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Salt Lake City’s Urban Growth and Kennecott Utah Copper: A Geographical Analysis of Urban Expansion onto a Previously Proposed Superfund Site Adjacent to the World’s Largest Copper Mine

Kelly K. Lemmons

University of Massachusetts Amherst

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SALT LAKE CITY’S URBAN GROWTH AND KENNECOTT UTAH COPPER: A GEOGRAPHICAL ANALYSIS OF URBAN EXPANSION ONTO A PREVIOUSLY PROPOSED SUPERFUND SITE ADJACENT TO THE WORLD’S LARGEST COPPER MINE

A Thesis Presented

by

KELLY KRISTOPHER LEMMONS

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of

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Geosciences
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Approved as to style and content by:

______________________________
Piper Gaubatz, Chair

______________________________
Richard Wilkie, Member

______________________________
Laurie Brown
Acting Department Head,
Department of Geosciences
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INTRODUCTION

Kennecott copper mine is one of the largest producers of pollution in the United States: it has contaminated over 72 square miles in the Salt Lake Valley. In 1998 alone, Kennecott, which is located only 25 miles southwest of downtown Salt Lake City, released 439 million pounds of toxic material into the Salt Lake Valley. Kennecott was proposed as a Superfund site by the EPA in 1994. Today it is the largest manmade excavation in the world.

When mining operations began in 1863 at what is now Kennecott, Salt Lake City was a small city of just over 8,000 (Census, 1860). In recent years, the city has expanded toward Kennecott, so that once distant hazards are now literally in Salt Lake City’s residents’ backyards. According to the basic patterns commonly identified in the academic literatures on environmental justice and urban growth, as the Salt Lake City metropolitan area grows towards Kennecott the assumptions would be (1) Kennecott’s mining activities would be severely hindered by the influence of the EPA or would be forced to close due to the proximity of residents. (2) Those living/moving nearest to the area would most likely be low income people with no other options. (3) Arousal of community opposition to Kennecott as residents continue to move closer, which in this paper is referred to as “reverse” NIMBYism. However, none of the assumptions are the case. Why is it that Kennecott continues to function at full capacity without direct influence by the EPA and those residents encroaching upon it are not of low income and are not in opposition?

This study of social, urban and historical geography will address these questions by exploring the spatial, economic and political history of Kennecott, Salt Lake City and
the EPA, with a focus on the recent and ongoing development of 20,000 new homes in the area called Daybreak.

The analysis will draw on analytical and theoretical approaches common to geographical analyses of urban growth and sprawl, environmental perception and environmental justice in relation to the nexus of spatial, economic and political circumstances which have led to the development of a new housing area on previously polluted land.

Figure 1 Kennecott copper mine. Source: Kennecott

Methodology

I used the following four methodologies in my research (data sources will be described in the paragraph below): (1) Survey and analysis of archival (primary and
secondary) sources produced during the key time periods of the 1890’s, 1940’s and 1980’s to present. (2) Site survey and map interpretation. This involved visiting the site and analyzing it in relation to aerial photographs and maps in order to understand the spatial contexts of the issues. (3) Semi-structured interviews to gain insight into the differing perspectives of people and agencies relevant to social, political and economic issues surrounding the topic. (4) Review and analysis of supporting academic literature, particularly in the fields of environmental justice and NIMBYism published by geographers, historians and legal scholars.

Five types of data were used in my research:

(1) Primary sources: most of these sources are housed at the “Research Center of the Utah State Archives and Utah State History.” The center includes state and local government records, books, manuscripts, photographs and newspaper archives for the state of Utah which were used in obtaining statistical information on employment and population records of the company and the state. Also used was the Utah Division of Labor archive to research the influence that Kennecott has had on employment and the Utah economy. The government of Utah’s “Utah history to go” database was also used in documenting the history, growth and development of both the Salt Lake Valley and Kennecott. The archival documents of the EPA were used to document the EPA’s history and involvement with Kennecott.

(2) Interviews with key actors such as: Merlin Jones, one of the largest landowners in the Salt Lake Valley, whose land is adjacent to that of Kennecott’s; Norman Bangerter, the governor of Utah from 1984 to 1992; Mark Knold, the Senior
Economist for the Utah Department of Workforce Services; Blair Bangerter, contractor of residential development of Kennecott land; and Scott Crump, author of several books and articles on Kennecott and its surrounding mining towns. The three main goals of these interviews were to establish differing perspectives and positionality of key actors; to clarify relevant aspects of the history; and to access alternate information as compared to the official record of this situation.

(3) Basic field surveys and map interpretation: I visited the Salt Lake Valley to gain a better understanding of the spatial constructs at work and to visit the Utah State Department of Agriculture to view aerial photographs. The United States Geologic Survey’s “earth explorer” database was also used to view aerial photographs of the Salt Lake Valley so that I was able to interpret and map the urban development of the valley and encroachment on the mine and once hazardous areas.

(4) Secondary data: The South Valley Journal, published since April 1991, along with the states two largest newspapers, The Salt Lake Tribune and The Deseret News, were used to obtain information on community support and perspective of the Kennecott mine, development of the Salt Lake Valley and future plans of both the city and the mine for the valley.

(5) Analysis of supporting academic literature: published articles by scholars such as Been (1994, 1997), Boone and Modarres (2006) and Pastor (2001). Here I focus on social science research produced by geographers, sociologists and environmental historians. My focus was especially on the themes of environmental justice, NIMBYism and community response to environmental hazards and mitigation.
Figure 2 Satellite View of Salt Lake Valley May 2000. Base image source: Nasa 2000
CHAPTER 1

UTAH HISTORY AS IT PERTAINS TO MINING 1847 - 1896

The spatial, economic and political history of the Salt Lake region before the foundation of the Bingham Canyon mines (present day Kennecott) had profound influence both on the ways in which the mines were founded and operated and on the ways in which the mines and the adjacent settlements developed in tandem during the twentieth century.

By 1896 Utah and the Salt Lake Valley had seen the establishment and expansion of the “Mormon Kingdom,” the arrival of the transcontinental railroad and a regional depression that lasted almost 25 years. This history and its impacts on mining and settlement will be discussed in the following chapter.

The spatial, economic and political history of Utah up to 1896 can be broken into two main periods. The first began in 1847 with the arrival of the Mormon pioneers and ended in 1869 with the completion of the transcontinental railroad. This period marked the beginning of Mormon dominance and expansion in the Great Basin, as the Church established its “Kingdom” here on earth. The second began in 1869 and ended in congruence with the mining and agricultural depression that lasted from 1873 to 1896. This period is defined by the effects of the railroad on the territory and the end of Mormon seclusion.
The Establishment of Salt Lake City and the State of Utah

Salt Lake City was founded on July 24, 1847 by Mormon pioneers, also referred to as members of the Church of Jesus Christ of Latter Day Saints or Latter Day Saints (LDS) or just saints, who trekked to the remote Great Basin area to escape religious persecution. Mormon pioneers immediately began settling the Salt Lake Valley and surrounding areas, founding what was called the Utah Territory. This “Salt Lake Oasis,” as Langdon White described it, was an island of industry in an arid wilderness, running 130 miles long, from two to eighteen miles wide, comprising 680 square miles of occupied land (1925). In March of 1849, the Church and the areas inhabitants organized themselves as the State of Deseret, and the legislature forwarded a petition to Congress for admission into the Union (see Figure 1). Instead of granting the petition of the Deseret State, Congress in 1850 created the Utah Territory that shrank the proposed area considerably. The limits of the Utah Territory at the time were defined as follows: bounded on the west by the State of California; on the north by the Territory of Oregon; on the east by the summit of the Rocky Mountains; and on the south by the 37th parallel, bordering what is now Arizona. It extended from the 37th to the 42nd degrees of North latitude, and between the 107th and 120th degrees of West longitude having a width of 300 miles, and an average length from east to west of 600 miles. The entire territory at that time contained an area of about 180,000 square miles (Hayward 1851).
This new Utah Territory originally encompassed most of Nevada and all of western Colorado, however, in 1858 gold was discovered around the area of Pike’s Peak (present day Colorado) which was included the Utah Territory. A year later the Comstock Lode (present day Nevada) also was discovered. Due to an influx of miners to these areas, Congress, in response to the miners’ numerous petitions, created the Colorado and Nevada Territories, shrinking even more the Utah Territory in 1861. The territory changed several more times over the next several years, so that by 1868 it assumed its present size and shape.
The Utah Territory had a difficult time applying for and being accepted into the Union as a State over the years, officially petitioning for statehood seven times. Although it was formed well before the territories of Nevada and Colorado (1861) which were each accepted into the Union as states in 1864 and 1876; Utah didn’t achieve statehood until 1896 as the 45th State (Thatcher 2008).

**Colonization**

The colonization of the Utah Territory occurred very rapidly due to the large numbers of Mormon pioneers coming from Western Europe and Eastern United States. These pioneers crossed the plains to the area, and between 1850 and 1860 the population of Salt Lake County went from 6,157 to 11,295, an 83% increase. An average of 4,000 Mormon pioneers a year immigrated to the Utah Territory during the decade following 1860. Although Mormon immigration to Utah decreased by half during the 1870s and 1880s, its population growth was replaced and even surpassed by that of eastern capitalists and prospectors, moving west to make their fortune. In 1869 there were fewer than 1,000 non-Mormons in Utah and by 1870, with the opening of mines and the completion of the railroad, that number jumped to 4,000 (Beadle1876, 644). This population boom between miners and Mormons continued for several decades as shown in Table 1.
Due to limited availability nearly all arable land in the Great Basin and in the Salt Lake Valley had been taken up by 1882, and in 1883 colonies had been pushed forward into adjoining territories until they extended from north to south in a line of about 1,000 miles (Bancroft 1889, 693).

