Miss Chuquicamata, the Slag

Ignacio Acosta

Chuquicamata dominates an entire territory, not only because of the oceanic, sedimentary depth of this hole in the ground, but because of the nearby ranges of slag-heap mountains that its excavation constantly engineers[1]

A geography of contestation

Chile presents itself as a curiosity on the map. The long and narrow nation (4,300 km by an average of 175 km) appears geographically isolated from the metropolitan centres of the north and disconnected from the rest of the Latin American region. In fact, impenetrable natural barriers surround it. Lying between the high Andes Mountains to the east, the cold Pacific Ocean to the west, the Atacama Desert to the north and Antarctica to the south, Chile is a geographically bound and isolated territory.

Part of the 'Pacific Ring of Fire', where the Pacific plate dives below the continental plates producing an invisible geological conflict, Chile is linked to deadly earthquakes and volcanic activity. The geology and geography of Chile are shaped by these extreme conditions which are intrinsically linked to its mineral wealth. As magma pushes up from underground, it clashes with water, heating it and pushing minerals closer to the crust of the earth. Active volcanoes, the product of the clash between the Nazca and South American tectonic plates, accompanied by a long history of earthquake activity, form its dramatic geography.

Due to its unique configuration in the Andean subduction zone, Chile presents the largest copper

mineralisation on the globe, giving Chile the world's largest reserves of copper: Chile sits on the major copper porphyry deposits of the Andes Mountains.[2] As the U.S. Geological Survey notes, due to its unique geological and geographical configuration, Chile is the source of 27.5 per cent of the global reserves of copper.[3] Mainly located in the Atacama Desert, these contested extractive ecologies have come to be at the centre of a series of political and environmental disputes. Amongst the many conflicts that have arisen are, on the one hand, protracted legal battles involving the big multinational corporations that control 70 per cent of Chilean copper output, and on the other the agricultural communities struggling with growing desertification, water contamination and land expropriation.[4]

After the Pacific War (1879–1883), the bases for the contemporary Chilean economic system were established through the incorporation from Peru and Bolivia of the vast territories of the Atacama Desert, rich in copper and nitrate.[5] Since then, the management of these resources has been mainly in hands of foreign capital. British capital played a key role in the development of the Chilean economy as a whole, and particularly in the management of it copper and nitrate resources in the nineteenth century. Later in the twentieth century, U.S. investors, such as the Guggenheim brothers, took over the extraction of Chilean minerals. In late twentieth and twenty-first centuries a mix of multinational corporations together with the state owned mining corporation, CODELCO, have been responsible for roughly 11 per cent of global copper production.[6] Today these mines include the Escondida, currently the world's largest single producer of copper,[7] and Chuquicamata, the biggest open-cast copper mine in the world; both are located in the northern region of Antofagasta. Alonso notes that Chuquicamata's 4.5km long, 3.5km wide and 850m deep open-pit is deeper than the highest built structure in the world, the Burj Khalifa in Dubai[8].

The Guggenheim brothers

The Guggenheim brothers, who controlled Kennecott Copper, acquired the Chuquicamata mine through their subsidiary, the Chile Copper Company, in 1913. Chuquicamata, where the world's largest copper deposits were located, started operations on 18th May 1915.[9] The brothers believed in driving profit opportunities to the limit, and were, as Thomas O'Brien has suggested, 'the corporate crown of a classic American success history.'[10] Despite the fact that the primarily source of their fortune came from the wholesale trade, the family consolidated the expansion of their wealth through their ownership of other mining, smelting and refining businesses. Their empire extended worldwide through Utah, Alaska, Mexico, the Belgian Congo and Chile, as their advanced techniques of non-selective mechanised processes of extraction permitted the processing larges of volumes of material in a highly cost-effective way, thus revolutionising the industry. The Guggenheim brothers had pioneered the use of power shovels since 1892 and their flotation system completely re-shaped the landscape of the mining sector. The brothers brought to Chile systems of extraction, smelting and refining that were already in place in their U.S. subsidiaries. Geoffrey Jones explains how the knowledge and processes developed in one country were exported in order to maximise efficiency and return-value. The capital-intensive nature of the business meant that long periods of operation were needed before large profits arrived.[11] In addition, technological developments powered the acceleration and transformation of the mining business 'from a family-run, small scale, cottage speculation to a highly developed, large-scale, mechanized business.'[12] Economies of scale were needed for securing long term-growth and return of value, and therefore the key points of this historical shift lay in the development of new technology to process large amounts of material and the high level of investment required. Jones argues that the legal framework in which multinationals developed in the United States from a centralised business operated by its owners

towards a larger firm permitted a new type of corporate power, one that facilitated the raising of capital.[13]

