

THE ALMADÉN MERCURY MINING DISTRICT

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Abstract. The Almadén mining district includes the World's largest mercury mine, exploited in a practically continuous way since Roman times until the closure of all the mines and metallurgical dependencies at the 1990's and the 2000's. In this work we summarize the most relevant information about the mining geology of the district, as well as the history of mercury and the Almadén mine. Final concerns include a compilation of the actions carried out to preserve the rich local mining heritage, funded and realized by different instances, such as the Almadén School of Mines (Escuela Universitaria Politécnica de Almadén, UCLM), the mining company (Minas de Almadén y Arrayanes S.A., MAYASA), and the regional government (Consejería de Educación y Cultura, Junta de Comunidades de Castilla la Mancha). All these actions have implied a valorization of the heritage resources for tourism, as well as a preservation of the knowledge of the mining area history.

1. INTRODUCTION

The Almadén mercury mining district corresponds with a Hercynian structure of the Iberian Massif, the Almadén Syncline. The Iberian Massif can be subdivided in a series of Zones, and the Almadén syncline is part of the largest Zone, the Central Iberian Zone, being located on its South area (Figure 1). The syncline comprises Palaeozoic (meta)sedimentary and magmatic rocks, including Ordovician (Tremadocian) to Late Devonian (Fametician) shales and quartzites, as well as the (meta)magmatic rocks, characteristic of this structure, and corresponding to basalts and mafic pyroclastic rocks, with minor mafic intrusive (dolerites) and even minor intermediate to felsic effusive differentiates (quartzandesites, rhyolites) (Higuera et al., 1991). On the other hand, the most interesting feature of the Almadén syncline is to be the host of the World most important mercury mining district, comprising not only the huge mine of Almadén, but also 5 more mines of less importance, and up to 60 points where the presence of cinnabar (HgS, the main mercury ore) has been described.

2. LOCAL GEOLOGY

The geology of the area can be described, in simple terms, as a Hercynian syncline of Palaeozoic rocks resting unconformably on Pre-Ordovician rocks of the so-called "Complejo Esquisto-Grauváquico" (CEG). A brief description of these features follows.

The Preordovician basement (CEG) corresponds to (meta)shales and greywacke, constituting a thick and homogeneous complex, probably affected by a Pre-Hercynian tectonic event of late Precambrian age (Cado-mian). These materials can be found both North and South of the syncline structure, at the Valdemanco and Valle de Alcudia anticlines, respectively.

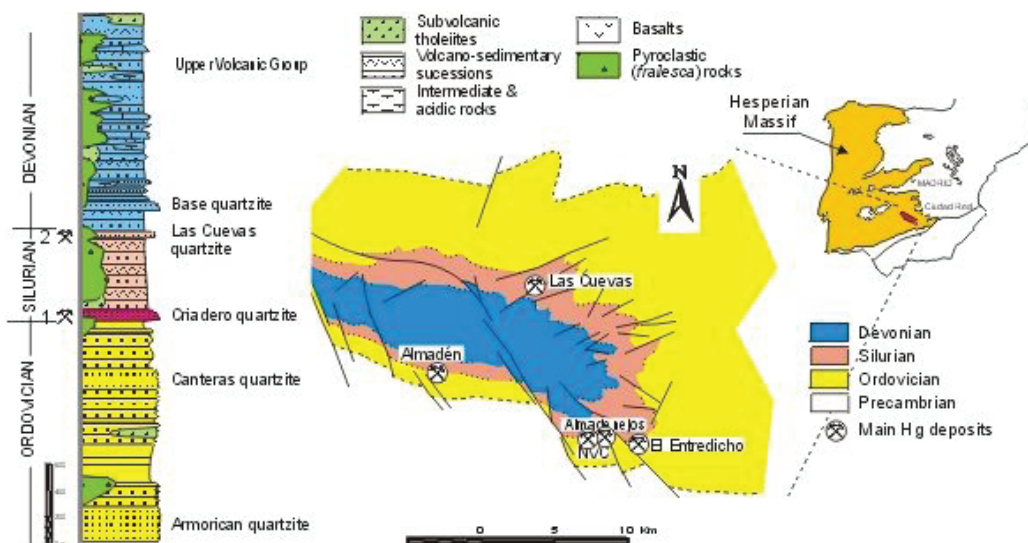


Figure 1. Location and geological sketch map of the Almadén syncline, with indication of the main Hg deposits.