**Early Expansion of the Salt Lake Valley**

As Salt Lake City began to diversify from an agrarian economy, an expanding city center began to consume the surrounding farmland. This transition is depicted in Figures 2-4. By 1896 the population of Salt Lake County had surpassed 60,000 and Salt Lake City continued to establish itself as the dominant city in the entire Great Basin.
Figure 4: 1855 Map depiction of the Salt Lake Valley. Arrows pointing to Salt Lake City and its grid pattern development which at the time spanned only a few streets in each direction. Source: Egloffstein 1859

Figure 5 Birds-eye view depicting Salt Lake City in 1875. The view is looking from the northwest to the southeast. The map shows a large expansion of the streets from east to west, with farm land in the south. Black lines are added to show the outline of development as depicted in Figure 2 from 1855. Source: Sheldon 1875
The Mormon Question

Starting in the 1860s many 19th century Americans began to engage in a discourse often referred to as the "Mormon Question," which raised fundamental issues about religion, marriage, and constitutional law (Gordon 2001). What was the U.S. government to do with these people who seemed to be less involved with the Union, and clearly more involved with the founding of their own territory and a place to worship as they pleased? The government’s fear was that the Mormons seemed to be governed solely by a prophet and not by the U.S. Constitution. It was not knowing the answers to these questions that caused the desire to solve what seemed to be the “Mormon Question.”
During the Civil War the Second and Third California Volunteers were activated and given orders to protect the overland mail through Utah and to keep the Mormons under surveillance. The government was suspicious of the Mormons and was afraid that they would use the Civil War to declare their own independence from the United States. The California Volunteers were composed mainly of miners and were under the command of Colonel Patrick E. Connor. Connor, a miner himself, had fared well in the California gold rush. The “belligerent Connor was angered at the independent spirit of Utah’s pioneer residents and managed to convince himself that the Mormons were ‘disloyal and traitorous to the core’” (Arrington 1963, 11). Wanting to be closer and more involved in the Civil War the Colonel and the Volunteers petitioned to be sent to
the Potomac; their petition was denied (Tullidge 1886). As what seemed to be a desire to make his stay in Utah more meaningful, the Colonel took it upon himself and his Volunteers to solve the “Mormon Question.” His plan was to start a gold rush into the Salt Lake Valley that would eventually wash the Mormons out with in-migration of an industrious and enterprising non-Mormon population. Connor intently asked Mormons, Indians and traders about any mineral occurrences and instructed his men that when it didn’t interfere with their military duties to prospect for gold and silver. On July 21, 1864 Connor penned:

As set forth in former communications, my policy in this Territory has been to invite hither a large Gentile and loyal population, sufficient by peaceful means and through the ballot-box to overwhelm the Mormons by mere force of numbers, and thus wrest from the church….the absolute and tyrannical control of temporal and civic affairs….I have bent every energy and means of which I was possessed, both personal and official, towards the discovery and development of the mining resources of the Territory, using without stint the soldiers of my command….These exertions have, in a remarkably short period, been productive of the happiest results….Mines of undoubted richness have been discovered, their fame is spreading east and west (Arrington 1958, 202)

Three main factors prevented the Connor-hoped gold rush. One, mining prospects at the time were much better in Nevada, Colorado and California. Two, Utah was too far from the Missouri river and the Pacific coast to make mining profitable. Three, in response to these mining activities and the negative effects they had on the shrinking of the Utah Territory in the past, Mormon leader Brigham Young argued for a sustainable agrarian society rather than a boom and bust mining economy. He stated:
Can you not see that gold and silver rank among the things that we are the least in want of? We want an abundance of wheat and fine flour, of wine and oil, and of every choice fruit that will grow in our climate; we want silk, wool, cotton, flax and other textile substances of which cloth can be made; we want vegetables of various kinds to suit our constitutions and tastes, and the products of flocks and herds; we want the coal and the iron that are concealed in these ancient mountains, the lumber from our sawmills, and the rock from our quarries; these are some of the great staples to which kingdoms owe their existence, continuance, wealth, magnificence, splendor, glory and power; in which gold and silver serve as mere tinsel to give the finishing touch to all this greatness. The colossal wealth of the world is founded upon and sustained by the common staples of life (203)

Because of these three factors and the admonitions of Brigham Young, only a handful of Mormons joined the Volunteers in the gold hunt during this time. The net result was a failure as no general mining activity was reported again until about 1870 (Census 1900, 323).

Figure 8 Brigham Young. Source: Tullidge 1886
Politicians confidently predicted that the railroad would be the answer to the “Mormon Question,” that like many places before it would succumb to the demands of civilization which followed the railroad. In 1866 the editor of The Galaxy wrote:

This organization (referring to the Mormon Church) of his (referring to Brigham Young) can do something, but not much. For rolling back the tide of Anglo-American civilization, whenever that tide shall wash over the mountain bounds of Utah, Brother Brigham’s bands will be just as efficient as old Mrs. Partington’s mop in keeping the Atlantic Ocean out of her back kitchen…When the United States goes to Utah, Mormonism will disappear like a puddle with Niagara Falls turned into it…Probably this is to be the real solution of the Mormon question (The Mormons 381).

The transcontinental railroad was completed in 1869, but had little cultural influence on the Church, making it easier for immigrants to reach Utah faster and more conveniently.

**Utah’s Economic Roots in Mining, the Arrival of the Transcontinental Railroad**

From the beginning Utah had an agrarian based economy. The pioneers were primarily farmers, and were encouraged to farm as shown in this quote by Brigham Young:

Go and raise wheat, barley, oats, get your bread and make gardens and orchards and raise vegetables and fruits that you may have something to sustain yourselves and something to give to the poor and the needy (Arrington 1958, 203)

However, with the discovery of precious minerals in the 1860s, mining also became part of Utah’s economic foundation. Mining “changed the course of Utah’s economy. Mining not only increased the money supply, thus stimulating trade, but also contributed
to the establishment of the first bonafide banks in Salt Lake City” (Alexander & Allen 1984, 68).

The arrival of the transcontinental railroad and the prospects of mining threatened the Mormon local economy. Nevertheless, in many ways the Church initially supported the completion of the transcontinental railroad, aiding in the surveying of the land, labor and even advancing money for preliminary surveys and explorations of the Union Pacific Railroad. Brigham Young stated “we want to hear the iron horse puffing through this valley. What for! To bring our brethren and sisters here” (Arrington 1958, 236). But the railroad also threatened the homogeneity of the predominantly Mormon Salt Lake Valley by making it financially possible to bring in an influx of “Gentile” eastern capitalists and miners to exploit Utah’s natural resources. In response to this threat of non-Mormon miners, the church slowly began to support the mining industry for Mormons. They began to allow a limited number of church members to be employed in the mines, in hopes that as Mormons filled these mining positions there wouldn’t be a need for an added immigration from the outside. The Mormons also hoped that the cash generated from such work could be used to purchase raw materials that could then be manufactured in Utah. Economically the Mormons had a monopoly in the intermountain west; controlling the price of wheat, peaches, flour and anything else they produced agriculturally, and they were able to trade and sell these items at inflated prices. As the railroad brought in cheaper manufactured goods, knocking down the price of locally produced goods, mining provided the region a way in which to offset that loss of income. Clearly the church now viewed the mining industry as a way to diversify its economy. They placed repeated emphasis on Utah mines being used sustainably to build up the
“Kingdom” and that parallel development of manufacturing would be done so that the mining materials could be processed locally. This bolstered the Utah economy and replaced the money that could have been lost to the imports brought in by the railroad.

The transcontinental railroad was completed in 1869. Mormon policy makers fought the immediate shift to a mining economy, and many of their policies were successful. The church did not grow significantly weaker, and the “economy of the Saints” was not “mineralized.” Although mining had helped the territory’s economy, it had not become reliant on the raw materials.

**Attempts to Diversify the Economy**

During the period between the 1870s and 1890s the church spent considerable effort in diversifying its economy, trying to protect itself from eastern capitalists with such endeavors as the church run Zion’s Co-operative Mercantile Institution (ZCMI). ZCMI was advertised as the first department store west of the Mississippi (Arrington 1958, 301).

**Silver Mining**

Also affecting the railroad and mining in the Salt Lake Valley was the “Panic of 1873” which caused an agricultural and mining depression in Utah that lasted until 1896 (Arrington 1958, 383). Silver was the main source of mining in the valley. Table 2 shows the dominance in silver mining even during the depression, showing that in 1880 silver produced almost 5 million dollars in value compared to $300,000 produced by gold.
Table 2 Gold and Silver production 1880, Utah. Source: Census 1900

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<th>Silver</th>
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<tr>
<td></td>
<td>Ounces</td>
<td>Value</td>
<td>Ounces</td>
<td>Value</td>
<td>Total Value</td>
</tr>
<tr>
<td>Total from Utah mines</td>
<td>14,105.5</td>
<td>291,587</td>
<td>3,668,585.5</td>
<td>4,743,087</td>
<td>5,034,674</td>
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The Panic of 1873 was caused in part by the Coinage Act of 1873 that affected the price of silver. The act changed the monetary system from a gold and silver standard to only a gold standard. Eliminating the free coinage of silver caused the sharp decline in the price of the precious metal relative to that of gold (Friedman 1990, 1159; Hepburn 1903, 331). This led to the closure of banks and silver mines in Utah; effecting farmers and the agricultural economy that launched the territory into a depression lasting about 23 years between 1873 and 1896 (Arrington 1958, 383).

Conclusion

To summarize, between 1847 and up to statehood in 1896 mining had been suppressed in the Utah economy for several reasons: one, the initial influence of the Church during the 1850s and 1860s; two, mining deposits discovered in the 1860s were initially not profitable without a railroad; and finally, after the arrival of the railroad mining was not profitable on a large scale because of the agricultural and mining depression. This 49 year period set the stage for mineral exploitation in the Salt Lake region as religious perceptions toward mining changed and economic conditions became more favorable.
Utah’s Economic Transformation, the Influence of Mining

The late 1800s marked the partial unification of the Church of Latter Day Saints’ (Mormons) self-sufficient village economy with the exploitive, individualistic economy of the early miners and traders. This unification created a more specialized economy based on commercial agriculture, mining and smelting (Arrington 1974, 4). As the Church predominantly influenced and drove Utah’s economy during the 1800s, the early 1900s was influenced by outside capitalist entrepreneurs. This influence was favored by miners and the Church alike, as each saw it as a way to strengthen the economy through outside investment.

This outside influence made possible the exploitation of Utah’s minerals and as one author states “mining, paced by copper, was extremely important to the economy” (Alexander 1974, 44). Copper production in 1909 was 109 million pounds and increased to 246 million pounds by 1917. This large increase was due primarily to the merger of Boston Consolidated Copper Company and Utah Copper Corporation in 1910. These two companies merged to form Kennecott Utah Copper Company which became very influential in the Utah economy, producing thousands of jobs and millions of dollars in revenue. That same year Utah produced income figures that gave it the appearance of unusual abundance; these figures were skewed by mining income of course and the Utah economy continued to be bolstered by the mining industry. By 1912 the copper mining industry alone employed 4,500 men and 1,200 more in its large smelters (Alexander & Allen 1984, 130). Mineral extraction and processing grew stronger
and by 1919 the smelting and mining district of Utah grew to be the largest in North America, treating 4.43 million tons of metal.

