A VISITOR'S GUIDE TO THE W.M. KECK EARTH SCIENCE AND MINERAL ENGINEERING MUSEUM AT THE MACKAY SCHOOL OF EARTH SCIENCES AND ENGINEERING

INTRODUCTION

This guide to the W. M. Keck Earth Science and Mineral Engineering Museum (known as the W. M. Keck Museum) points out many highlights of the facility, but there is much more to be discovered for those with an interest in exploring the details. It is difficult to enjoy all that the W. M. Keck Museum has to offer in just one visit; therefore making more than one visit is strongly encouraged. One will find a treasure-trove of geological and historical displays contained within the walls of the museum.

Throughout this guide technical words and phrases are used, most of which are defined in the glossary at the end of the text.

OUTSIDE OF THE BUILDING-MACKAY STATUE-COMSTOCK LODE

In 1906 Clarence Hungerford Mackay and his mother, Mrs. Marie Louise Mackay, agreed to finance a new mining building at the University of Nevada, as a memorial to Clarence's father and Marie Louise's husband, John W. Mackay. They commissioned William S. Richardson of the New York architectural firm McKim, Mead & White to design the building. After visiting the campus, the Mackays chose a site at the north end of the quadrangle for the structure. In 1907 Clarence Mackay also agreed to finance the beautification of the quadrangle, which was known for many years as the Mackay Quad, in recognition of the donor. On June 10, 1908 the Mackay Mines Building and the statue of John W. Mackay were dedicated. The original building was designed for about 40 students.

The statue of John W. Mackay that stands at the entrance of the Mines building was sculptured by renowned artist Gutzon Borglum, the same man who created the presidential busts on Mount Rushmore. Mackay's statue was also a gift from Clarence and Marie Louise Mackay. Take a close look at the Borglum sculpture. It is made of bronze, which is a copper-tin alloy. John William Mackay holds in his right hand "a bit of the good earth of Nevada from which issues the wealth which brought into being the State and provides it with material progress" and in his left hand a miner's pick symbolizing "toil, industry, and ambition." Mackay is also dressed as an early miner and peers into the future. Who was John Mackay, and why is he so honored? Mackay was born in Dublin, Ireland in 1831 and came to Nevada in 1859 as part of the prospecting rush to the Comstock, near Virginia City. He was a partner in the group that developed the Big Bonanza silver deposit in the Comstock, which produced millions of dollars in gold and silver during the 1870s and 1880s. Clarence H. Mackay decided to give back to Nevada some of the wealth that he obtained through his father. He decided on the University of Nevada because of its continuing service to the people of the state. Clarence and his mother felt that mining would always be a basic Nevada industry.

In 1926 Clarence Mackay donated another $100,000 for modernization of the Mackay School of Mines building. This gift allowed for the expansion of the building with the addition of a second floor behind the two story front. In 1988 the building underwent a major renovation, including a seismic retrofit and the installation of a steel frame for support.

The building reopened to the public during homecoming festivities in October of 1993 and the museum was renamed the W. M. Keck Museum in recognition of the generous gift from the Keck Foundation making restorations possible.

The Comstock mining district is extremely important in Nevada's history, as well as the history

of the Mackay School of Mines. Gold was first discovered in Gold Canyon, near present day Dayton, in 1850. These placers were worked until rich silver ore was discovered at Gold Hill and the main part of the Comstock in 1859. The discovery of silver caused the "rush to Washoe" that resulted in the formation of Virginia City and the Nevada Territory. By 1864 there were sufficient people living in the area, and President Lincoln needed the "good Republican" votes, that Nevada was granted statehood. Since discovery, the Comstock has produced several hundred million dollars worth of gold and silver. If the value of the silver and gold were calculated at current metal prices this would be one of the richer mining districts in the world.

LIBRARY-ENTRANCE

Immediately inside the front door of the building is the entrance to the DeLaMare Library, which contains books, maps, government publications, periodicals, theses and microforms related to the fields of mining, engineering, geology, computer science, and geography. The library was named in honor of Grover Whitby "Dee" DeLaMare (1912-1989), a 1938 graduate of the Mackay School of Mines. DeLaMare was associated with the discovery of several Nevada gold mines.