Palaeozoic succession corresponds to an almost complete stratigraphic series comprising Early Ordovician (Tremadocian) to Late Devonian (Fametician) (meta)sediments mostly of detritic origin. Middle Devonian is absent at this sequence, and minor carbonate rocks, of Ashgillian age, are exceptions to this general description. Another exception to note is the presence of magmatic rocks, forming layers and sill-type intrusions all along the stratigraphic section, although they are more frequent among Silurian rocks, and much more among the Devonian sequence, that can be described as volcano-sedimentary. The sedimentary record includes four major quartzite formations, named as Armorican Quartzite (Arenigian), *Canteras* Quartzite (Llandeilian, or Dobrotivian in the modern nomenclature), *Criadero* Quartzite (Upper Hirnantian-Lower Llandovery) and *Base del Devónico* Quartzite (Siagenian). To note again is the *Criadero* quartzite name, after the presence of the cinnabar orebodies (*Criadero* means ore deposit).

Magmatic rocks present in this stratigraphic record include mafic volcanic rocks (mainly metabasalts, but also minor outcrops of differentiated volcanic rocks, such as trachytes, trachyandesites and rhyolites), as well as pyroclastic rocks (the so-called *Frailasca*, local name derived from its aspect similar to the habits of monks, *frailas* in Spanish). Also relatively frequent are sills of mafic dolerites. Especially interesting are the *Frailasca* pyroclastic rocks, formed by basaltic fragments in a siliciclastic matrix, and including occasionally ultramafic fragments. These rocks forms diatreme-like structures hosted in the (meta)sedimentary rocks all along the stratigraphic sequence, although they are specially frequent in Silurian and Devonian rocks, and they have been interpreted as genetically linked to the origin of the mercury deposits, being present in most of them, and particularly in the largest ones.

Tectonic deformation includes folding, causing the general structuration of the area, with asymmetric anticlines and synclines with south limb almost vertical and north limb dipping among 30 and 45°. These structures are also affected by faulting, corresponding to several arrays, and producing horizontal displacements of up to several kilometers with minor vertical components.

Granitic intrusions are also present in the syncline, but not in the Almadén mercury mining area.

A small basin filled by sands and boulders sediments of Carboniferous age is present at the syncline nucleus area.

The area is actually subject to erosion, and crossed by Valdeazogues (meaning mercury valley, after the Arab name for mercury, *Azogue*) River, tributary of the Guadiana basin. General geomorphologic pattern of the area corresponds to an Appalachian relief, with sierras over the quartzite formations and valleys on shales formations, with maximum topographic differences reaching 350-400 m.

3. GEOLOGY OF THE MERCURY DEPOSITS

As above stated, Almadén is not just its huge mercury mine, but a District comprising also a number of smaller deposits, exploited to lower or larger extend through history, as described in Chapters III and IV of this work. Here we describe the main geologic features of the main mines of the district.

After the main geologic studies carried out in the district (Saupé, 1973, 1990; Hernández, 1984; Borrero & Higuera, 1990; Hernández et al., 1999), the mercury mineralization comprised in the Almadén mercury mining district can be subdivided, from the geological point of view, in two types: stratabound deposits, hosted in the Criadero Quartzite, and epigenetic deposits, hosted in any Palaeozoic formations of the syncline. The first type can also be named as Almadén type, and includes the Almadén and El Entredicho mines, and possibly also the Vieja Concepción mine. The second, or Las Cuevas type, is a non perfectly homogeneous group of deposits characterized as a whole for the presence of cinnabar as fracture/veins fillings in the (meta)detritic rocks and replacements guided by veins systems in magmatic rocks. Main mines of this second type are Las Cuevas, Nueva Concepción and Nuevo Entredicho, as well as the smaller mining sites of Corchuelo, Guadalperal or Las Tres Hermanas.

Almadén mine is the world's largest mercury mine. It has produced about 7,5 million flasks (commercial unit for mercury quantity, corresponding to 34,5 kg of the metal, usually bottled in stainless steel containers —flasks—, of 2,5 l of capacity), meaning around 260,000 t of mercury. This represents more than 90% of the District production, and almost one third of the total world's historic mercury production. Cinnabar mineralization appears as a dissemination in three quartzite horizons, affected by the complex local tectonic deformation, and so it is divided in two branches: North branch, exploited from surface to some 250 m deep, and the South branch, exploited from some 50 to 550 m deep. These branches are separated by a tectonic accident, the so called "*falla Meridional*" (Meridional fault), as well as by the presence of a diatreme of the Frailesca rock (Figure 2). North branch was exploited from the origins of the mine to 1755, when a fire stopped the mine activity for several years. After that, this branch was abandoned until the 80's of the 20th Century, when a deeper part of this branch was discovered and exploited until 2004, date of the final closure of the mine. It consists in a fragment of a fold pinched by the Meridional fault, and includes two mineralized horizons, almost vertical, with some 200 m in length and some 300 m in height. South branch was discovered in 1697, and exploited until 1998. It consists in a second fragment of the main mine fold pinched by the Meridional fault, and includes two mineralized horizons of orebodies: San Pedro at the so called "*Cuarcita inferior*" (footwall quartzite) and San Francisco and San Nicolás orebodies, at the "*Cuarcita superior*" (hangingwall quartzite). The orebodies extend some 300 m in length and some 550 m in height, they are some 5 m thin as an average, and they contain the cinnabar dissemination with an average content of 5% Hg. Some minor folds and a number of dextral faults affect the general structure described.