**Depression of the 1920’s**

1917 marked the peak year of metal production in Utah because of high demand for the World War I effort. Post World War I demand for metals began to fall. By 1920 copper had declined to 116 million pounds from its high of 246 million pounds in 1917 and in “1921 the output of all metals decreased 96 percent in volume and 56 percent in value below the 1920 level” (Alexander 1974, 60). Utah’s economy suffered severely because of layoffs at the mines. In fall of 1921 several of the smelters and mines in Utah closed, however, a year later conditions began to improve. In the spring of 1922 employment increased and most mineral industries were back on their feet as prices and demand again began to rise. Throughout the rest of the decade mineral production was stable, which reflected the Utah economy as well, however, the value of the mining industry did not reach the average of 1917 until 1929 and then not again until 1941 because of the Great Depression (Alexander 1974, 86). The Great Depression hit Utah harder than other intermountain states due to the low prices of metals and agriculturally produced goods of which Utah depended heavily. Production in the mines stagnated, and most companies shut down entirely leaving many people without jobs.
World War II

It wasn’t until the beginning of World War II that the prices of metals began to rise with the demands of the warring countries. In 1943 the Utah copper industry (Kennecott) produced over 323 million tons of copper at a value of over $84 million. Utah’s production of copper continued to increase until it was eventually producing 1/3 of all copper used by the allied countries. This jump in production helped pull Utah’s economy out of stagnation and back into the forefront with thousands of jobs in Salt Lake City being created for the war effort, most of which were centralized around the mining and smelting industry.

Utah’s Post World War II economy slumped a little as demands fell but by 1950 the mining industry had grown stronger than ever before and Salt Lake City housed the greatest concentration of nonferrous mining, smelting and refining industries in the nation (Alexander & Allen 1984, 252).

Diversifying the Economy, Mining industry becomes less influential

During the 1960s and 70s Salt Lake City witnessed an enormous change in its economy. Utah’s economy was obviously tied to the rise and fall of copper, however, great efforts by the city government were successful in bringing in new businesses that transformed the local economy from a defense and mining industry to a highly technological and service based economy. By 1980 the economy was sufficiently diverse that a report by the University of Utah Graduate School of Business in 1982 in reference to the influence of Utah’s copper
industry, specifically that of Kennecott states, “the Salt Lake labor market area is sufficiently large that no one single project will dramatically change the growth patterns” (Graduate School 1982, 5). In the Utah Annual Report of that same year it reports, “with the presence of Kennecott, mining is a high-profile industry in Salt Lake County. However, its profile is unwarranted in terms of employment numbers, as the industry accounts for less than one percent of all employment” (Utah Dept 1982). Kennecott’s employment numbers throughout the years has remained at an average of 6,000 employees excepting times of strikes and closures due to low market value. As Salt Lake’s economy has continued to grow and diversify, Kennecott has become less influential in terms of employment percentages.

Present

Although the copper mining industry once played a key role as Salt Lake’s most important industry, helping it become the most influential city in all of the Great Basin, as the Salt Lake economy continued to grow and diversify the copper mining industry became less and less influential.
CHAPTER 2
THE KENNECOTT UTAH COPPER COMPANY

The name “Kennecott” has been used by several companies, some of which are associated with mining and smelting activities in the Salt Lake area and others which are not. In this paper “Kennecott” refers to the Kennecott Utah Copper Corporation and its sister company Kennecott Land under the auspices of Rio Tinto PLC, a British-based corporation.

Geologic History

West of the Wasatch Mountains across the Salt Lake Valley lay the Oquirrh (O-ker) Mountains. The Oquirrh’s, meaning shining mountains, derived their name from the Paiute Indians. The range starts at the southern tip of the Great Salt Lake and runs south for about 30 miles forming the western side of the Salt Lake Valley.

Figure 9 Geologic Map of the Oquirrh Mountains. Source: Wilkerson, 2008

1 This section draws heavily on the geologic research performed and written on by L. Bailey, which is clearly the most descriptive geologic text on this topic
The Oquirrh Mountains are the result of faulting and folding of massive blocks of the earth’s surface during the latter half of the Mesozoic Era, about forty million years ago. This great deformation was part of the uplift which created the Rocky Mountains. Plastic magma was first forced upward to form great intrusions in the center of the Oquirrh range. As the magma cooled, it crystallized into igneous rock resembling granite. These intrusions created immense pressure which folded the deformed sedimentary layers. Tongues of magma intruded between and through sandstone and limestone beds. Liquid magma melted and combined the sedimentary rock, and even floated blocks of rock upward. The older rocks were cracked, shattered, pulverized, and altered – limestone was metamorphosed to marble. Hot solutions and pressure cemented together silica particle of sandstone, forming quartzite. Elsewhere, heat was intense enough to create massive quartz beds (Bailey 1988, 1).

After the Oquirrh Mountains had been carved into their present form, rhyolite oozed out of fissures at the base of the range creating a complex pattern of fissures and cracks creating natural conduits for upward percolation of mineral-bearing solutions (Bailey 1988, 1).

Solutions ascended through large and small fissures. Superheated and under pressure, the liquids were strong solvents and active chemical agents. As the solutions percolated up through thousands of feet of fissures and cracks, the load of mineral constituents increased. On approach to the surface, pressure grew less, temperature decreased, and minerals crystallized along fissure walls, in cracks large and small, and
between particles in pulverized zones. Porous sedimentary rock soaked up the solution like a sponge and filled with silica and sulphides of iron, copper and gold. Acidic solutions seeped between limestone beds, dissolving calcium carbonate and leaving great lenticular cavities. A later infusion, at a lower temperature, filled these cavities with lead, silver, and zinc (Bailey 1988, 1).

The mix of temperature and chemistry produced a series of overlapping concentric rings of mineralization three and a half miles wide in an east-west direction, and four miles wide north and south (see Figure 1, arrow pointing to the three concentric rings). The limestone formations surrounding the igneous stocks were impregnated with various silver minerals.

Weathering and down-cutting of the Oquirrh Mountains exposed the ore-bearing deposits. Runoff breached the deposits, leaving three great limestone beds exposed. Galena and native copper were left as float on canyon slopes. Creek beds and alluvial accumulations were rich in gold. Evaporation of spring and creek waters left blue-green deposits of copper carbonates. Evidence of rich mineralization was discernable everywhere in Bingham Canyon (Bailey 1988, 2). Some of the copper ore bodies were so exposed that it became simple to find mineral occurrences, although at the time copper didn’t mean much.

This area “exhibits all the classic mineralization, alteration, and zoning expected, but not often seen in a porphyry copper district” (Babcock 1992). These “fifteen square miles of mineralization would make the Oquirrh Mountains a strong contender for the title of ‘World’s Richest Mountain Range’” (Bailey 1988, 2). In 1863 many individual
claims were made in the Bingham Canyon area. These claims were not seriously mined until 1896.

**Early Development of Resources**

When the Mormons arrived in the Salt Lake Valley in 1847 they viewed the Oquirrh Mountains as a resource for timber and the grazing of farm animals. Brigham Young sent the brothers Sanford and Thomas Bingham to settle near the mouth of a canyon thirteen miles south from the northern most point of the Oquirrh range to log timber and graze cattle. The brothers were the first on record to have noticed mineral and ore occurrences in the Oquirrh Mountains. Because of the counsel by Brigham Young to steer clear of prospecting and mining the Bingham brothers disregarded the mineral occurrences and established a cattle settlement in the Bingham Canyon that still carries their name.

On May 8, 1860 a find of copper was reported in the newspaper *Deseret News*:

Copper.- We have recently been presented with a specimen of virgin copper...which those well versed in mineralogy, to whom it has been exhibited, pronounce equal to the best they have ever seen. If it exists in the vicinity, as is alleged, in any considerable quantities, it would probably pay well for working... but in these days, gold is the principal thing sought after, and a man who would engage in copper mining in an inland country like this, might by some, be considered in a state of insanity.

In 1862, Colonel Patrick E. Connor and his federal militia were stationed in Utah to protect the overland mail and to keep an eye on the Mormons. Connor and many of his troops were seasoned prospectors, and Connor encouraged them to prospect the surrounding mountains. The first formal prospecting claims were made in 1863. A
farmer named George Ogilvie presented several Bingham Canyon ore specimens to Colonel Conner, who then organized the West Mountain Mining District.

Babcock states that the original discovery was made on silver-lead ore that made mining in the area seem profitable (1992). Connor invested over $80,000 of his own private fortune and with that the Volunteers constructed several mines and smelting furnaces in the district (Arrington 1963, 202). The treatment of ores by smelting was new to the Californians, and their previous experience in milling gold was of no service to them. Other disadvantages were that charcoal, necessary in smelting, was not abundant and transportation costs were extremely high. A large sum of money was spent with no result, and Connor’s hopes of a gold rush into the territory were thwarted (Stenhouse 1873, 715). From 1863 to 1865 over a million dollars (Arrington 1958, 202) was invested into the exploitation of Utah’s minerals, but all companies involved went bankrupt, including Knickerbocker and Argenta Mining and Smelting Companies. The “business of mining had to be suspended to await the advent of the ‘iron horse,’ which was to bring renewed vitality to the occupation of the miner” (Stenhouse 1873, 715).

**The Era of Lead and Silver**

The transcontinental railroad was completed in 1869, and a branch line was built to Bingham Canyon in 1873. This completion ushered in a decade of lead and silver mining that produced millions of dollars. Copper was also found amongst the silver and lead but the smelting facilities lacked the proper equipment to extract it. The rich finds of copper that have defined Bingham Canyon and Kennecott were not initially mined until decades later.
Table 3 Percent of National Production and Total Value of Silver, Copper and Lead produced in Utah 1870-1890. Source: University of Utah

<table>
<thead>
<tr>
<th>Year</th>
<th>Lead</th>
<th>Silver</th>
<th>Copper</th>
<th>Total Value $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>23.4</td>
<td>3.9</td>
<td>0.4</td>
<td>1,449,566</td>
</tr>
<tr>
<td>1875</td>
<td>31.9</td>
<td>9.3</td>
<td>1.8</td>
<td>5,504,401</td>
</tr>
<tr>
<td>1880</td>
<td>15.6</td>
<td>12.1</td>
<td>0.1</td>
<td>5,918,252</td>
</tr>
<tr>
<td>1885</td>
<td>19.8</td>
<td>13.1</td>
<td>0.1</td>
<td>7,793,867</td>
</tr>
<tr>
<td>1890</td>
<td>23.8</td>
<td>14.7</td>
<td>0.4</td>
<td>12,308,915</td>
</tr>
</tbody>
</table>

As Gold and Silver mines in Bingham Canyon continued to grab all of the attention, two individuals began to realize the potential of the copper rich mountain: Enos Wall and Samuel Newhouse. It is through these two men that the enterprise of copper emerged through two rival companies.