On the wall above the stairs to the second floor is a cast of *Hydrotherosaurus alexandrae* Welles, an 85 million year old long-necked swimming reptile. The fossil was discovered in Fresno County, California. See the plaque on the wall for details about this prehistoric reptile. There is also a map of the western United States that shows the extent of the ancient sea where *Hydrotherosaurus* lived.

W. M. KECK MUSEUM

OVERVIEW OF CONTENTS

The museum was founded in 1908 as the Mackay Mineral Museum to house minerals, rocks, and fossils from Nevada and around the world. The collection also includes numerous mining artifacts from Nevada, historical photographs and maps, and a portion of the Mackay silver collection. The present day museum is the result of a generous grant from the W. M. Keck Foundation. The foundation was established in 1954 by William Myron Keck, founder of the Superior Oil Company. A grant from the foundation was received in 1988 and used to modify the museum to its present form.

MAIN FLOOR

Most of the displays on this floor are minerals housed in cases built in the early 1900s and installed when the museum originally opened in 1908.

Most of the cases along the walls and in the center of the room have numbered plates below the display. The descriptions below are referenced to the case numbers. Below most of the displays are storage units that contain research specimens. These are locked, but are available to researchers. Above the cases on the east wall (to the right upon entering) are a series of pictures of Nevada mining camps. These camps can be located on the relief map of Nevada along the wall opposite of the entrance. Several of the descriptions below contain phrases in bold caps, which refer to titles in the cases.

GLASS CASE CONTAINING LARGE
MINERAL SPECIMENS (to right upon entering the main floor of museum)

Note that each specimen is labeled with the mineral name and the collection locality, if the locality is known. Above the case is a painting of the 1880s Virginia City by Fred E. Green of Virginia City.

CASES 1 THROUGH 14 (west wall of museum)

The minerals in these cases are examples of the Dana system of mineral classification. In CASE 1 the posters at the top and the left side describe many of the properties that are characteristic to individual minerals and how these properties are used to identify minerals. In CASE 2 through CASE 14, there are examples of the various classes of minerals. In each display there are posters that supply additional information about the mineral classes, and other pertinent information. Minerals in these display cases are also used as study sets for students of geology and mineralogy.

Above the cases are a series of mineral photographs by M. J. Hibbard, Professor Emeritus of Mackay School of Mines. Below each photograph is a description of the mineral.

LEFT OF CASE 1

Here is a large specimen of quartz crystals and a block of blister copper from the Nevada Consolidated Copper smelter that was in McGill, White Pine County, Nevada. Blister copper is an initial product in the purification of copper. Copper minerals are removed from the ore by milling, and then smelted to produce blister copper. The name “blister copper” comes from the bubbles on the top to the block of copper.

NORTH WALL (wall opposite of the entrance)

To the left (as you face the wall) is a drill that was used in underground mines to drill holes in rock. The holes were filled with an explosive to break the rock for removal from the mine.

At the center of the wall is a raised relief map of Nevada that shows the locations of the principal towns, counties, and mining districts within the State. Nevada is part of the Basin and Range geologic province, which is defined by north-south trending mountain “ranges” with intervening valleys or “basins”.

To the right of the relief map is a collection of ore specimens from around the world donated by William Mayrsohn. Note the large pieces of native copper from the Upper Peninsula of Michigan.

Above the Mayrsohn case is a satellite image of the Las Vegas/Lake Mead region.

The safe in the right corner was used by John Mackay in his office in Virginia City and contains ore specimens from several Comstock mines. Above the safe are pictures of the four “Silver Kings” and owners of the Big Bonanza mine: John Mackay, James Fair, James Flood, and William O’Brien

CASE 15

Here is a portion of the Leonardi mineral collection. Modesto Leonardi was a graduate of the Mackay School of Mines and worked for many years as a senior manager for U.S. Borax, in addition to being an avid mineral collector. In the upper left-hand portion of the case is a large specimen of native silver. Above the case is a photograph of Nenzel Hill at Rochester, Pershing County, Nevada.