El Entredicho open pit can be considered as a "scale model" of Almadén, also with a main fold and a central fault dividing the deposit, as well as a *Frailesca* diatreme cutting the Criadero Quartzite (Figure 3).

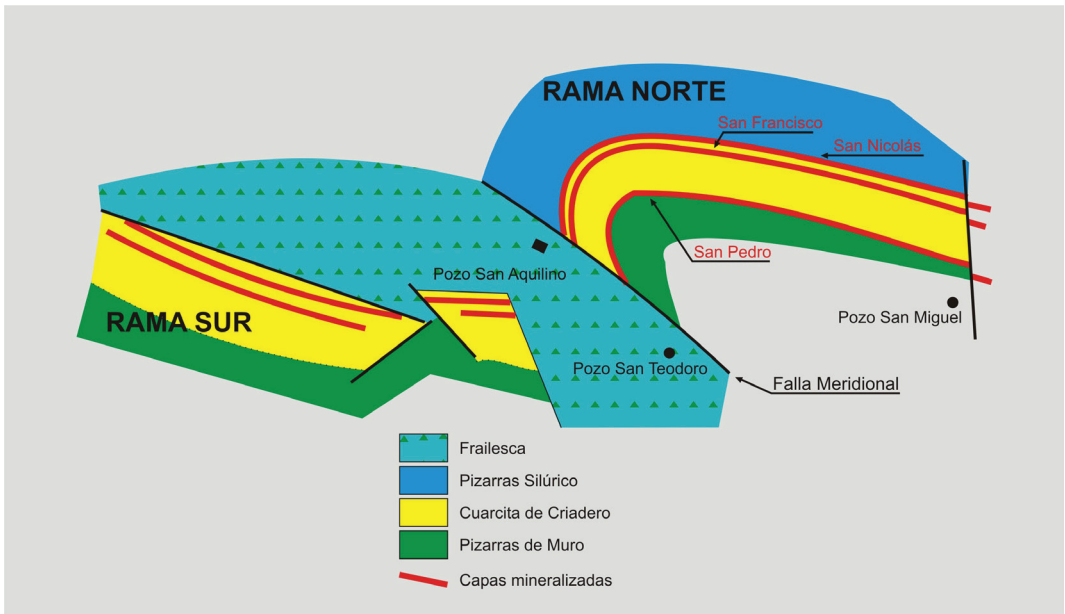


Figure 2. Geological sketch map of the Almadén mine, at the 7st mining level.

Here the orebodies are only two, an Upper one equivalent to San Francisco + San Nicolás at Almadén, and a Lower one, equivalent to San Pedro in Almadén. Again these quartzite levels hosts the cinnabar dissemination (Figure 4), in this case with an average Hg content of 3%, which persist some 100 m in length and some 80 m in height. In this case it is clear than the mercury contents in the quartzite orebodies decrease away from the *Frailesca* diatreme. Mines reserves are in the order of 250.000 flasks.

Las Cuevas mine belongs, as previously said, to a different geological model. Mineralization is located in a higher stratigraphic level, and most of the ore is hosted by volcanic rocks, not only of *Frailesca* type. After Higuera et al. (1999) it can be interpreted as an epigenetic mineralization, constituting two subvertical and column-like orebodies, with some 100 m height and some 25 m diameter. Cinnabar appears as discontinuous vein fillings and disseminations replacing volcanic rocks and clasts of the *Frailesca* rocks (ure 5). Mined reserves are in the order of 180.00 flasks, and the mine was in activity in Romans times, and from 1983 to 2001.

La Nueva Concepción corresponds also to an epigenetic mineralization, different in many aspects to that of Las Cuevas. In this case the orebody corresponds to a dissemination of replacement typology affecting a series of magmatic rocks that only can be interpreted as dikes cutting the Criadero Quartzite (Figure 3). Cinnabar dissemination is very rich in the area next to surface, where the magmatic rock forms a quite large massif hosted in the Criadero Quartzite, and depletes downward, where the magmatic rocks constitutes a couple of dikes some 5 to 10 m thick hosted in the footwall shales formation. The mine was discovered in 1698, had a main exploitation period between 1702 and 1860, and later it was subject of a couple of intents of reactivation, but the deep mineralization was too poor. Total mined reserves can be estimated in 150.000 flasks.

Vieja Concepción mine was exploited during the 17th Century, and it was never again recovered, so information regarding its geology is very scarce. After drill holes data, it seems to be an Almadén type mineralization, also hosted in Criadero Quartzite. Mined reserves can be estimated as less than 100.000 flasks.

