports by scientists and mining engineers such as Doroshin, Furuhjelm, and H. J. Holmberg, who made a mineral survey of Kodiak. Just as Doroshin was winding up his investigations in 1852, Furuhjelm first came to Russian America and stayed in the colony for more than 10 years. He designed the Kenai Peninsula coal mining venture at Port Graham and continued the exploration for gold initiated by others in the Southeastern Panhandle of Alaska. Upon his return to the Russian Empire, Furuhjelm became the director of the Geological Survey of Finland during the 1870s and played a role in establishing the iron mining industry in Scandinavia.

Compiling significant geological and mineral resource information was one of the most important scientific accomplishments in the colony during the mid-19<sup>th</sup> century. In 1849, Governor Tebenkov hired Constantine Caspar Andreas Grewingk to produce Alaska's first geologic map.<sup>58</sup> As those in mineral exploration know, then and now, a good geological base can serve as a predictive tool for discovering mineral deposits. Grewingk was a leading geologist and mineralogist in Russia. During his lifetime, he published more than 180 articles and several books on the geology, mineralogy, and archeology of the eastern Baltic region, the geology of the Ural Mountains, and the physical geography of the San Francisco Bay area (North America). Grewingk compiled information from an enormous information archive acquired by the RAC, and summarized:

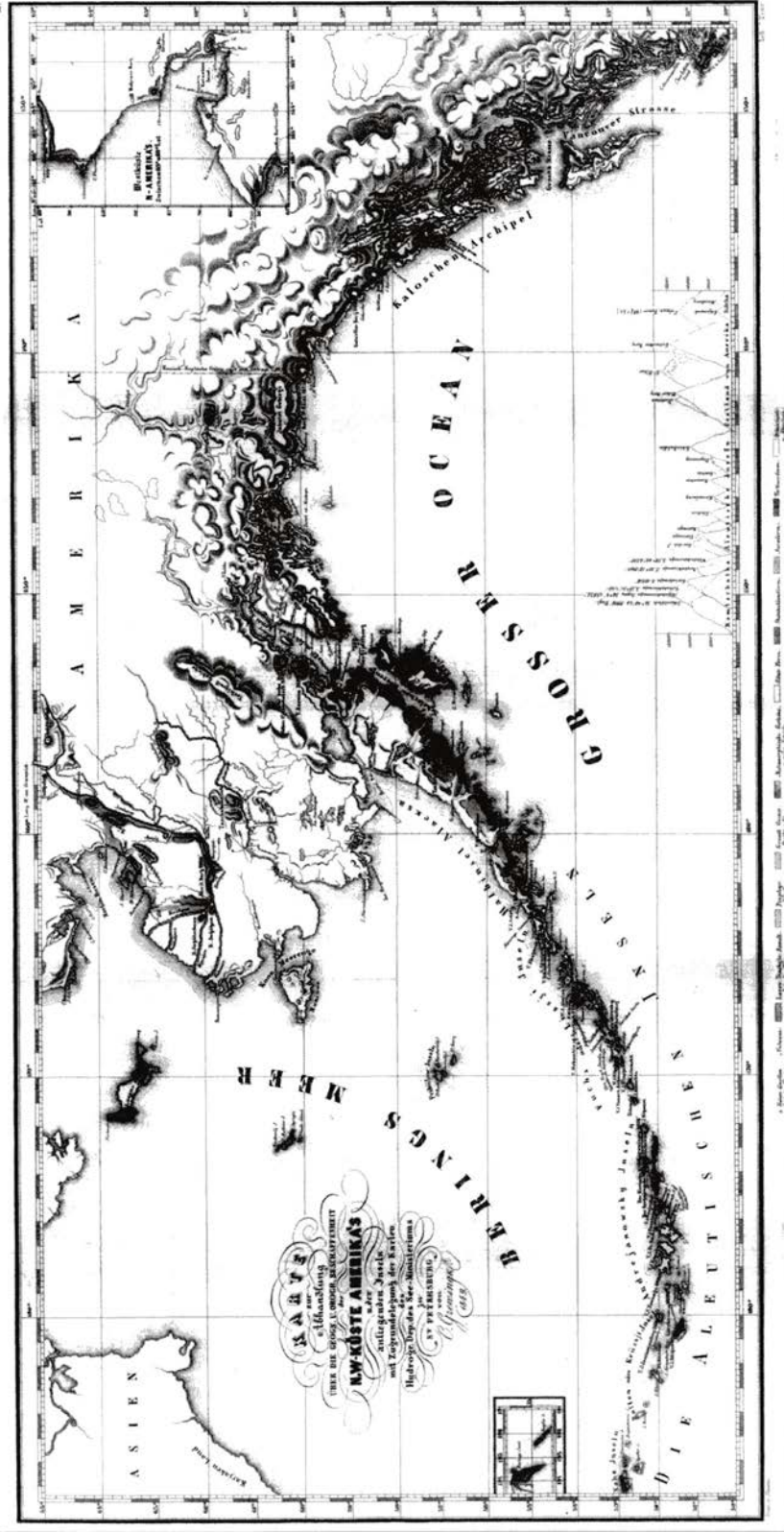
- Coal investigations carried out by I. G. Voznesensky;
- The geography of the coast from Oregon to the Aleutians;
- Analyses of sulfur deposits from several volcanic centers in the Aleutians;
- Locations of industrial mineral commodities for construction projects in Kodiak and near Sitka;
- Discoveries of copper mineralization, iron ochre, garnet, schorl (tourmaline), and graphite;
- Observations of earthquake activities as compiled from historic RAC sources;
- A near complete compilation of all active volcanoes in the Aleutian Arc and Wrangell Mountains; and
- Hundreds of fossil collections from RAC staff, naval officers, and scientists.