CASE 16

This case holds a variety of minerals, mostly from Nevada, donated by Elwin Fisk, Mackay School of Mines Class of 1951. Note the collection of Wulfenite crystals in the lower left-hand corner of the case. Wulfenite is a mineral that contains both lead and molybdenum. Above the case is a photograph of Rochester, Pershing County, Nevada.

CABINET TO LEFT OF TALL CABINET

The case contains a portion of the William Mayrsohn mineral collection. Notice the piece of refined copper. This is the basic material used to make copper wire, and other copper products. Above the cabinet is a location map for the abandoned copper mines on Peavine Mountain, northwest of Reno, Washoe County, Nevada.

TALL CABINET TO LEFT OF CASE 18

Here are two rare minerals discovered in Nevada by researchers at the Mackay School of Mines. Both minerals occur in the mercury deposits at McDermitt, Humboldt County, Nevada.

CASE 18

This case contains a portion of the J. D. O'Brien mineral collection. The specimen of Lazulite in the bottom center of the case is a relatively rare mineral found near Death Valley. Above the case is a 1914 photograph of Gold Hill, Storey County, Nevada.

CASE 19

This case contains several examples of petrified wood from western United States. The two placards describe petrified wood and how it formed. Above the case is a 1914 photograph of Virginia City, Storey County, Nevada.

CASE 20

NEVADA ORES AND MINERALS. The case contains a variety of ores that have been mined in Nevada. Note the several gold ore specimens, none of which contain visible gold. This is typical of Nevada gold ores, even in mines that are currently in operation. Above the case is a photograph of Rawhide, Churchill County, Nevada taken in September 1909.

CASE 21

METALLURGY OF IRON AND OTHER MINERALS. The iron ore specimens are from the iron ranges of the upper Midwest. The remainder of the display contains examples of the various commodities produced from iron ore.

Above the case is a photograph of a mine and mill, the location of which is unknown.

CASE 22

This display illustrates how diamonds form and the rocks that are associated with diamond deposits. The replica of the 726-carat Jonker diamond was presented to the Mackay Museum (original name for the Keck Museum) by Harry Winston in 1938. Mr. Winston was one of the important diamond dealers in New York City. Above the case is a photograph of Goldfield, Esmeralda County, Nevada.

CASE 23

RIO TINTO MINE, MOUNTAIN CITY COPPER COMPANY, MOUNTAIN CITY DISTRICT, ELKO COUNTY, NEVADA-left side of the case. These are copper ores from the Rio Tinto mine near Mountain City, Elko County, Nevada. Most ore that is mined is massive, like this, not the crystalline forms that are displayed in Cases 24-26.
OTHER ORES: ALUMINUM, CHROMIUM, COBALT, MANGANESE, NICKEL-right side of the case. These are a variety of ores from western United States. Brucite (top part of the case) is magnesium ore that is mined near Gabbs, Nye County, Nevada. Above the case is a photograph of the Bellmont mill and Buckeye mine in Tonopah, Nye County, Nevada.

CASE 24
Here is a collection of minerals mostly from Nevada, note the two high-grade gold samples in the middle of the display. The bright yellow mineral in these specimens is native gold.

CASE 25

SOUTH AMERICAN MINERALS DONATED BY R. SCOTT WERSCHKY. Most of these are crystals from Peruvian mines. The epidote specimen is an unusual crystal form for the mineral. Above this case is an original map of the Treasure Hill area, White Pine County, donated by Frank and Sharon Lewis.

CASE 26

This case contains a variety of minerals, many of which are from Nevada mining districts. The fluorite crystals are unusually large.

CASE 27 AND 28

This is a rotating exhibit case that has been used for a variety of displays, including Minerals of Nevada, featuring specimens that appeared in a 2003 book published by the Nevada Bureau of Mines and Geology and the Nevada Press; and the 50 Millionth Ounce of Gold produced from the Carlin Trend. Fifty million ounces is a lot of gold and there are only a few regions in the world that have been as productive. The commemorative coin minted for this occasion is on display downstairs in the Silver Room.