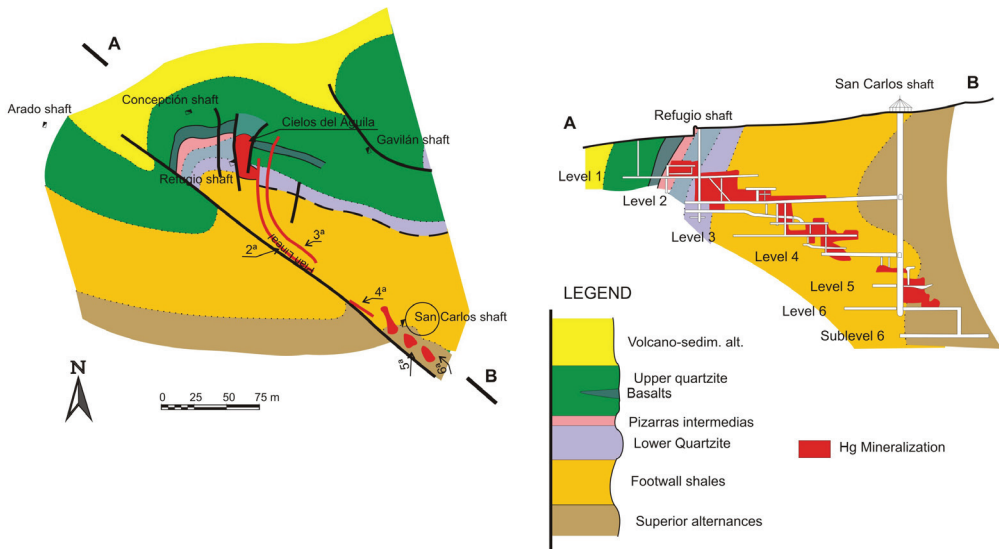


Figure 3. Geological sketch map of La Nueva Concepción Hg mine.



Figure 4. Criadero Quartzite with the cinnabar mineralization.

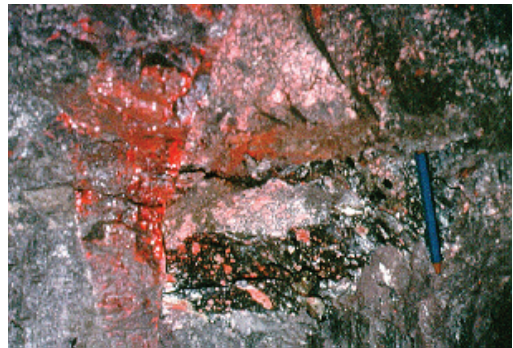


Figure 5. Las Cuevas mineralization, with a massive cinnabar vein (to the left) and cinnabar replacement at Frailasca clasts.

Nuevo Entredicho was discovered in the 80's by means of drill holes, looking for a different possibility to the North of El Entredicho mine. After this drill hole data it seems to be a small mineralization with extremely high cinnabar contents, hosted by *Frailasca* rocks. It was planned to exploit it, but a reinterpretation of its size and the low mercury prices did it non-viable.

A general and striking feature of all these mineralizations is their monoelemental character: mercury is an element that is usually found together with others, including As, Sb, Ag, Au, or even platinum group elements, or U (Idria). However in Almadén there are not other elements but mercury at the mineralizations. Even pyrite,

the most common sulphide accompanying other sulphides in most types of base metals deposits, is relatively scarce in Almadén type mineralizations, although it is quite abundant in other ones belonging to Las Cuevas typology.

The origin of the mineralizations is subject of controversy, between scientists defending an origin linked to mercury extraction from shales formations (Saupé, 1973, 1990) and scientists defending a deep origin, related to transport of the mercury from the mantle by the magmatic activity (Higuera, 1995). In both cases, mercury should have entered and disseminated in the "Criadero Sandstone" previously to its transformation to quartzite.

4. MERCURY MINING HISTORY IN RELATION TO ITS APPLICATIONS

Mercury is a singular element, causing the interest of man, and also capable of being used in a number of applications. That has caused the Almadén mineralizations to be exploited continuously for over 2000 years, in particular at the Almadén area.

Prehistoric people were interested in the usage of cinnabar as red pigment. Red has always been considered as a "noble" colour, and so the first known applications of mercury were in this form, and so it was used at mortuary paintings for kings. Ancient Chinese and Hindus already used cinnabar to colour the skin, as paint, as well as in ointments. The Hindus also believed in mercury's aphrodisiac properties and Phoenician already used it within the recovery of gold. Mercury has been also found in Egyptian graves (1600-1500 b.C.), whilst Romans and Grecians used it for medical purposes. However, there is no clear evidence of the usage or extraction of cinnabar at Almadén during this period.

Romans were also interested in the red colour of cinnabar, and called it "vermilion". Concrete applications of vermilion were wall paintings, women makeup, and togas staining. Romans exploitation of Almadén is well documented, being expressly mentioned by Pliny the Elder.