The Guggenheims formed the Chile Copper Company in 1910.[14] At the time of their arrival, the nation's basic industry required intensive capital investment so as to be operated profitably. As Christopher Schmitz suggests, the brothers' major ventures in Chile changed not just the nation's old-fashioned mining industry, but also contributed to a new direction of the modern world economy by 'developing a new generation of giant, low-grade copper mines.'[15] Chuquicamata rapidly contributed to the consolidation of the brothers' domination as the leading finance capitalists in the world's metals market.[16] In 1923, with the aim of investing in the nitrate industry, the Guggenheim brothers sold the mine to another U.S. mining corporation, Anaconda. On 1 March 1923, Murray Guggenheim received the largest check in history at the time, for U.S.$70.000.000. Flushed with cash, the brothers were recognised to have the fourth largest fortune in the U.S.[17] Anaconda controlled Chuquicamata mine until 1971 when a major nationalisation of copper came to effect on 11 July. Based on the UN Resolution 1803, regarding the rights of sovereignty of natural resources, the major copper bodies of Chile of were expropriated by President Salvador Allende from U.S. international mining corporations. These included Chuquicamata and El Salvador mines (Anaconda Copper Company) and El Teniente (Kennecott). Since then, copper resources have been a key asset of the state, forming part of a major territorial transformation of the industrial landscape of Chile. Nationalisation was partly reverted during General Augusto Pinochet's dictatorship with the implementation of neoliberal policies.

Chuquicamta, a territory within a territory

The corporate town of the Chuquicamata mine – which has the same name – was designed as a model town in the offices of the Guggenheim bothers in New York in the early

decades of the twentieth century, where more than thirty architects were hired to design its urban plan.[18] The town grew up next to the mine, following the patterns of other mining settlements in the U.S., such as Butte, Bisbee and Tyrone. All are in close proximity to the location of natural resources. This runs counter to the general process of global urban transformation generated by industrialisation: access to transport networks determines where urban development takes place. Due the capitalist nature of mining endeavours, corporate towns are designed, as Carter suggests, 'to fulfil basic social necessities by maximising profits. They are thus both hypercapitalistic and socialist at the same time. The companies maintain dictatorship authority over the towns and the residents but provide for certain needs so that the workers stay happy and, much more important, productive.'[19] As result, both architectural formations and urban design are conceived in a typological form. While reducing substantially the costs by increasing efficiency, the standardisation and mass production of the architectural foundations of corporate towns can be seen as a reflection of the mechanised nature of the modern mining industry. In this way, it is important to recall that the functionality and profitability of industrial development is the main driving force behind the growth of corporate mining towns. To archive efficiency, urban systems must fulfil the basics needs of their inhabitants. This includes: housing; educational establishments for primary and secondary students; a health-care system for the miners and their families; and retail and foodstuff businesses.

The Guggenheim brothers financed the investment needed to plan and execute the urban settlement of Chuquicamata, including public services and a complete welfare, social and housing association system for the workers and their families. Within the confined zone of the town everything was subsidised by the company, including a modern hospital, primary and secondary educational institutions for the children and housing schemes, depending

on the needs of each family. This paternalistic social system, which covered all their basic needs, allowed workers to concentrate fully on their work. As result, no one outside of the corporate umbrella was allowed to live within the town's boundaries; if a worker left his work, he was also required to move out of town.