CASES 29, 30, 31, and 32

Posters in these cases describe the various minerals
produced and some of the mining districts of each Nevada County. The azurite and limonite specimens in case 31 are from the copper mines near Ely, White Pine County, Nevada. Note the

pictures of the Fairview and Goodsprings mining districts in these cabinets.

CASES BETWEEN 30 AND 31

These are rotating display cases. Exhibits are changed on a regular basis and are frequently designed by the students working at the museum.

CASE 33 and 34

INDUSTRIAL MINERALS. These are non-metal minerals and rocks that are mined for use in daily life. The poster at the back right of the case describes some of the industrial minerals mined in Nevada. Although not truly an industrial mineral, in the upper center of the case is a sample of crude oil from Railroad Valley, southwest of Ely in Nye County, Nevada. Some of the oil produced in Railroad Valley comes from Tertiary volcanic rocks, truly an unusual oil occurrence.

CASE TO RIGHT OF 34

Quartz is found in a variety of forms and colors, some of which are illustrated in this case. The large mass of smoky quartz crystals from Brazil is an unusual form.

CASE 35

MANGANESE/MAGNESIUM. Here are manganese and magnesium minerals that have been mined to produce these elements. In the lower left row is a specimen that was dredged from the ocean's floor.

CASE TO LEFT OF 35

Calcite has a variety of forms, many of which are displayed in this case. At the left center of the case note the double image formed as light passes through a calcite crystal. The explanation for this refraction of light is on the card above the crystal.

CASE 36

IRON. Here are examples of iron bearing minerals, most of which were mined as iron ores. The poster at the back of the case describes many of the uses for iron.

CENTER OF CASE 35-36

LEAD. This case holds several examples of lead minerals. Galena is the mineral commonly mined for its lead content. The poster at the back of the case describes many of the uses for lead.

CASE 37

GOLD ORES. These are examples of gold ore from Nevada, and other parts of North America. The poster at back of case describes some of the uses for gold.

CASE 38

SILVER ORES. These are specimens of silver ore from Nevada and throughout the world. The

poster at the back of case describes some of the uses for silver. Note the pictures of Pioche and Austin, which were two of the larger Nevada silver districts.

CASE TO LEFT OF 39

NEVADA AGATE, OPAL, & PETRIFIED WOOD. These are all forms of silica. Even the petrified wood is a replacement of wood fibers by silica.

NEXT CASE TO THE LEFT

A variety of garnets are displayed in this case. In the upper part of the case is a description of the six most common varieties of garnet.

CASE 39 AND 40

MACKAY SPECIAL COLLECTION. This is a collection of the museum's finer mineral specimens. Some of the more spectacular minerals include an azurite from the Washington Roebling collection (designer of the Brooklyn Bridge), a delicate wulfenite crystal cluster, a very large smoky quartz from the Lake Tahoe area, and a group of opals from northern Nevada. The opal specimens are encased in water in order to preserve their opalescent properties. If allowed to dry, opal will disintegrate and cease to reflect light.

CASE TO RIGHT OF 40

Here is another rotating display.

CASE TO LEFT OF 41

This is a display of turquoise. Nevada has produced turquoise for several hundred years and was once the largest producer in the United States. Native Americans first mined the mineral to use as jewelry and in trade. Note the various colors of turquoise in this display. The cut turquoise was shaped and polished by Frank Margrave, a longtime Reno resident, and was donated to the museum by his wife, Luella Margrave, in memory of her husband.

CASE 41 AND 42

The principal portion of this display is **COPPER ORES**, mostly from western United States. Copper ores are among the most colorful, occurring in shades of striking blue and green, and in a variety of crystal shapes. The azurite and malachite specimens are among the most attractive in the museum. The poster at the back right of the display describes many of the uses for copper. The left one-third of the cabinet is a display of zinc ores. The slab of metal in the back left is refined zinc, produced from the processing of zinc ores. The poster at the back left of the case describes many of the uses for zinc.

CASE TO RIGHT OF 42

This case contains several artificial "minerals" and in the lower right is a display of birthstones.