**Boston Consolidated and Utah Copper Mining Companies**

Enos A. Wall first arrived at Bingham in 1887. An owner of other mining properties in Montana and Idaho, Wall was intrigued by the signs of copper that had turned many rocks in the canyon green through spring runoff and oxidation. Ore samples taken in the area assayed an average of 2.4 percent copper, which provided Wall with sufficient evidence to proceed in purchasing as many mine claims as possible. The difficulty that Wall encountered was convincing others that mining the area for copper would be profitable. With copper prices around 12 cents a pound, many would be investors thought it impossible to make money on such a low concentration of copper.
Eventually it was through this purchase and the investments of the prominent Guggenheim family that the Utah Copper Company was formed in 1903.

Samuel Newhouse, an owner of several successful mines in Colorado, first came to Utah in search of gold. He bought an abandoned gold mine in Bingham Canyon and by accident discovered ore channels carrying considerable amounts of copper. Newhouse also encountered the same problems as Wall in convincing businessmen to invest, however, Newhouse had several financial contacts in England, and with their help eventually formed the Boston Consolidated Mining Company in 1898.

With proper financial backing these two mines successfully began to process ore for profit. The average ton of ore was said to contain 2 percent copper, 0.15 ounces of silver and 0.015 ounces of gold (Arrington 1963, 53).

The property of these two companies adjoined each other, Boston Consolidated owning the top of the mountain with Utah Copper owning the surrounding mountain side.

**Open-Pit Mining**

Open-pit mining is the extraction of minerals from above rather than through tunnels. It is used to reach ore that is covered by layers of dirt, called overburden, but is close enough to the surface to extract. Overburden is the area of rock and soil that is above the area of economic interest.

Open-pit mining seemed necessary to both companies because the copper wasn’t necessarily found in veins accessible by tunnels, rather, it was found in sandstone and other host material in a constant ratio ranging from 1-2%, thus creating the necessity to process a lot of ore to make a profit. The copper-impregnated host material was so
abundant it made it seem cost effective to remove the thick layer of overburden, allowing mining companies unabated access to the low grade ore body.

Figure 10 Bingham's two great copper companies open-pit mining 1908. On top of the hill is Boston Consolidated Mining Company. About half way down the hill begin the terraces of Utah Copper Company. Source: Bailey 1988, 60

Boston Consolidated began using open-pit mining techniques in 1906 through the use of steam shovels and in six months had stripped more than 2,000,000 tons of capping. The company soon ran into financial difficulties however, and the rocky cliffs of Bingham seemed to be unprofitable to remove. The company relinquished the open-pit mining technique in 1907 and resumed extracting ore from underground tunnels.

A few months after Boston Consolidated started open-pit mining, Utah Copper also began using the new technique. In seven months Utah Copper had removed over 700,000 cubic yards of capping, or the equivalency of nearly 7 acres of ground to uncover six acres of ore. Initially this was a costly approach since the first two years of open-pit mining expenditures exceeded profits. It seemed apparent that:
The exploitation of the huge Bingham porphyry deposits could best be worked by joint efforts on the part of the Utah Copper and Boston Consolidated companies. Their land adjoined each other, with the former owning the lower portion of the hillside, and the latter the top of the Bingham hill (Arrington 1963, 57)

In 1910 the two companies merged into the Utah Copper Company spanning 540 acres.

The history of Bingham Canyon up until 1910 showed signs of a typical boom and bust mining town. Experiencing a flurry of activity from 1863-1865 with the California Volunteers, silver fever in the 1870s and 1880s and a struggle for copper extraction during the 1890s. Not until the merger of Boston Consolidated into Utah Copper did the ability to mine for a secure economic profit come to fruition. Three factors contributed to its eventual success: total mining acreage; large quantity of low grade copper ore; and technology and innovation to process the ore.

**Establishment and Growth of Kennecott Utah Copper Company 1908 – Present**

In 1908 the Guggenheim family acquired the Kennecott copper mine in Alaska. Eventually they “decided to throw all of the Guggenheim coppers into one bag” (Arrington 1963, 68), creating the Kennecott Copper Corporation in 1915. Utah Copper’s name was changed to Kennecott Utah Copper and in terms of this paper will be referred to as just Kennecott. Although the Utah Copper Company had been older, larger and more established, the Guggenheims made the arbitrary decision of naming the company after the more recently acquired Kennecott, which many Utah Copper employees resented and resisted for many years.
World War I, World War II and the Depression

After the merger of the Boston Consolidated and Utah Copper companies and the formation of Kennecott, production of copper continued to rise. During World War I Kennecott was second only to Montana’s Anaconda mine in newly mined copper. It continued to produce in accordance with demand and the rising and falling of copper market prices. Production slowed in the 1920s due to falling copper prices and again in the 1930’s because of the depression but soon rose to production demands for World War II. Kennecott produced one-third of the copper used by the allies in World War II reaching peak wartime production in 1943 producing 639,484,093 pounds of copper.
Table 4 Copper Production Kennecott Copper 1905-1945 (Arrington 1963, 90)

<table>
<thead>
<tr>
<th>Year</th>
<th>Copper in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1905</td>
<td>5,311,702</td>
</tr>
<tr>
<td>1910</td>
<td>84,502,475</td>
</tr>
<tr>
<td>1915</td>
<td>148,397,006</td>
</tr>
<tr>
<td>1920</td>
<td>101,897,758</td>
</tr>
<tr>
<td>1925</td>
<td>214,162,139</td>
</tr>
<tr>
<td>1930</td>
<td>161,138,717</td>
</tr>
<tr>
<td>1935</td>
<td>118,466,057</td>
</tr>
<tr>
<td>1940</td>
<td>452,538,235</td>
</tr>
<tr>
<td>1945</td>
<td>444,800,637</td>
</tr>
</tbody>
</table>

Post-World War II, The Richest Hole on Earth

After World War II, despite labor strikes and the ups and downs in copper demand, Kennecott continued to refine and expand methods for producing copper at less cost. In 1950, in order to lower production costs of hauling ore from the bottom of the pit to the top, Kennecott constructed two tunnels both over 4,500 feet long to move ore directly from the bottom into trains.
These proved so successful that they built another in 1958 over 18,000 feet long. As technologies advanced in the recovery of minerals during the 1940s and 1950s Kennecott found ways to recover several other precious metals that weren’t possible previously, including molybdenum, platinum, palladium, tellurium, selenium, rhenium and nickel sulfate. With the recovery of these minerals from existing mine tailings and continued operations, Kennecott Copper Mine began to build a reputation as the “richest hole on earth.” By 1963 the mine had produced over 16 billion pounds of copper, 500 million pounds of molybdenite, 70 million ounces of silver and 9 million ounces of gold. At the
time this amounted to over $6 billion. In 1963 Arrington wrote in his book titled “The Richest Hole on Earth”: 

Despite the almost inconceivably vast yield of this mine – it holds undisputed first place in the aggregate quantity of metal produced by a single mine...In the process of obtaining these ores, more than 2.2 billion tons of overburden have been removed – a mountain has been converted into a vast amphitheater. As the largest man-made excavation on the face of the earth, involving the moving of four times the yardage of earth moved in the original digging of the Panama Canal

Copper ore grade declined as the pit got deeper. Since more overburden needed to be blasted and removed to produce the same amount of copper, Kennecott undertook $100 million expansion program in 1963, which enabled them to extract an extra 100,000 tons a year. As the mine continued to expand downward and outward, the once Bingham Canyon was being engulfed. The thriving mining town of Bingham, the center of commerce for the mining community, was bought by Kennecott and by 1971 ceased to exist as the town was completely enveloped by the mine.

**Purchasing of Kennecott**

In 1970 the Clean Air Act was passed to protect the general public from exposure to harmful airborne contaminants. To comply with this act Kennecott had to make some drastic and expensive changes to their smelting scheme. The company spent over $300 million to expand existing smelters and furnaces to abide by new regulations. These new costs created “uncertainties surrounding the emerging environmental agenda (which) interfered with long-term planning for the copper operations” (Whitehead 2006, 247). These costs, coupled with the
1970s oil crises, caused copper production costs to soar and made it difficult for Kennecott Copper Company to stay on top going into the 1980s. From 1980 to 1981 Kennecott’s profits were down 43% (New York Times 1981). These financial difficulties and the drop in stock price allowed the company to be acquired by Standard Oil of Ohio (SOHIO). Due to recessions and labor disputes Kennecott shut down in 1986. It resumed production the following year after new labor negotiations and better copper prices. In that same year SOHIO was taken over by the London-based firm British Petroleum (BP). With new leadership and financing the company announced a new $400 million modernization program for Kennecott. By 1988 the new program had helped revitalize Kennecott, adding new production and technology allowing the mine to produce on average 85,000 tons a day, 13 percent above original capacity (Whitehead, 2006, p. 247). The following year BP then sold Kennecott to the second largest mining company in the world, Rio Tinto, another London-based company. Unlike SOHIO and BP, Rio Tinto specialized in mining, and with special interests in Kennecott, the company invested an additional $227 million to increase production. By 1991 Kennecott was producing 125,000 tons of raw material per day, which in turn produced 300,000 tons of copper annually, along with significant quantities of molybdenum, silver and gold (Whitehead 2006, 248). Seeing the vast quantities of ore still available in the Kennecott mine, Rio Tinto invested another $880 million to construct a new smelter and modernize the copper refining operation. Since Rio Tinto’s acquisition of Kennecott in 1989 and to the present, it has invested nearly $2 billion in the modernization of Kennecott and its facilities.
Present Condition and Future of the Mine

At present the open-pit mine is one of the engineering marvels of the world. It is more than ¾ of a mile deep and more than 2 ¾ miles wide at the top, making it possible to stack two Sears Towers on top of each other and still not be able to reach out of the mine. It has produced over 36.2 billion pounds of copper, 190 million ounces of silver, 23 million ounces of gold and 850 million pounds of molybdenum. The cumulative value of these minerals far exceeds the yields of the Comstock Lode, Klondike and California gold rushes combined (Kennecott Public Affairs 2002). Annually, the mine produces about 300,000 tons of copper, 4 million ounces of silver and 500,000 ounces of 99.99 percent pure gold (Kennecott 2007). In 2007 Kennecott was Rio Tinto’s highest net earning mine, earning over $1.6 billion, while producing 13% of the nation’s copper (Bennett 2008).