### **Discussions and Conclusions**

Indigenous people of Alaska used mineral materials for centuries and, in many cases, millennia. Native groups consumed natural resources to sustain relatively sophisticated cultures. Natives and the RAC established a symbiotic relationship exploiting some mineral resources, especially copper. The Ahtna acquired the valuable commodity from their region and, through their 'middle men,' the Eyak and Chugach, sold or traded native copper to either the RAC or other indigenous groups along the entire west coast of North America. Not only did indigenous people use mineral resources; they also knew where many deposits occurred, and informed European prospectors where to find them. Although gold was not important to their indigenous cultures, copper most certainly was.

Despite the RAC's concerted efforts to develop mineral wealth, most of Alaska's mineral endowment was exploited after the 1867 purchase. Only a short-lived coal mine and an interesting ice extraction enterprise managed to export commodities to markets outside of Alaska during the Russian period. However, the lack of significant mineral resource development by the RAC is an oversimplification. Copper and iron were collected and used as feed materials for metal foundries for the colony's needs. During the California Gold Rush, the RAC benefited from the new West Coast markets. In similar fashion, bricks and dimension stone for construction of buildings and riprap and armor for protection of harbors were successfully manufactured and quarried. The RAC





Geologic map of the Northwest Coast of North America; the topography based on Russian Admiralty Hydrographic Department maps in St. Petersburg, by C. Grewing in 1849. This is the first geologic framework map of Alaska. The original source is Grewing's essay on the geodesy and mineralogy of the North-West Coast of America and nearby islands, first published in Beitrag zur Kenntniss der orographischen und geognostischen Beschaffenheit der Nord-west-kust Amerika mit den anliegenden Inseln, appearing in the Verhandlungen der Mineralogischen Gesellschaft zu St. Petersburg, 1847-1849 (Journal of the Mineralogical Society of St. Petersburg), and published in book form in 1850. Source: from the author's collection.

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fielded many competent explorers, and the knowledge that they acquired still helps modern geologists better understand mineral resources.

The esteemed US Geological Survey geologist Alfred H. Brooks believed that, from the perspective of mineral resource development, a significant flaw for the RAC lay in the design of its imperial charter. It did not provide for acquiring fee-simple title to land and other financial incentives. In contrast, the charter Great Britain provided to the Hudson Bay Company in Canada did provide for fee-simple land acquisitions and financial incentives, which resulted in more sustained development. The RAC Charter had to be renewed, on average, every 20 years, injecting uncertainties into long-term planning for Russian American projects. Interestingly, Brooks believed that, had Nikolai Rezanov, a major RAC shareholder, lived (rather than sustaining fatal injuries in an accident in 1807), the visionary may have provided the leadership and imperial influence necessary to develop mineral resources at higher levels in Russian America. According to Brooks: “Had Rezanov lived, the Russian Flag would probably still be flying on American soil, and a considerable portion of the continent would be under the dominion of the Tsar.”<sup>59</sup>

Brooks’ 1953 book, *Blazing Alaska’s Trails*, was edited by Burton Fryxell, who worked from a lengthy manuscript Brooks wrote prior to his untimely death in 1924. It is assumed that Brooks wrote the aforementioned opinion prior to the 1917 Bolshevik Revolution. Although the RAC failed to develop mineral resources on a large scale by the time of the purchase, a *New York Times* piece dated April 9, 1867, summed up what was then known about the region:

Surface washings of gold have been found on the east side of the coast range of mountains.... Native copper has been discovered in various places along the coast and in the vicinity of the Copper River. Iron ore of excellent quality ... is now being smelted and worked by Russian artisans in repairing ships .... Coal is found in large quantities and is used by Russians for naval purposes.... On the islands there are many fresh water lakes which afford an inexhaustible supply of very pure ice.... Taken as a whole, the country (Russian America) cannot be considered a dreary waste of glaciers, ice bergs, white bears and walrus.<sup>60</sup>

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#### **About the author**

Tom Bundtzen is a research geologist and avid mining historian based in Fairbanks, Alaska. He obtained BS and MS degrees in geology from the University of Alaska Fairbanks in 1973 and 1981 respectively. After a 25-year career with the geological survey division of the Alaska Department of Natural Resources, he retired from state service and formed Pacific Rim Geological Consulting, Inc., in 1997. In April, 1997, Tom and others formed the Alaska Mining Hall of Fame Foundation (AMHF), a 501(c)(3) non-profit organization dedicated to honoring Alaska's mining pioneers. Since that time, 110 miners, geologists, government administrators, and others that have contributed to Alaska's mining industry have been inducted, and the AMHF has a website ([alaskamininghallofame.org](http://alaskamininghallofame.org)) that features biographical sketches of inductees. Induction ceremonies have been held in Anchorage, Fairbanks, Juneau, and Nome. Tom currently serves as president of the Alaska Mining Hall of Fame Foundation.