CASE TO LEFT OF 43

This case is another rotating exhibit.

CASES 43 AND 44

The right third of the case contains a variety of minerals from around the world. The center third of the case is the Samuel Brady Collection of Lake Superior Ores and Minerals. Note the two copper spear points that were made by Native Americans before contact with Europeans. The left third of the case is a display of mercury minerals, mostly from Nevada. The poster at the back of the case describes some of the uses for mercury.

CASE 45

This case is divided into two sections, **METALLURGY OF VARIOUS METALS** and **TIN.** The right half of the case shows products of metallic ore refining. These are the feed stocks for the products that are used in everyday life, such as the aluminum bar that can be turned into beverage cans. The left part of the case contains specimens of tin ores and some of the refined tin products. The poster at the back of the case describes many of the uses for tin.

CASE 46

TUNGSTEN. Shown here are several examples of tungsten ores. In the top row there are some products of tungsten refining. The poster at the back right describes many of the uses for tungsten.

CASE TO RIGHT OF 46

In this case is a collection of various forms of quartz, many of which are crystals. Tiger Eye, in the center left, is one of the rarest forms of quartz.

CASES 47 AND 48

SURFACE MINERALS. These are minerals formed at, or very near, the surface of the earth. Many times these minerals form on other substances, such as the calcite on a horseshoe in the center top of this case. In other instances the minerals are deposited at the earth's surface such as the sinter in the lower center of the case, which was deposited from hot water at Steamboat Springs, near the Mt. Rose-U.S. 395 intersection, south of Reno.

CASE TO LEFT OF 47

Here is a collection of large ore specimens from Nevada. The cinnabar in the lower center of the case was deposited at Steamboat Springs, similar to the sinter in cases 47 and 48.

CASE BETWEEN 48 AND 49

These cases contain several large mineral specimens, many of which are well formed crystals. In the upper left corner of the right case are fossilized shark teeth. Below that specimen is a drawing of what this 250 million year old shark might have looked like.

CASES 49 AND 50

Each mineral has a characteristic mineral form, or forms, that develop when minerals grow in open spaces. These two displays contain examples of many of these crystal forms. The posters at the back of the case list crystal classifications used by mineralogists to identify minerals. The

card with each specimen identifies the mineral, its chemical composition, crystal classification, and the crystal form. Crystal forms are important aids in mineral identification.

CASE TO LEFT OF 50

RARE EARTH MINERALS. Rare earth minerals contain rare earth elements (scandium, yttrium and the lanthanide series) and although they are fairly abundant in the earth's crust, they occur in very low concentrations because they do not bond with common ore-forming anions.

LOWER FLOOR

At the base of the stairs on the lower level are posters that show how diamonds and gold are mined and processed. These posters were a gift from Dan Taranik, Anglo Gold. To the right of the posters are two cases of specimens and computer parts that demonstrate the connection between mining and finished product. For example, there are two bottles of Nevada crude oil, which is the base material for making plastic used in the computer case. Many of the electrical connections in the various computer components are made of gold and silver. The silicon chip that is the heart of the computer is made from quartz, which is also the principal component of sandstone. Much of the wire in computers is made from copper ore.

Through the doorway is the Mackay silver collection. The Mackay silver was a gift from John Mackay to his wife Marie Louise. More than a half a ton of Comstock silver was sent to Tiffany & Company in New York to make the "finest silver service possible." Two hundred silversmiths worked for two years to create the Mackay Silver Collection, which consisted of a service for twenty-four totaling 1,350 pieces and containing 14,718 ounces of silver. The silver service was completed in 1879 and put on display at the Paris Exposition. The Mackay family used these pieces regularly. Look carefully, each piece bears Marie's initials, MLM. The placard on the case in the center of the room details the background of the silver service. The University was given fifty-five pieces of Mackay silver by the family in 1955, and this silver has been used at important University events since that time. Prior to the construction of this room, the silver was housed in Special Collections at the Getchell Library.