Today Kennecott is still a prominent mine in the Salt Lake Valley landscape. Its visitor center, that gives tours of the mine and allows for a spectacular view of the open-pit, attracts over 100,000 visitors each year. With money received from the entrance fee at the visitor center Kennecott annually donates over $100,000 to more than 100 locally based Salt Lake organizations that provide assistance to the poor and needy, the disabled and other important community-based charities. It also provides several scholarships to teachers in the local Jordan School District allowing them to get masters degrees while continuing to teach classes.
Future

Kennecott plans to extend the open-pit operations as long as it’s economically possible. Tests show that there are copper deposits to a depth of 100 feet above sea level, which is almost a mile deeper than the present depth of the pit. With current technology, recoverable copper deposits can take the pit about 650 feet deeper than it is now (Whitehead 2006, 249). Potential open-pit expansions and underground operations could extend the life of Kennecott to 2036 (Bennett 2008).
CHAPTER 3

SALT LAKE CITY’S URBAN GROWTH 1950 – PRESENT

The purpose of this chapter is to illustrate the growth of Salt Lake City towards the Bingham Canyon Mine and Kennecott property line. Several maps are used including aerial photographs from the United States Geologic Survey to show Salt Lake City growth patterns from 1950 to the present. There will be several landmarks shown on the proceeding maps to orient the reader. These landmarks will first be shown in Figure 13 and then referenced on historic aerial photographs to gain understanding of Salt Lake’s expansion.

Figure 13 Landmark map of Salt Lake Valley. Source: Google 2008
Airport II\(^2\) in West Jordan, Utah, is used as a landmark because it is easy to recognize through aerial photographs and it is located halfway down the valley on the west side. Redwood Road, on the west side of the valley, is used as a reference because much of the early settlement was concentrated around this Utah highway. Also referenced is Interstate 15, cutting the valley into two halves, the east and west side.

**Kennecott Property**

Kennecott owns over half of the developable land remaining in the Salt Lake Valley. Its property line, known as the “west bench”, is shown in Figure 14. As Salt Lake City grew Kennecott purchased more and more land to act as a buffer between the city and its mining activities.

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\(^2\) Airport II was built in 1942, owned by Salt Lake City, use is split between air force and private planes. It is not a commercial airport.
Urbanization 1950s

The Salt Lake Valley is defined by physical features on all four sides. To the east lie the Wasatch Mountains, marking the beginning of the Rockies. To the west lie the Oquirrh Mountains that form the beginning of the Basin and Range. The south border is formed by the coming together of the Oquirrh’s and the Wasatch and the northern boundary is formed by the Great Salt Lake as illustrated in Figure 15.

![Figure 15 Salt Lake Valley Source: Google 2008](image)

By 1950 Salt Lake County’s population was 274,895 with the majority of the people living in Salt Lake City. As Salt Lake City grew and urbanized there formed bedroom communities on the periphery of the City. The urban development by 1950 is shown in Figure 16 highlighted and labeled in the southwest end of the county is the Kennecott peninsula that juts out into the valley. Depicted in this area is a tailings pond and mounds of overburden removed from the mine and relocated here. In 1950 population density was very low in the southwest end of the valley, as shown and
highlighted in a black dotted line. There were only two small patches of settlement along one of Salt Lake’s highways – Redwood Road. Shown with a dash-dotted line is Salt Lake City’s urban sprawl extending south on the east side of the valley.

Figure 16 Aerial Photograph 1950 West side of Salt Lake Valley Source: USGS 2008
1960 Expansion

By 1960 Salt Lake County’s population had risen nearly 40 percent to 383,035 (census), most of the growth occurring on the east side. As shown in Figure 17 in 1962 no major settlement had occurred south or west of Airport II, and most of the land continued to be used for agriculture.

In the same year Kennecott continued to use its land in the valley for tailings as shown in Figure 18. They also continued leasing their unused land to farmers.
Figure 18 Aerial Photograph 1962 west side of Salt Lake Valley Source: USGS 2008
Salt Lake City’s urban growth up until 1965 is depicted in Figure 19. Most of the new development occurred in adjacent cities and towns on the periphery of Salt Lake City. This growth mainly took place on the east side of the valley as the city expanded to the south. Two settlements, West Jordan and South Jordan, along Redwood Road remained disconnected with the continuous urban growth from the north.

Figure 19 Salt Lake Valley Urban Growth to 1965 Source: Base map adapted from Kennecottland 2008
1970 Urban Expansion

From 1960 to 1970 Salt Lake County added almost 75,000 people bringing its population to 458,607 (census). The sprawl moved primarily to the south and west, engulfing what was once a small settlement along the northern part of Redwood Road, with another settlement uncontiguous with the urban sprawl appearing in the south end of the valley.

Figure 20 Salt Lake Valley Urban Growth to 1970 Source: Base map adapted from Kennecottland 2008
1980 Urban Growth

Salt Lake County’s population grew 35 percent from 1970 to 1980 totaling 619,066. Aerial photographs were not available from the year 1980 to analyze, so the closest year, 1977, was used to portray the urban growth through the majority of the decade. Expansion flowed south along the I-15 corridor consuming all of the major settlements that were not contiguous with sprawl before and also filled most of the east side.

Figure 21 Salt Lake Valley Urban Growth to 1977 Source: Base map adapted from Kennecottland 2008
1990 Urban Growth

During the 1980s growth was slowed by a state wide economic recession that was due in part to the closing down of Kennecott for a year in 1985. Growth was 20 percent for the 10 year period with the population reaching 725,956 by 1990. Urban growth continued to fill the east side of the valley almost entirely and pushed slightly further west toward Airport II. Again, aerial photographs were not available for 1990 but only for 1987 upon which the following map is based.

Figure 22 Salt Lake Valley Urban Growth to 1987 Source: Base map adapted from Kennecottland 2008
2000 Urban Growth

From 1990 to 2000 Salt Lake County grew 24 percent to 898,387. Urban growth finally pushed passed Airport II in the west and began to fill the south end of the valley leaving only room towards the Kennecott property line to grow.

Figure 23 Salt Lake Valley Urban Growth to 2000 Source: Base map adapted from Kennecottland 2008
2008 Growth

At present Salt Lake County’s population is estimated at almost 1 million people.

Figure 24 is a 2010 representation of the Salt Lake Valley and Kennecott’s Daybreak development in the southwest corner which is currently under development on formerly polluted land recently cleaned up by Kennecott.

Figure 24 Salt Lake Valley Urban Growth projected to 2010 Source: Base map adapted from Kennecottland 2008
Conclusion

Salt Lake County’s growth rate remains in the top 50 amongst other counties in the nation. Salt Lake has no where else to grow except to the southwest where there is still land available to develop. As the population of the Salt Lake Valley continues to grow, land values continue to rise. In the second quarter of 2007 home prices nation wide took their biggest drop in 16 years, while Salt Lake City boasted a 21 percent increase in median home sale price from the year previous (National Association of Realtors 2008). So, if growth is to continue, there is no other option than to encroach upon the largest copper mine in the world, as land becomes available and developed on the once proposed Superfund site.

Figure 25  Sunset development adjacent to Daybreak with the mine in close proximity. Picture taken by Gary Lemmons
Figure 26 Kennecott Copper mine and Oquirrh Mountains in background, showing the new housing development at the base of the mine. Picture taken by Gary Lemmons
The Environmental Protection Agency was formed in 1970 by the Nixon administration in part to heighten public awareness and to gain public support for the mitigation of environmental injustices, which were brought to the forefront by Rachel Carson's *Silent Spring* in 1962. Prior to the establishment of the EPA, the federal government was not structured to make a coordinated attack on the pollutants that harm human health and degrade the environment. In the Reorganization Plan No. 3 to Congress on July 9, 1970, President Nixon called for "a strong, independent agency" (EPA 2008). Components of the agency were pieced together from several other programs in various departments. National Air Pollution Control Administration, the bureaus of Water Hygiene and Solid Waste Management, and functions of the Bureau of Radiological Health all came from the Department of Health, Education and Welfare. Federal Water Quality Administration came from the Department of the Interior, pesticide registration from the Department of Agriculture and responsibility for radiation criteria and standards from the Atomic Energy Commission and the Federal Radiation Council.

The mission of the EPA:

To protect human health and the environment. Since 1970, EPA has been working for a cleaner, healthier environment for the American people… to develop and enforce regulations, offer financial assistance, perform environmental research, sponsor voluntary partnerships and programs, further environmental education and to publish information (EPA History 2008)
As the Salt Lake area saw a huge boom in residential development and sprawl in the 1980s the EPA became more concerned and involved with Kennecott’s mining activities and performed the original site assessment of the Kennecott area in 1984, but at that time Kennecott was not very cooperative towards any cleanup agreement. By 1990 the State of Utah had sued Kennecott for ground water damage in the southwest end of the Salt Lake Valley and after poor cooperation again by the company the EPA and the state of Utah joined forces. Agreement talks towards cleanup began in 1991 and by the next year all parties had reached a verbal accord as to how the cleanup was going to take place. However, in 1993 Kennecott walked away from the negotiations due to disagreements over money. It was then, January 1994, that the site was proposed for EPA’s Superfund National Priorities List (NPL). Through Superfund, EPA can place contaminated landscapes on the NPL for cleanup and hold companies responsible for the contamination and liability of that cleanup. Under Superfund, EPA has the authority to oversee cleanup of various hazardous waste spills or releases. While EPA requires that private parties responsible for the wastes conduct their cleanup, when responsible parties cannot be found or cannot afford to pay for the cleanup, costs may be covered by Superfund. Cleanups conducted under Superfund can be costly and time-intensive depending on the complexity and extent of contamination. Under certain circumstances, EPA and industry may negotiate to conduct cleanups outside of the traditional Superfund NPL process \(^3\) (Kennecott Mining Site 2006, 4). Being labeled a Superfund site also carries a certain stigma, and Kennecott’s reputation would have been severely damaged due to the listing, and with the idea of developing their property and wanting to avoid bad

\(^3\) This section draws heavily on the “Abandoned Mine Lands Case Study” produced by the EPA
publicity, Kennecott completely reversed its formerly recalcitrant position and began to work in partnership with the EPA to cleanup the site.