Arabs were especially interested in the liquid metal, as a component of their intent, through alchemy, of "transubstantiating" other metals into gold.

Another important application of the metal during middle ages was clinic, being some of its compounds the only cure for syphilis, as discovered by Paracelsus. During this period the mine, owned by the Spanish crown, was rented to diverse people, exploiting the ores in a very irregular form, trying just to get the maximum production without any planning for future or any security or health concerns.

The discovery of America in 1492 and the related discovery of the huge silver and gold deposits of Mexico and Bolivia, among others, caused the largest impulse to the exploitation of cinnabar, related to the discovery of the so-called "método de patio", a process based on mercury amalgamation for the recovery of these metals from their ores. The method was implemented by Bartolomé de Medina in Mexico in 1550, and soon expanded throughout the world. Also, the discoveries of the possibility of using this metal in thermometers, by Fahrenheit, and in barometers, by Torricelli, are important milestones in the usage of the metal during this period. Mining in Almadén began to be the most important business for the Spanish crown, and mining activity developed largely, producing a very important need of miners and engineers, the formers from poor areas of Spain, the latter from Germany, in particular from Freiberg. These German engineers developed new exploitations techniques, and began to consider the health risks concerned in these works. A part of the workers were prisoners and the rest were free people, but in general they received an unhealthy treat, denounced by the writer Mateo Aleman in 1572. During this period, the mine was under the administration of the Fuggers, important German bankers, under the supervision of the owner, still the Spanish crown. The mine activity was frenetic, and only

stopped by floods and by fires, two of them very important in 1550 and 1755, that lasted years, and caused changes in the usage of mine fortifications, from wood to brick fabric.

Another important impulse to the usage of mercury came with the application of the metal to the chlor-alkali industry, in 1892, after the discoveries of Carstner-Fellner. By then the risks related to the exploitation of mercury were very well known, and produced the reduction of the working schedule for the Almadén mine workers to 8 days for month, alternating with other type of surface jobs. Mine was then under the administration of the Roschild American bankers, until year 1921, when it passed to the direct administration of a state owned organism, later transformed into the state owned company *Minas de Almadén y Arroyanes S.A. (MAYASA)*, in 1982. Other important applications of mercury and its compounds during this period include electric batteries and instrumentation.

In the 1970s it developed the important "Minamata incident", a poisoning with the extremely toxic compound methylmercury ($[\text{CH}_3\text{Hg}]^+$), produced at the Minamata bay area, in Japan, as a consequence of consumption of fish with high contents of this toxin, due to the release of it to the bay by a chemical industry producing methylmercury as a by-product. The "incident" caused hundreds of deaths and thousands of affected by illness and theratogenic effects, and it was the beginning of the consideration of mercury as a "global pollutant". Mercury prices declined severely in the international market, and the "ecological consciousness" developed in parallel to this and other environmental incidents. Mercury applications declined, and at present there are worldwide legislation aimed to reduce the risks linked to the usage of the element, including the European Mercury Strategy, that will ban mercury and its compounds exports from Europe since March 2011. On the other hand, all these questions coincided with the extenuation of the Almadén district mines, forcing the closure of all of them between 1997 (El Entredicho) and 2006 (the metallurgical plant, working with cinnabar reserves since the closure of the last mines).

5. THE HISTORY OF THE ALMADÉN MINE

Almadén is one of the oldest mines in the world. The first known mining resources in the area are mineral pigments from the numerous remaining cave paintings, probably calcolitics which appear in the shelter of local quartzite mountain range (for example, in the so called Virgen del Castillo). Theophrastus of Efeso (372 BC-285 BC), Aristotle's favourite disciple, describes the esteemed cinnabar of Spanish origin, which takes us to a mining of at least 2,300 years of antiquity.

The municipality of Almadén was always identified with the ancient roman settlement of SISAPO; recent archaeological excavations have proved that this mining municipality is located near La Bienvenida, which lies further to the south. Nevertheless, numerous remains from the cinnabar mines of Las Cuevas, Guadalperal, Valdeazogues and Mina Vieja have been found in Almadén dating from that time. The Romans extracted cinnabar because vermilion was commercialized all over the Mediterranean. Pliny the Elder already described the distillation of native mercury from cinnabar in pots.

During the Roman Empire, the mines were exploited systematically (they belonged to the emperor) and since the fall of the Roman Empire the documented information is very limited until the VIII century (year 711) when the Arabic rule began in Spain, being the site property of the caliphs.

The arrival of the Arabs revived the mercury mining in Almadén with the introduction of a metallurgic method, the xabeca furnaces which were working until 1600 approximately, new words appeared, tools and the name of Almadén itself etc.