To the right of the Mackay Silver Collection room is a display of fluorescent minerals and a discussion of why minerals fluoresce. On the upper left side of the case is a two-way switch that turns on the ultraviolet lights, causing these minerals to fluoresce. Look at the minerals in both plain and black light to see the difference. Fluorescence is one more tool geologists can use to identify minerals, particularly the tungsten ore scheelite.

Across the hall from the Mackay Silver Collection is an exhibit of historic mining in Nevada detailing the daily work performed by the miners, engineers, and assayers. In the days of the Comstock, professionals did a variety of jobs and it was not unusual for an engineer to also assay ore samples. Books and mineral specimens were important reference materials and common in engineer's offices. The survey equipment and drafting materials were used daily. Also in the room is a model of a stamp mill, which was used to crush ore to release the valuable minerals, such as gold and silver.

UPPER FLOOR

The staircase near the entrance on the Main Floor is the access to the displays on the Upper Floor. At the top of the stairs are two pictures on the wall to the right. These are photographs of Mammoth and Ground Sloth tracks (see the description to the left of Case 51) taken in 1882 during construction of the Nevada State Prison in Carson City. At several locations on this floor

there are blocks of rock taken from the prison site that contain the actual footprints of these animals.

MASTODON CASE

Here are the fossilized remains of a 3 million year old mastodon that was found near Gardnerville in Douglas County in May 2000. Faculty and students at the Mackay School of Mines helped to excavate and prepare these fossils

LEFT OF CASE 51

On the wall is a map of the foot prints found at the Nevada State Prison in Carson City, and a description of the animals that made the tracks. On the floor are some of the actual tracks that were removed from the prison.

The rock below the Nevada State Prison is composed of sandstone and shale. During the 1870s prisoners quarried the rock for building stone, during which time two fossil footprint horizons were discovered. Most of the prints are in shale that was deposited in a Pleistocene river system, about 50,000 year ago. Sheriff W. J. Hanks of Storey County first brought the find to the attention of the California Academy of Sciences in June 1882. The largest prints belonged to a mammoth. As the animal walked through the soft mud it left footprints. Later these dried, hardened and were covered by sand that preserved the footprints. The other footprints were made by smaller animals, and although some interpreted a set of prints to have been made by a "giant man" these turned out to be from the ground sloth.

CASES 51 AND 52 AND THE CASE TO THE RIGHT

Here are examples of Comstock ore, rocks containing silver and gold. The pictures at the back of each case illustrate life and mining on the Comstock during its heyday. The Comstock was most active between the late 1860s and late 1880s with a peak population of over 30,000 people!

CASES 53 AND 54

These display cases contain specimens of Comstock ores. Generally, the gold and silver minerals are so fine grained that they cannot be seen in these specimens. This case also contains many minerals that can be confused with gold and silver, and shows how difficult it can be for the untrained eye to tell them apart. To the right of these cases are three rifles that were used by guards at Comstock mining operations. With so much silver and gold at the mines theft was always a concern.

LEFT OF CASE 53

This is a model of the West End mine in the Tonopah mining district, Nye County, Nevada. The red and yellow areas are where ore was mined, and the square shapes are the underground workings. Above the model are examples of stock certificates and above those a geological map of the western part of the Tonopah mining district.

CASES 55 AND 56

Here are examples of equipment used in locating, testing and producing metals. Survey chains marked out claim boundaries, gold pans were the original means of determining the presence of gold in an area, a hand lens was used to see if visible gold was present. Later, assays were invented to determine if and how much metal was present.

LEFT OF CASE 55

Bullion Scales were used to weigh gold and silver at the mine site, which insured proper payment once the metal arrived at the mint. These scales were used in Virginia City and were a gift of Zeb Kendall.

CASES 57 AND 58

As noted in this display case, “there is nothing so dark as a miner’s working place when his light has gone out” in an underground mine. These two display cases hold various types of lamps and candle holders used to light underground workings during the early days of mining in Nevada. Today, battery operated lamps (an example in the lower right of the case) are used underground, but it is still dark when the battery goes dead.