**What Needed To Be Cleaned Up?**

Over its 140 years of mining history, the mining operations at what is now Kennecott have dumped over 6 billion tons of material in and around the Salt Lake Valley (Kennecott Public Affairs 2002). In 1998 Kennecott was the top polluter on the EPA’s toxic release inventory (TRI) report, releasing 439 million pounds of toxic material. In explaining their emissions Kennecott says that more than 99 percent of the company’s reported emissions went to controlled and permitted tailings impoundment or waste rock repositories, and that the numbers don’t represent an increased danger to public health or the environment (Cray 2000). Replying to this statement environmentalist Alan Septoff, Research and Information Systems Director at Earthworks in Washington D.C., said that it indeed does pose a threat:

Bingham Canyon is a major Superfund site in part because of the types of waste Kennecott has emitted. These wastes do represent a threat to public health or the site would not be [sic] on the Superfund list⁴ (Cray 2000)

Kennecott has polluted the valley floor and ground water with arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, acids, sulfate, and zinc. Before the threat of these contaminants was recognized, homes were built on former flood plains with high level of these contaminants. Mining waste leached acid waters and created a 72-square-mile plume of sulfate-contaminated ground water. Drinking water wells contaminated with cadmium, chromium, sulfate, and arsenic were shut down in the 1980s. This put a burden on communities in Salt Lake County. Even though many

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⁴ Kennecott’s proposal by the EPA to be on the Superfund list is still pending
communities currently rely on surface water for municipal water supplies, they need new sources of drinking water to support rapidly growing populations and cannot use ground water as a municipal water supply if they are above or adjacent to the plume.

On the south shore of the Great Salt Lake metal ore was smelted and processed by Kennecott for almost a century, resulting in contaminated sludge, soils, surface water, and ground water. In this area lead, arsenic, and selenium are the main contaminants of concern. A plume of selenium-contaminated ground water enters nearby wetlands through springs and seeps which are particularly troublesome because native birds are
Sensitive to selenium (Kennecott Mining Site 2006, 3). Federal scientists studying the Great Salt Lake have found alarmingly high levels of mercury in the water which are even more dangerous to human and wildlife than selenium (Henetz 2005).

Figure 28 Bingham Creek Tailings cleanup project Source: Kennecott Mining Site 2006, 4

Cleanup

Since 1984 the EPA has been involved in over 61 cleanup activities and assessments of Kennecott. In 1995, Kennecott, EPA and the State of Utah signed an agreement, saying that Kennecott will continue voluntary cleanups and the EPA will defer final listing on the NPL. In 1999 the completion of cleanup activities of eight sites involved digging up near-surface soil wastes with high lead and arsenic levels, and
removal of the wastes to collection and storage areas. More than 25 million tons of mining wastes have been removed. The cleanup of five areas has yet to be completed at present time. Also in 1994 the EPA suspended all well drilling permits due to the 72 square mile plume contamination. Remediation and attempted cleanup of the contaminated ground water is in progress in accordance with the EPA.

Kennecott has cleaned up more than 25 million tons of waste material since 1991 and replaced that with another 20 million tons of clean material. Kennecott has spent more than $350 million on reclamation projects and over $100 million on ground water clean up (Whitehead 248; Bennett 2008). The listing of Kennecott as a superfund site continues to be deferred as they are still voluntarily complying with EPA standards.

Due to several successful cleanup projects, Kennecott has been used by the EPA as an example of a Superfund alternative site. Although the Kennecott site was never placed on the NPL, its cleanup can be considered a major accomplishment of the Superfund program and law. The threat of NPL listing served as a way to motivate Kennecott to voluntarily cleanup the site. The desire to avoid Superfund’s enforcement and liability provisions and the discovery of new real estate opportunities have come together to compel the cleanup of widespread contamination over thousands of acres in the Kennecott zone. Kennecott managers believed that by performing the cleanup themselves and avoiding NPL listing, they saved a great deal of time and money, and helped create a better future for Kennecott while maintaining valuable land holdings with reuse potential (Kennecott Mining Site 2006, 8).
Development of Kennecott’s Property: Sustainable Living

This section will discuss the development and future development plans of Kennecott Land, a sister company to Kennecott Utah Copper, which will be referred to as Kennecott throughout the remainder of this chapter.

Kennecott is currently developing their old mining property in the southwest area of the Salt Lake Valley for residential and commercial use. As the Salt Lake City metropolitan area has grown and consumed its hinterland, the valley land prices have risen. Kennecott owns over half the developable land remaining in the Salt Lake Valley; this area is the largest metropolitan landholding by a single owner in the United States. As prices have risen for land, so has Kennecott’s interest in developing their own property. As one journalist wrote, “Kennecott Land is also sitting on a gold mine — of real estate” (Smeath 2005). In 2004 they approached Salt Lake City and surrounding city officials to change zoning ordinances to fit with their master plan of the “west bench.” The officials complied with the changing of the ordinances allowing for residential and commercial zoning on the west bench after Kennecott paid an undisclosed amount to the University of Utah Business School in return for an estimate of the economic potential of the West Bench project. The study concluded that an estimated $12 billion in taxes and fees from the construction alone will be made by local governments. When the project is completed, it is estimated that the west bench area will generate $480 million annually in local tax revenue (Smeath 2005).
Figure 29 Salt Lake Valley, Kennecott Development Plans. Arrows and labels added. Source: Kennecottland 2008.

Figure 30 Daybreak master plan. Source: Kennecottland 2008
Daybreak

The Daybreak community is the first step in the West Bench project. It is incorporated with the city of South Jordan. Construction began in 2004 and will be completed by 2020. It is being constructed where once seepage ponds held 50 years worth of mining sludge (Kennecott Mining Site 2006, 11). Daybreak is a 4,200 acre master-planned community that will eventually have over 20,000 homes. The impacts on such things as the environment, transportation and available drinking water will be great. Daybreak is also planned for 45 acres of mixed use development and in 2007 Kennecott broke ground on a new three storey, 175,000 square foot office building located in Daybreak’s Village Center. As the promotional literature for the project explains, “the Daybreak Corporate Center, directly across from the Oquirrh Lake, will offer exquisite views to more than 600 professionals” (Kennecottland 2008).

Daybreak has been advertised as a sustainable community boasting 1,000 acres of open space, over 100,000 newly planted trees in the area to recycle carbon dioxide and a 37 mile trail system. The main goal stated on Kennecott’s website is to build “enduring communities” through six main areas: classic neighborhoods; public transit options; jobs and economic opportunities; parks, trails and open space; lifelong education; and natural resource conservation.
Figure 31 Picture looking east at Daybreak with the Wasatch Mountains in the background. Source: Kennecotland 2008

Figure 32 Picture of Daybreak with the Oquirrh Mountains and the Kennecott mine in the background. Source: Kennecotland 2008
Kennecott is promoting Daybreak as a sustainable development project, “It’s all about creating a sustainable community. A place that preserves the environment and the quality of life for today’s residents and for generations to come” (Kennecottland 2008).

Portrayed on Kennecott’s Daybreak website are hundreds of pictures depicting the new development, most of which use the backdrop of the Wasatch Mountains which are on the other side of the valley, although, Kennecott advertises Daybreak as “nestled at the base of the Oquirrh Mountains” (Kennecottland 2008). Very few pictures are used showing the Oquirrh Mountains with Daybreak actually being nestled at the bottom of the largest manmade excavation in the world.

Kennecott’s housing covenant, a document signed upon purchasing a home in Daybreak, includes the following disclosures:

due to the presence of elevated sulfate concentrations some of the soils are corrosive and/or conductive, which means the affected soils could cause damage to metal objects and/or certain types of concrete on the ground…while such sulfates, lead, arsenic and other metals in the groundwater may render the underground water undrinkable, it does not pose a health or safety concern or threat to individuals who may work, live or recreate in the Project (Lamb 2007)

Further, the “sulfates may make it difficult for certain types of plants to grow in the affected soils” (Warchol 2006). Hundreds of families have already purchased homes in Daybreak despite these statements, including the Bastian family as reported by the Deseret Newspaper:
Tyler Bastian bought one of the tasteful two-story, three-bedroom houses in Daybreak and admits, "The disclosure made me a little nervous when I saw it."

Bastian was vaguely aware of Daybreak’s environmental issues from news reports…"I can't imagine them [Kennecott Land] putting this much money into it if there was a serious problem," Bastian says. "It's such a huge, huge corporation, I can't imagine them risking being taken down over a small community" (Warchol 2006)

**Future Development**

The Salt Lake Valley is an area projected to grow by 1.2 million people over the next 20 years primarily from Utah families having children and grandchildren.

Kennecott states that:

The opportunity for quality growth is huge and it’s here now. We believe the West Bench is the logical place for long-term, quality growth in the Valley. We want to build enduring communities along Salt Lake Valley’s West Bench and we are working with the community to do it right (Kennecottland 2008)

The West Bench will be a place that features transit centers near homes, jobs for local residents, schools and open space.

Kennecott is planning for the eventual transformation from a private land holding into a public showcase of new communities and spectacular open spaces over the next 50 – 75 years, turning their 93,000 acres of reclaimed mining land into what they advertise as a sustainable community, although it sits atop a site once used as a tailings pond, and above an aquifer contaminated with sulfuric acid.
Figure 33  West Bench Master Plan, arrows and labels added.  Source: Kennecottland 2008
Geographical Growth of Kennecott, Consuming Everything in Its Path

Since the beginning of open-pit mining in 1906 the mine has grown in size as it disposes of its overburden material. Bingham Canyon has slowly been swallowed as this growth has taken place. The cities of Highland Boy and Copperfield, both predominantly owned and constructed by Kennecott in Bingham Canyon, were entirely bought up by Kennecott and dismantled by the end of the 1950s to create more space for the expanding open-pit. Further down the canyon was the city of Bingham, also owned and constructed by Kennecott was eventually bought up entirely and completely torn down in the early 1970s. The city of Lark, once located at the base of the Oquirrh Mountains below the open-pit, again being owned and constructed by Kennecott was torn down in 1978, and the area is now covered by mine tailings.

In 1915 Kennecott’s ore reserves were listed at 390 million tons. Due to technological advancements that allowed for further exploration of the ore bodies and the ability to process low grade ore more effectively, every year for the next forty years greater and greater quantities of ore reserves were indicated despite the quantity mined during that year. In 1930 reserves were listed at 630 million tons, enough ore to extend the mine’s life 20-25 years. By 1940 reserves were listed at 100 million tons, and in 1963 Kennecott estimated that it could continue actively mining for another thirty years (Arrington 1963, 79). In 2005 Kennecott announced that it could continue actively mining until the year 2020. In 2008 Kennecott released information stating that it was possible to continue mining until the year 2036 (Bennett 2008).
Figure 34 Progression of open-pit mining 1900 to 1990s. Source: Crump 2005
Has Kennecott instilled in its neighbors at Daybreak a false sense of a terminal mine; convincing residents that the mine will only be in operation for the next couple years?