Another important legacy from that time, together with remains of long bunnhole oil lamps, tools and dif-

ferent goods found inside the first floors of the Almadén mine and the surroundings, is the rich mining vocabulary (alarife, almijarero, etc.) whose culmination is Almadén itself which means “the mine”. Besides the mining heritage, Almadén also has medieval castles like the Retamar castle in Almadén (it has been restored recently with a scenic viewpoint looking over Almadén), Aznaron in Chillón, Vioque in Guadalmez, etc.

During the XII century the Castilian Kingdom took the place of the Arabic domination, the site was then controlled by the Spanish state with consecutive leasings to Catalanian and Genovese traders and merchants. The main leasing was to a group of German bankers called Függer and lasted from 1525 to 1645.

The discovery of America marks a historical milestone to launch again Almadén mining, especially since the moment the process of silver and gold amalgamation was discovered by Bartolomé de Medina in 1554 in the city of Pachuca (México), turning a small village into a source of mining and industrial development.

The reverberation furnaces from the Fugger times (1600) and *Alúdeles* or Bustamante furnaces (Spanish industrial archaeology jewel), brought from America to Spain, in what might be called a technological exchange, previously the xabeca furnaces were taken to America. These are good examples of the transformation the Almadén mine was going to suffer in that period.

Mercury was an exploitation hub of American precious metals and the Almadén mine. “The crown jewel” which must be protected through mining precincts (Buitrones, Almadenejos, etc.) with emblematic gates such as Charles IV Gate. It is a neoclassical work, dated in 1786, made with solid bare brick, which allowed a controlled access to the enclosure.

Mercury demand was high during the 16th, 17th and 18th centuries. In the second half of the 18th century the incorporation of new mining technologies, coming from Freiberg, Germany and the progressive mechanization of the workings increased the productive capacity, causing a significant change in mining exploitation with the introduction of new working methods (Testeros, Larrañaga, etc.). These changes also affected Almadén, and it may be said this will be the greatest and most brilliant urban period of the city.

Almadén shows in its morphology, a historical evolution, always related to the mine. The first trace is approximately radius central, around Retamar castle, and it expresses clearly the connection between narrow and winding streets belonging to an Arabic settlement, over an elevation. Later Almadén spreads out close to Buitrones precinct and San Teodoro shaft until the 18th century when a linear expansion begins from the mine core, which proves an urban connection and a spatial subordination to this.

Almadén has a very important artistic and historical heritage, mainly from modern times; this is shown in the architectural pieces due to relevant mining and metallurgical settlement. In this context, it is the 18th century when the deepest trace was left in the Almadén real estate and even in the nearby towns of Almadenejos and Chillón.

In general, these works from the 18th century are characterized for the use of traditional materials from the area (such as quartzite stone masonry, brick or tiles, ilex wood, Arabic tile and forge) the construction simplicity, is not opposed to regularity in the façades and rationality in inner spaces and lastly, the carefulness of the decoration by using enlightened ornamental elements in main façades. We cannot talk of styles (baroque or neoclassical features). These elements are arranged mainly in the façade centre, covering the main house door or the main floor balcony.

In this collection of historic buildings the **“Bullfighting ring”** is one of the most interesting and singular places in Almadén, it is of great architectural and urban interest. This building has got a hexagonal floor, and the central bullring encircles elevated corridors in 2 floors which give shelter to 24 houses, shaping a mixture of bullring and room building of singular characteristics. The main entry is a wide gate with a projecting balcony (box for distinguished persons in the inner part) and impeccable ornamental top. The location of the building, next to the royal way, was of peripheral use at the beginning and principal nowadays.

San Rafael Mining Hospital, is another singular building in Almadén, it is the first hospital in the world to be built to treat miners suffering from hidrargirism and silicosis, due to poor ventilation in underground exploitations, mercurial vapor exposure, and silica dust inhalations, which caused high rates of illnesses and deaths.

It was established in 1752 and it was for workers and relatives as well; the hospital opened in 1774, reaching its highest activity in the 1780's and 1810's. It had L shape with wide corridors and vaulted wards for sick people and sanitary rooms, emphasis is given to its sober façade with a central balcony in which we can appreciate in the upper part a steeple and a niche with an image of Saint Raphael archangel, the main entrance gate is flanked with 2 graceful pilasters. Inside this spacious building stands out the marble staircase which serves for vertical communication with great luminosity.

Mining Academy (1777), the most important building in Almadén ever, with great meaning for national and international mining teaching, it was the first Mining School in Spain and the fourth in the world, very important engineers studied there, for example Fausto D'Elhuyar (he discovered wolfram) and Andrés Manuel del Río (he discovered vanadium). It is a two-storey building with basement and exits through a back door. It has 2 sections with classical façade made up of openings and pilasters with raised blocks of stone, in the façade stands out the balcony with circular parapets.

Other singular building in Almadén is the **Real Cárcel de Forzados**, heir of the original jail for 16th century prisoners; it was built in 1754 for prisoners working in the mine. The design and project management of the building work were given to military engineer Silvestre Abarca, who put up a two-storey building around a central courtyard.