One of the first mine lights was the simple candle, which only required a holder to attach to the mine rock or timber. The disadvantages were that a miner had to move the candle as he changed work spaces and if he got between the candle and his work area there was a shadow. Also, any air movement in the mine could extinguish the flame, leaving the miner in the dark. As a result the carbide lamp was invented, which attached to the miner’s hat supplying a more convenient light source. Eventually the safer and more reliable battery operated lamp was introduced. In the back right of the display case are several safety lamps that were used to test mine air. The lack of oxygen underground is one of a miner’s greatest fears.

CASES 59 THROUGH 62

Geologists subdivide rocks into three categories, sedimentary, metamorphic, and igneous. Igneous rocks are further subdivided to rocks that form within the earth (intrusive) and those that form on the surface of the earth (extrusive). These display cases contain examples of the more common types of rocks exposed at the surface of the earth. Above these cases are photographs of several Nevada mining camps.

CASE 63

This is a description of plate tectonics. As explained on the several placards in the case the earth’s crust is in continual motion. As shown here, many rocks found at, or near, the surface of the earth have direct connections to movement of the earth’s plates. Earth quakes along the San Andreas fault are in response to the Pacific Plate moving under the North American plate.

CASE 64

Here is a display of rocks, minerals, and fossils that were associated with Lake Lahontan, which existed in western Nevada during the last ice age. The lake first formed about 1.7 million years ago and ceased to exist about 10,000 years ago. Pyramid and Walker lakes are remnants of ancient Lake Lahontan.

SMALL CASE BETWEEN CASES 64 AND 65

These two cases contain a variety of fossils of different geologic periods. Note the fossilized fish that looks similar to today’s fish, even though it is about 40 million years old. The large rock on the floor contains at least one footprint of a prehistoric animal.

CASES 65 THROUGH 70

The six display cases to the left of the double doors contain fossils by geologic age, starting with the oldest in case 70 to the youngest in case 65. Geologists subdivide the earth's history into four eras, each of which is further divided into several periods. Above the cases are posters that describe the several eras and periods. Each poster outlines the timeframes of the eras and periods, and some of the important life forms that lived during those times. In the lower right corner of case 70 is a color coded explanation of the eras and periods. Fossils on display are some of the life forms that lived during each geologic period.

For instance, most of Case 70 is devoted to the Cambrian Period. Trilobites were one of the principal creatures that lived during this period, which extended from 510 million to 544 million years ago. There is a fossil record of these creatures because Trilobites had hard shells that were preserved in rock. Other life forms lived during this period but because of the lack of hard parts decayed upon death, leaving no fossil record.

CASES 71 AND 72

The upper case contains fossilized bone fragments from an ancient marine reptile call an Ichthyosaur. The official Nevada state fossil is the ichthyosaur *Shonisaurus popularis*, which lived in the Triassic period (~ 200 million years ago) and reached lengths of 40+ feet. The fragments on display here are from the ichthyosaur *Mixosaurus*, which is considerably smaller than *Shonisaurus.* The placard at the back right of the display describes the habitat and age range of the Ichthyosaur. In the back left is a picture of an Ichthyosaur skeleton with links to the various fossilized parts on display.

In the lower case are fossilized Mammoth bones (see picture on the wall to the right). Since these are relatively young, by geologic standards, the bones have not been completely fossilized. The Ground Sloth and Mammoth remains came from Clark County and the Mammoth tusk from Alaska.

DISPLAY OF MINING EQUIPMENT ALONG THE NORTH WALL

Most of the items here were used in and around the Comstock mines. In addition to the great wealth that came from the mines, the Comstock was a place of inventions. Because of unique geologic conditions new mining techniques were required, many of which found uses throughout the world. The picture on the wall illustrates mining on the Comstock and shows an example of square set timbering that was used to keep the mines from collapsing. Square set timbering was invented on the Comstock by Philipp Deidesheimer late in 1860 and then used throughout the world. On the floor to the left of the picture are two mine timbers that were deformed by the extreme pressure exerted by the rock in the deeper mines. Mining on the Comstock required a tremendous amount of timber to prevent cave-ins, most of which came from the Tahoe Lake region. On the wall to the right of the mine cage is a piece of flat cable, which was also invented for the Comstock mines. Flat cable has the advantage of being light weight and strong, and was used to hoist and lower mine cases in the deeper Comstock mines. This invention was also used throughout the world.