In a newspaper article published March 9, 2008 the author explains how the rising copper and gold prices have Kennecott rethinking development plans. Kennecott is already having second thoughts on whether to continue developing land that could possibly be mined in the future as prices rise. After a meeting with Kennecott, Salt Lake County Mayor reported that “gold and copper are doing very well, and they [Kennecott] made an economic decision to focus on their mining, which is very successful.” Clearly Kennecott has its priorities in mining and Kennecott has continued to expand in the past, constructing towns to only bury them as production of copper increased. As the life of the mine continues to be prolonged will the day come that the money to be made in copper will also cause Kennecott to tear down and bury another one of its developments in Daybreak?

**Current Events and Trusting Kennecott**

Since 1908 Kennecott has been using a tailings pond in the northeast corner of the valley to store mining refuse. Today this tailings pond holds over 1 billion tons of material. By 1988 the Salt Lake City metropolitan area had expanded to the west, enough that a community of over 200 residential homes neighbored the pond. During that same year Kennecott was told by engineers that the tailings pond and its containment barriers were at too high of a risk to breach in a big earthquake. If the pond were to breach it would completely cover the neighboring 200 homes and more. Kennecott was
advised by several lawyers to announce the possibility of a dam failure in the event of an earthquake to the public due to liability reasons. Instead, Kennecott ignored the lawyers and made deals with state regulators to keep the frightening engineering reports out of the public eye.

Figure 35 Tailings pond and proximity to residential community 2008. Also shown: 15 foot berm. Source: base map adapted from google maps 2008
Figure 36 Tailings pond in 2000 before being drained of water, compare to Figure 35. Source: NASA 2000

In 1990 and 1991 Kennecott, through a “middle man,” bought up 39 homes in the area and left them vacant to act as a buffer while they secretly began what is now a 30 year multi-million dollar project to stabilize the dams. Kennecott also built a boomerang shaped berm fifteen feet high around the residential community to act as a secondary barrier without disclosing its purpose to residents. In 1997 Kennecott sold the remainder of the homes it had bought up as the fortified dam became less of a risk to breach.

In the beginning of 2008 Salt Lake Tribune journalists dug up documents that revealed the Kennecott cover-up. Since the story release in May, Kennecott has apologized for the cover-up and in what seems to be an attempt to gain good publicity has donated several hundred thousand dollars to local charities. The remediation process of the tailings pond included structural fortification of already existing dams and the draining of water from the pond to make the material less viscous. Since the draining of
water, air traffic controllers have witnessed through the airport tower, located a short
distance from the tailings pond, large dust clouds being kicked up over the area during
high periods of wind. This creates another possible health hazard that has yet to be
investigated. Presently the dam and the tailings pond have been deemed safe even in the
event of an earthquake but ten years remain to fully fortify the tailings pond (Fahys 2008;
Stettler & Oberbeck 2008).
CHAPTER 5

ENVIRONMENTAL JUSTICE AND REVERSE NIMBYISM: URBAN DEVELOPMENT IN CLOSE PROXIMITY TO HAZARDS OR INDUSTRY

On the basis of the literature on environmental justice (Been 1994; Been & Gupta 1997; DeFur et al 2007; Pastor 2001; Deverell 2005; Schlosberg 2007) it would seem reasonable to assume in regard to Kennecott and Salt Lake City metropolitan area growth that those living/moving nearest to the area would most likely be of lower class and/or minority groups. Vicki Been defines the environmental justice movement as such, “The environmental justice movement contends that people of color and the poor are exposed to greater environmental risks than are whites and wealthier individuals.” She explains why poorer minorities live next to LULUs (Locally Unwanted Land Use):

The dynamics of the housing market therefore are likely to cause the poor and people of color to move to or remain in the neighborhoods in which LULUs are located, regardless of the demographics of the communities when the LULUs were first sited (1994)

In “Which Came First? Toxic Facilities, Minority Move-In, and Environmental Justice,” Pastor (2001) states that research suggests minority residential areas are more likely to host environmental hazards, and goes on to ask, “Is the current pattern of environmental inequity a field of bad dreams: Build it and minorities will come?” Been & Gupta (1997) suggest that disproportionate exposure could be due to reflections of the market; minorities and LULUs will be attracted to areas with lower housing values, and in fact, minorities may move in after the arrival of a new LULU. Been describes five factors that may contribute to poor minorities living near hazardous areas (1) poverty, (2) housing discrimination, (3) the location of jobs, (4) transportation, and (5) other public services that aid in these groups to "come to the nuisance -- to move to neighborhoods that host
LULUs -- because those neighborhoods offered the cheapest available housing” (Been 1994). Significant evidence suggests that poor minorities are disproportionately located in close proximity to LULUs (Been 1994). Schlosberg (2007) states that:

Most discussions of environmental justice focus on maldistribution – the fact that poor communities, indigenous communities, and communities of color get fewer environmental goods, more environmental bads, and less environmental protection.

Other research done on the topic of environmental justice suggests that industries have deliberately located their facilities near minority communities in hopes that because of their low income and minority status they will not have the political prowess to oppose the location of the facility. Such action by these industries has been referred to as “siting” (DeFur et al 2007; Pastor 2001; Deverell 2005). Boone and Modarres (2006) also describe this deliberate location of hazardous facilities in proximity to minority communities as “environmental racism.” As residents move closer and closer to Kennecott one would assume that (a) land values would be low near the disamenity, fostering low-income development, and (b) the company would encourage low-income development so as not to be troubled by the heightened environment sensibilities and political power of wealthier residents.

A field of inquiry which falls within the broader sphere of environmental justice is NIMBYism. The term NIMBY (Not In My Back Yard) has been around since the early 1980’s and refers to social opposition to LULUs. This opposition is usually associated with unwanted land use that is perceived to have negative environmental and health impacts (Schively 2007). Peter Sandman (1985) states that aside from health risk the community’s greatest concerns are: a loss in property value; being able to stop other
LULU’s from siting once one already has; decline in quality of life due to odors, truck traffic and noise; suffering of community image; overburdening of community services; and the questionable aesthetics of the facility.

It is possible that the relationship of Kennecott to Salt Lake City is an example of “reverse” NIMBYism. In other words, as NIMBYism is the opposition to the siting of facilities in already established communities, “reverse” NIMBYism will be defined as newly established community opposition to a previously sited facility that was constructed before residential encroachment. This thesis explores whether such opposition has occurred as residents and communities encroach upon the already existing Kennecott facility.

**Race and Ethnic distribution in Salt Lake County**

The Salt Lake County minority population more than tripled from 1980 to 2000 to reach 171,190. The majority of the minority population in Salt Lake County is Hispanic as shown in Table 5 (Perlich 2006, 10).
Table 5 Source: Perlich 2006, 10

<table>
<thead>
<tr>
<th>Race and Ethnicity of the Population</th>
<th>Salt Lake County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population</td>
</tr>
<tr>
<td>Total</td>
<td>898,387</td>
</tr>
<tr>
<td>Not Hispanic or Latino</td>
<td></td>
</tr>
<tr>
<td>White alone</td>
<td>791,600</td>
</tr>
<tr>
<td>Black or African American alone</td>
<td>727,197</td>
</tr>
<tr>
<td>American Indian</td>
<td>8,501</td>
</tr>
<tr>
<td>Asian alone</td>
<td>6,487</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>10,865</td>
</tr>
<tr>
<td>Other race alone</td>
<td>912</td>
</tr>
<tr>
<td>Two or more races</td>
<td>14,922</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>106,787</td>
</tr>
<tr>
<td>Minority</td>
<td>171,190</td>
</tr>
</tbody>
</table>

Minorities account for 19.1 percent of the county’s total population, and the total minority population of Salt Lake County accounts for over 50 percent of the states minority population. This distribution and the population growth over the past 100 years is shown in Table 6.
As shown in Figure 37, minority groups are mainly concentrated in the north and northwest end of the valley away from the copper mine. The southwest corner of the valley has the lowest distribution of minority groups in the county, with South Jordan’s neighboring cities of Bluffdale and Riverton having minority populations constituting at 5.3% and 4.6% of their total populations.
Income Distribution

Median household income in the north and northwest of Salt Lake County are the lowest, with Salt Lake City itself being at $36,944. Interestingly enough as you draw closer and closer to the copper mine in the southwest corner, median household income rises. South Jordan has the highest in the area at $75,433 (See Figure 38).
Also following those same trends is the share of persons below the poverty line. Again, the north and northwest having the highest percentage of people below the poverty line, and closer to the mine are the lowest percentages of poverty in the valley (See Figure 39).
Assumptions Based on Race and Minority distribution and Income

Again, as residents move closer and closer to the mine and Kennecott develops its land, there are two assumptions that might be made, (a) land and home values would be low near the disamenity, fostering low-income development, and (b) the company would
encourage low-income development so as not to be troubled by the heightened environment sensibilities and political power of wealthier residents.

The median selling price of a home in Salt Lake County from January 2008 to April 2008 was $242,000. In South Jordan, Utah, at the southwest corner of the valley where Daybreak is being developed by Kennecott, the median selling price of a home in 2008 is $345,000 with the majority of those homes actually being sold in Daybreak (Mitchell 2008), showing no signs towards fostering low income development.

“Reverse NIMBYism”

An article entitled “Everyone On the Bus: Consultants Help Builders and Developers Convert Opponents Into Proponents” states:

Kennecott Land’s extraordinary effectiveness in involving citizens, planning commissioners from adjacent jurisdictions, and community leaders is the result of its compelling communications campaign for its West Bench project (Reber 2006, 67)

This “compelling” campaign was designed by the San Francisco based company, GCA Strategies. Kennecott hired GCA to rally community support for the West Bench project and spent millions of dollars on public relations and advertisement. In an interviewed I conducted with Debra Stein, CEO of GCA Strategies, she explained that “the West Bench project has the potential to be a NIMBY.” It was her job to make sure that didn’t happen. In an article titled “GCA Success Stories” published on GCA’s Website, it states:
Gaining community and political support for Kennecott Land Company's 90,000 acre West Bench project is one of the greatest entitlement permitting challenges in America. GCA's challenge: to develop the first-phase entitlement strategy and create initial citizen and political acceptance for this massive project (GCA 2008).

This discussion then goes on to say that “results exceeded all expectations” (GCA 2008).

The first-phase entitlement strategy created by GCA for Kennecott Land included a detailed government relations program, a comprehensive community outreach plan, meta-analysis of existing opinion research, customized multivariate analysis telephone survey for Kennecott and a designed tiered community outreach plan. This plan focused on stakeholders, influential people, constituents and the press. It developed key messages, provided communications training for key outreach team members, and is providing on-going consultation on government and community outreach challenges as Kennecott moves forward with the West Bench project (GCA 2008).