The building's ground floor was for the prison personnel and the first floor was for cells and dormitories. The building, also known as New Jail, was knocked down in 1968 and since then, there stands the new Polytechnic University School of Almadén.

Currently, the building's ground floor has been preserved (punishment cells), whose ruins have been recovered by means of a project and have been integrated in the building, now they are classrooms, offices, departments and a museum belonging to our Polytechnic University School of Almadén.

But not only are the civil architecture related to the mines outstanding examples from the 18th century in Almadén. There are also religious buildings of interest: San Sebastian church, in the Plaza de los Donates de Sangre, was built in that time. The San Juan's Chapel in the Plaza de la Constitución. The most representative religious building is the Nuestra Señora de la Estrella's church, located in Plaza de Jesús, it has got baroque and neoclassical elements and it was an old chapel devoted to Jesus Christ with great distinction. The temple has got a Latin cross shape, with a front which combines stone and bare brick with a covering of Arabic tiles.

The main gate's decoration with an open space with a round arch, framed by two pairs of Doric columns over elevated bases to support a decorated architrave.

In the 19th century, the Industrial Revolution brought new mercury applications and an increasing demand, which produced new technological changes, mining derricks is a good example. They represent the technological progress in the Almadén mining district; they were metallic with different extractive machinery systems. We have, from the oldest to the most modern:

* San Aquilino's shaft (19th century) in San Teodoro's precinct, winch equipment and pulley system from that time.

* Number 1 shaft from Diogenes mine (19th century) in the courtyard of the Polytechnic University School of Almadén. It has got a winch set and pulley system.

* San Teodoro's shaft (20th century), in the San Teodoro precinct in Almadén from the 1960's.

* San Joaquin's shaft (20th century) in Buitrones precinct in Almadén. This shaft came into service in 1961 with modern technology from that time.

The industrial and warlike mercury uses (fulminating and explosives) increased the demand in the first half of the 20th century, causing important changes reflected in the numerous industrial buildings of the mine:

* The building housing extractive machinery of San Aquilino's shaft.

* The mercury warehouse.

* Carpentry and forge warehouses.

* Old metallurgical chimneys.

* The old power station located in the working neighborhood of Almadén and converted now in a sheet metal workshop.

* Pacific furnaces.

* Installations of San Miguel shaft.

Later, the progressive substitution of mercury by other metals in the chemical industry (chlor-, alkali, batteries, fungicide, etc.) and the abandonment as strategic metal from an arms point of view caused a sharp decline in the demand, becoming more accentuated in the 80's due to environmental pressures.

For the last 3 decades, the mining activity suffered a progressive recession in Almadén resulting in a decrease in the number of workers, with important social and economical consequences for the municipality resulting in the closure of the mining installations in 2003. This closure forced people to find out new alternatives for the area, diversifying the economical activity and finding out a revitalization and implementation of its mining heritage, one of the most important elements for the future development of the area.

6. ALMADÉN MINING HERITAGE REVITALIZATION

Undoubtedly, the interest in the Almadén heritage has been shown in the great amount of research done in Spain and abroad, but it was in the 90's when the concern to recover and preserve our heritage began.

The opening in 1985 of the "Francisco Pablo Holgado" mining and historical museum in the Polytechnic University School of Almadén (EUPA), constituted the first really serious concern for the Almadén heritage. It takes up 3 exhibition areas of more than 800 square meters. The first area is the School's own courtyard, dedicated to big industrial archaeological elements especially Derrick number 1 from Diogenes mine in the Valle de Alcudia.

The second area corresponds to a restored area of the cells of the Real Carcel de Forzados (an old jail) from the 18th century and the third area, divided in 2 sections, devoted to paleontology and mineralogy the former and the latter to Almadén mining history.

The whole area culminates in an exhibition room of 100 square meters and the School historical library from the 18th century. The museum has supported educational activities, and it is a revitalizing element in preserving the Almadén mining heritage.

In 1994 and 95 a team of the EUPA teachers and students prepare a thorough inventory of ethnographical heritage elements in Almadén. This inventory served as base for a project for the Diputación Provincial de Ciudad-Real about "strategic planning of ecotourism in Valle de Alcudia" (future programs), these suppose future proceedings.

The private company, MAYASA, through a "*Sociedad Turística Comarca de Almadén*", will be other significant motive to go on with the process, and they will transmit the heritage richness of the area, creating its own spirit and interest, which is little known in the area.

The recognition of the “Manifest for the Restoration of the Mining and Historical Heritage in the Almadén Area”, that the Spanish Society in defense of the Geological and Mining Heritage, prepared with occasion of the first scientific session, in October 1996,, where it was declared of highly interest, for current and future generations, the preservation and restoration of the mining heritage.