To the left of the mine case and above the drill is a framed longitudinal section of the Comstock Lode. This represents a slice through the earth showing the locations of the various mines. Note the Sutro tunnel, which was constructed to drain mine water and to explore for deep ore deposits.

GLOSSARY

Alloy: A combination of two, or more, metals.

Anion: A negatively charged ion that combines with elements to form chemical compounds.

Artificial Minerals: Minerals that are made by humans rather than formed in nature.

Birthstone: A gemstone that symbolizes the month of a person's birth.

Cage: A device to lower and raise men and equipment in mine shafts, much like an elevator.

Carbide: A carbon based compound that is burned in a lamp for light in underground mines.

Carlin Trend: The northwest to southeast alignment of gold mines north of Carlin, Nevada in Elko and Eureka counties, Nevada.

Comstock: A series of fault zones that contain minerals, principally gold and silver, in sufficient quantity that extraction produced a profit. The heart of the zone is from Virginia City to Gold Hill in Storey County, and extends several thousand feet below the surface.

Crystal: The outward expression of a mineral's internal structure that is characterized by smooth surfaces or planes producing geometric shapes.

Crystal form: The geometric shape of a crystal.

Earth's crust: The outer most layer, or shell, of the Earth.

Fluorescent minerals: Those minerals that emit characteristic colors when exposed to "black" light.

Fossil: Any remains, trace, or imprint of a plant or animal that has been preserved in rock.
Fossilized: The remains of a plant or animal that has been turned into a fossil.

Geologic era: A major subdivision of geologic time that contains two, or more, geologic periods.

Geologic period: A major subdivision of geologic time that is a subdivision of a geologic era.

High-grade: A subjective term used to describe how much metal is present in a given quantity of ore. Generally, high-grade ore contains significantly larger amounts of metal than is typical for mines in the region.

Igneous rock: A rock that is formed by the cooling of molten material or magma.

Metallurgy: The science of separating metals from ores and preparing them for use.

Metamorphic rock: A rock that formed by the combination of heat and pressure on a pre-existing rock.

Mill: The portion of a mining operation where minerals are recovered from ore for further processing or use, usually in a building containing equipment for crushing and separating ore.

Mine: The portion of the mining operation where ore is removed from the earth, either underground or in an open pit, and taken to the next stage of processing.

Mineral: A naturally occurring inorganic element, or compound, that has a unique chemical composition, crystal form, internal structure, and physical properties.

Mineral form: Characteristic crystal shapes of minerals.

Mineralogist: A scientist that studies minerals.

Mining camp: The community that forms when a group of mines are developed is one location.

Mining district: An area of mine concentrations where historically miners came together to develop rules for the staking of claims and maintaining records for mining activities.

Native minerals: Minerals that are composed of a single element, such as gold or silver.

Ore: Mineral concentrations that can be mined from the earth, processed, and turned into useful products for our society, while producing a profit for the mining company.

Placer: A surficial mineral deposit formed by mechanical concentration of mineral particles from weathered debris.

Petrified wood: Wood that has been replaced by silica.

Precious metals: A general term for gold, silver, or any of the minerals of the platinum group.

Rare Earth Minerals: Rare minerals that contain elements with periodic number between 57 and 71 on the periodic table of elements.

Refined minerals: The process of recovering metal from ore minerals after they have been concentrated in the milling process, such as refining copper to produce the pure metal that can be used to make products for society.

Refining: The process of removing impurities from metals after the smelting process.

Sedimentary rock: A rock that is formed by the consolidation of loose sediment that has accumulated in layers.

Sinter: Rock that is formed from the outflow of water from hot springs.

Smelter: A mining facility where ore minerals are converted to their metal form.

Specimen: A sample of a fossil, rock, or ore.

Stamp mill: A crusher that used large cylinders that were dropped on rock to pulverize the ore and liberate the contained metals.

Surface mineral: Any mineral that formed at, or very near, the surface of the earth.