It is through the hiring of GCA and the implementing of these strategies that Kennecott has been able to gain stronger support from the community about the West Bench project and on the mine. Referring to the strategy used by GCA, Reber stated, “in the end, they witness how those who once said ‘not in my backyard’ change into those who recognize the development's benefit to the community” (2006, 68).
In interviewing local Daybreak residents I asked three questions: (1) what were your reasons for moving to Daybreak; (2) how high of a priority was public health and
environmental safety in your decision in finding a home; and (3) how do you perceive Kennecott? Reasons for moving to Daybreak were as follows: amenities such as parks, a wonderful elementary school, lakes, sense of community that is created through planned neighborhoods, pedestrian friendly, availability of new homes, far enough away but not too far away from Salt Lake City downtown area and the future building of a religious temple within the development. Most said that the threat of environmental hazards or contamination was very low in their priorities towards choosing a house. Those interviewed also said that they were very trusting of Kennecott and if the city of South Jordan said it was okay to build then it must be okay to live there as well. Most of the interviewees felt that Kennecott was a very good and trustworthy company and they had never heard anything bad about the company or its operations. Significantly none of those interviewed had any knowledge of Kennecott’s past usage of the current Daybreak land or the proposed listing as a Superfund site.

The local newspapers have been very positive in their reports on Kennecott and Daybreak boasting such titles as: “Sun Shines on Daybreak,” “West Bench – Property might give Salt Lake County tax, jobs, windfall,” “Creating a Vision for Salt Lake’s Future” (Deseret 2008). No reports were found that described the old mining use of the land. Local newspapers appear to be positive and may lack information on environmental studies of the area, not providing local residents or would be home buyers with information on potential hazards.

Blair Bangerter, co-owner of Bangerter Homes (construction company contracted by Kennecott to build hundreds of homes in Daybreak), in an interview stated that he felt safe in Daybreak, that the project brought innumerable benefits to the area and the valley.
He said, “this (referring to Daybreak) is probably one of the safer places to live, the EPA has paid so much attention to it and Kennecott has done everything required it to be able to build – it’s safe.” Asking him about people’s perceptions of Kennecott and potential hazards he stated, “people don’t ask, no one asks about the mine or environmental hazards, they trust Kennecott, they trust the local government” (2008). Ron Ricks, a former supervisor for ten years at Kennecott, said in an interview that he trusts Kennecott, in working for them he was never lead to believe otherwise, “If Kennecott says it then they are going to do it. If they say they are going to cleanup and want to protect the environment then they will. They won’t just say those things for good PR, they believe them and implement them” (2008).

In an interview with Mark Knold, the Senior Economist for the state of Utah, I asked the reasons why people are moving closer to the mine, he stated “it’s because there is no where else to go. If you want a new home you have to move to the south end of the valley” (2008).

In asking former Utah Governor Norman Bangerter about his perception of Kennecott he stated, “Although Kennecott has polluted a lot and the overburden (mine tailings) may be an eyesore, they have done much more for Utah in way of parks, jobs and so much more” (2007). In an interview with Scott Crump, an honors history teacher at local Bingham High School and author of several books on Kennecott and surrounding mining towns, I asked his opinion about Kennecott’s new interest in public relations. He replied:
Now that they are moving into real-estate they are trying to appear socially responsible, they are the largest money donor for Bingham’s new football stadium scoreboard (will be the first scoreboard in the state to boast a large TV screen for instant replays). If they want to be the largest builder in South Jordan they need to give something back (2007)

In reference to Table 7, there appears to be three general classifications of environmental awareness and concern: A, unaware and unconcerned; B, aware but unconcerned; and C, aware and concerned.

Most residents or would be home buyers appear to be in category A, unaware and unconcerned. Even after signing documents included in the housing covenant stating that they are aware of possible soil contamination, most remain unconcerned and only slightly more aware.

Developers, local government and the local newspapers appear to fall into category B, aware but unconcerned. Although they are knowledgeable about the contaminated ground water and remediated soil, they trust in the efforts made by Kennecott and remain unconcerned.

The environmental community is labeled in category C, aware and concerned. Such organizations as Earthworks and Save the Wild UP have both stated concerns over Kennecott and its downplaying of pollution to local media and residents. Both have expressed concerns over hazardous material in close proximity to local residents and are untrusting of Kennecott.

Possible Explanations

There seems to be evidence suggesting that the state of Utah and the Mormon cultural region are less involved in or aware of the environment in comparison with the
rest of the nation. This could possibly effect people’s perceptions of Kennecott and Daybreak in relation to the environment.

In an article titled “The Geography of American Environmentalism” Mazur and Welch discuss the geographic distribution of environmentalism among states. They found that Utah is one of the states least concerned with environmental protection (1999). Another article specifically addresses Mormon attitudes towards environmentalism, this being significant seeing that over 60 percent of Utah’s population is Mormon. The article found substantial differences between Mormons and the rest of the U.S. in terms of environmental involvement. Although Mormons tend to express high levels of environmental concern, they are less likely to have engaged in environmentally-oriented behaviors such as joining or donating money to certain environmental groups or participating in organized environmental activities (Hunter & Toney 2005).

As these articles suggest, Mormons are concerned with the environment but do not enter into any activity that would demonstrate this concern. In people’s perceptions of Kennecott, Daybreak and the environment, perhaps they are concerned with environmental hazards but not enough for them to either take action or to keep them from buying a home on remediate mining land. There is also a significant trust in local government, business and institutions.
CONCLUSION

How has Kennecott managed to remain in operation while being adjacent to a large population center, while turning a picturesque mountain range into a pile of orange tailings, polluting city’s aquifers, soils with lead and arsenic, the Great Salt Lake with mercury and selenium, and other environmental problems amounting to billions of dollars in potential cleanup? How has Daybreak been so successful while being located on a site once used as a tailings pond and located above a sulfuric acid contaminated aquifer? These contaminants are supposedly remediated because they are covered with a thick layer of “clean” soil, but would the general population want to live on top of a capped landfill? Is there a difference between that and Daybreak?

It is possible that if Kennecott were located anywhere in the U.S. outside of the mountain west it would not have enjoyed such success as it has in Utah. It is apparent that its “high profile” status established through its economic prowess in the first half of the 20th Century, public relations influencing community perception, regional environmental perception, amenities provided by Kennecott at Daybreak and lack of options have allowed Kennecott to remain in full operation and its residential development to be successful despite the fact that it has turned a mountain into an amphitheater, is located near such a large population and has polluted such a large area in the Salt Lake Valley.

Kennecott has managed to remain in full operation and be successful with Daybreak for the following five reasons: economics, public relations, environmental perception, amenities, and lack of alternatives.
1. Economic

Even though there was religious opposition to mining at first, eventually the Church and the rest of the community began to see mining as a way to bolster the economy. Mining became the roots upon which the Utah economic tree grew. The state’s economy rose and fell with the ebbs and flows of the mining industry in the first half of the 20th Century, helping establish Kennecott as a “high profile” industry in the Salt Lake Valley. Kennecott retained its “high profile” status despite the diversifying of the Utah economy during the 1960s and 70s, which helped the state’s economy become independent from mining. It is through this “high profile” status that Kennecott has been able to remain trustworthy and influential in the community and in the political arena despite its status being undeserved since the 1980s.

2. Public Relations

Kennecott has been deemed as “old reliable,” consistently producing and exploiting Utah’s natural resources for over 100 years. The Kennecott Land Company has been able to use public relations to separate itself from the mine by advertising itself as the opposite: sustainable, open space, a healthy community and natural resource conservation. In hiring GCA Strategies Kennecott was able to influence community perception of Daybreak and also influence politicians and decision makers with the promise of increase income through millions of dollars of tax money.

While researching this topic it took some effort to dig through the carefully-crafted image that Kennecott was releasing to finally see the legitimate concerns over the mine and residential development.
3. Environmental Perception

Also influencing the way in which Kennecott is perceived, especially in regards to the environment, environmental degradation and safety is the way in which the region’s residents perceive the environment. Articles suggest that Utah is one of the states least concerned with environmentalism, and also that Mormons are concerned with the environment but do not enter into any activity that would demonstrate this concern. In people’s perceptions of Kennecott, Daybreak and the environment, perhaps they are concerned with environmental hazards but not enough to either take action or to refrain from buying a home on remediate mining land.

4. Amenities

Included with the three above mentioned points are the benefits of the amenities offered as part of the Daybreak development project. Through interviews it appears that great amenities and a good location outweigh potential risks that may come with living on a pile of remediated mine tailings. Obviously the benefits of amenities in relation to risk is influenced heavily by the afore mentioned points. Local residents clearly place higher priority on amenities such as: good schools, lakes, walkable communities, open space, trails, parks, mountain vistas, community garden and community center.

5. Lack of Alternatives

For many people wanting to purchase a home outside of the densely populated Salt Lake urban area there are no other options but to move closer to the mine. As with
amenities, the opportunity to purchase a house just outside of the urban area outweighs the possible risks. This is so much the case that Kennecott is able to sell housing in this area to middle and upper-class home buyers.

**Relevance for Future Research Projects**

This study of the growth of Salt Lake City toward an environmental disamenity and the development of the Daybreak community on recently mitigated land contributes a cautionary counterpoint to the literatures on environmental justice because contrary to the standard hypotheses of environmental justice there seems to be no correlation to disadvantaged people and hazards or mitigated hazards in regards to Kennecott and the Salt Lake City metropolitan area. In fact some of the mitigated areas, such as Daybreak, are now home to upper-middle class residents, it is important for all such studies to take local contexts into account. Moreover, this thesis demonstrates that it is almost impossible to understand the relationship between pollution generating land use and community’s growth and development without first understanding the specifics of space and time of a certain location.

**The Future of Daybreak and Kennecott?**

This study is very specific in terms of the time period in which it was researched and written. Circumstances could vary greatly within the next two years or longer. This topic may become more positive in that Kennecott’s model of using public relations and other site specific things provided them could be used as a successful model of how to use remediated mining land. Or this topic may become more negative as unknown data
may arise to hurt Kennecott’s reputation. During the first half of 2008 there have been several revelations about Kennecott’s environmental practices which may challenge the company’s ability to maintain a positive “spin” on their environmental record.

Future study could be conducted on the specifics of the cleanup costs and removal of waste material in order to establish how “voluntary” cleanup became an economic investment. Future studies of community health in and around remediated mining areas could be beneficial in better reassuring or warning the public about the remediation process in relation to urban development.
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