This Manifest, with more than 1000 collected signatures, during the scientific session, from institutions and organisms and it was the final recognition of the collective consciousness of the Almadén citizens, in defense of an unknown legacy for many citizens.

1997 is a decisive year, it is when the regional authorities from *Junta de Comunidades de Castilla la Mancha*, through the *Consejería de Educación y Cultura* asked the University of Castilla la Mancha to carry out a Project (Industrial and Mining route in Ciudad Real: Almadén area, Almodóvar del Campo and Puertollano), to know exactly the area possibilities to be declared World Heritage, together with other proposals from the same autonomous community (Quijote Route, Villages of the Black Architecture, National Park of Cabañeros and the Ritual Celebrations of Habeas Christi), The 18th April of the same year, the Heritage National Commission accepted the proposal presented by the Junta de Comunidades. In this way, Almadén Mining Heritage became part of the 70 proposals Spain presented to the UNESCO in 1998 for the next 10 years.

In 1999 winds of change came for Almadén, it was said that something was moving on related to Almadén heritage and we can see how restorations works begin such as the Bullfighting Ring restoration (building from the 18th century, declared National Monument from 1973), the Bullfighting ring building is currently an important tourist spot with hotel, museums (tauromachy and ethnographic), restaurant and the possibility of being used for bullfighting and open-air performances. It was opened in 2003 and it was a success.

Minas de Almadén decided at the end of 2000 to include in the renovation plan of the company, the recovery of the mining heritage, creating the Francisco Javier de Villegas Institution in 2001, with the aim of restoring the *Minas de Almadén y Arrayanes, S.A. (MAYASA)*, historical heritage, promoting the historical and scientific knowledge of the mining exploitations to be known by everybody.

To carry out this project, in 2000, the Director Plan for the *Parque Minero de Almadén* was approved, being an instrument to design, control and plan the metallurgical and mining transformation of the Minas de Almadén installations in a Mining Theme Park, understood as a space for cultural transmission, education, and tourism of quality.

Turning on this plan to recover the mining heritage of MAYASA, the miner’s hospital of San Rafael was the first building to be restored, it was dedicated to be the headquarters of the “Francisco Javier de Villegas” institution and it kept the archives from 2003. The definitive closure of the mines in 2002 led to the comprehensive recovery of the installations according to this plan, working for several years in this project until it starts the dossier of considering it under the protection figure “*Bien de Interés Cultural del Conjunto Histórico Minero de Almadén*” and the opening the 16th January of 2008 of the Mining thematic park.

Together with the recovery works of the mining company, another institutions from Almadén went on working in the industrial heritage of this mining area, the *Escuela Universitaria Politécnica de Almadén* opens in December 2006 the Interpretation Center of the “*Real Cárcel de Forzados*” and the Almadén Townhall will open a tourist information center located in the Bullfighting ring building.

All this work carried out for the last 20 years has been followed by several national and international organizations, which from 2004 showed interest in declaring the Almadén mines part of the World Heritage. The creation of the ICOMOS-UNESCO chair in the Mining School of Madrid, had as main aim the support to get this objective and in the International Scientific Committee about Cultural Routes held in 2004 in Ferrol (La Coruña) by the Spanish ICOMOS National Committee it is clear the interest in the Almadén Mining in the Intercontinental Royal Way.

There is a general interest in the Almadén mining heritage, in 2006 ICOMOS-ESPAÑA, UNESCO-ICOMOS chair of the Mining School in Madrid, the Almadén Townhall and the Polytechnic University School of Almadén gave the first steps to prepare the process of declaring World Heritage by the *Junta de Comunidades de Castilla la Mancha* and the Minister of Culture to develop the right thing to do. The final results of the study and the international meetings about the Mercury and Silver Route in the Royal Intercontinental Way held in Almadén (November 2006) and San Luís Potosí (June 2007), since then, the minister of culture commissioned ICOMOS-Spain the preparation of the dossier to present the candidacy of Minas de Almadén for world heritage together with San Luís Potosí, Huancavelica e Idria. Finally only 3 participated. Huancavelica, due the earthquake which destroyed part of Peru in 2007 has slow down the work.

In September 2007 the first draft was submitted to the UNESCO in Paris, in order to be checked and corrected before the final submission in January 2008.

The joint dossier is called "Mercury-silver binomial in the Intercontinental Royal Route. Almadén, Idria, San Luís Potosí", after the evaluation we expect to enter Minas de Almadén in the list of World Heritage by June 2009.

Almadén longs for the decision of its mines to be included in the list of World Heritage to go on walking and searching a future tied to the mercury world.

"where the mercury vein finishes , it appears a new one, the rich cultural heritage of the Almadén area, a vein where the works will go on after the opening to the public of the mine theme park, mining academy, Almadenejos mines... till the revalue of the whole cultural heritage tied to the mercury exploitation arisen through centuries in Almadén".

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