Constructions were created initially as temporary structures; however, as the town expanded and the population settled, these became permanent. With regard to spatial layout, concepts of social stratification and the division of labour were part of urban design. These separations within a bounded territory had an impact in the power relations created between inhabitants. To give one example, different 'types' of workers were given different 'types' of accommodations. These divisions respected institutional hierarchies in relation to their skills, citizenship and marital status. Thus, the disappeared Campamento Americano was created only for U.S. citizens. It was located 3 km away from the settlements for the local workforce and represented the best type of accommodation. To give another example, 'Campamento Nuevo' was designed around a central square, similar to Tyrone in New Mexico, and other mining settlements in the U.S.

The social divisions between different 'types' of workers reflected the closed urban systems created by the company in the first place. The production of copper increased over time and the mine grew to become the world's biggest open-cast copper mine. Accordingly, the subsidised settlement expanded its capacity to fulfil the housing demands of the workforce. This process of expansion preserved, however, the town's isolation from its natural surroundings. This was a key factor and partly a product of the tough geographical conditions of the Desert of Atacama in which the mine was found and partly a result of Kennecott's corporate policies that established a new legal regime that ran parallel to state sovereignty. Furthermore, these conditions created a 'bounded territory within a territory,' an autonomous enclave controlled

by foreign interests and responding to an international corporate legal framework within state sovereignty.

The town was closed to habitation in 2007 when high levels of pollution, caused by the expansion of the mine to secure continuing profitability, threatened public health. At the time of closure, the 25,000 workers living there were relocated to the nearby city of Calama where new neighbourhoods were built – following the same strategies of social segmentation and urban fragmentation. Today, the majority of its 140,000 inhabitants work around the mine. Since the evacuation, the town of Chuquicamata has been detached from its original function, which was housing the mine's workforce. Its boundaries are fenced off and its buildings closed for habitation. Half of them are buried under a mountain of thousands of tons of waste material; the other half is abandoned and waiting to be consumed by the new artificial topography. Its boundaries are fenced and protected against unwanted intruders. The remaining houses, banks, shops, schools and public spaces have been closed. Some iconic buildings remain open for daily-organised tours run by the state-mining corporation. While guides explain the material qualities of copper that permit today's world of hyper-connectivity as well as the importance of Chuquicamata for the local economy, the visitors photograph fragments of its ghostly appearance.

Fieldwork, 20 September, 2012

My practice explores power dynamics in minerals, geographies and historical narratives. I work on long-term interconnected research projects that involve extensive historical research, field-work, the collection of archival materials, new photographic documentation and diverse forms of mapping. My work develops a site-specific methodology. Once a site is identified, archival research is conducted to investigate its historical significance. A site-specific photographic intervention then follows. Once the photographs are taken, a

process of post-production and image editing occurs.
A field-exploration trip to Chuquicamata took place on 20 September 2012. Special permissions were requested from CODECO, and Daniel Chirino, who works in the company's public relations department, was designated to take me around. I used a large format view camera. The act of walking shaped the way in which the photographic intervention was conducted. I was guided by the knowledge and experience of Chirino, who lived for twenty years in the settlement before its closure. Listening to his personal experience was key to deepening my insight into Chuquicamata's complex history and for guiding the picture making process. His concerns regarding the dismantling of the settlement, the vanishing of cultural heritage and the disappearance of historical buildings under the slag-heap shaped my conception and understanding of the site.

Guided by Chirino, an exploration of Chuquicamata took place in the course of six hours. The documentation began in the central square and continued through the town towards its limits as time progressed. At the time, I was interested in the seriality of the architectural formations, which responded to a capitalist logic of maximisation of resources. As such, the photographic work began by focussing on the iconic elements of the mining town located in the central square. It continued with a series of standardised houses using typological photographic conventions that look straight at the subject of the photograph. The photographic expedition progressed with the photographing of street views of the town, including a series of abandoned shops, a series of portrait photographs of trees and various types of buildings used for religious activities, taken in landscape format. At the end of the day Chirino suggested a visit to his former family home, which – as appears in the photographs – was dramatically almost buried under the slag-heap. At this stage, I shifted the topographic strategy of documentation deployed during the fieldwork towards a more spontaneous act of

documentation of the fragmentation and disintegration of the topography and the architectural formations, and as such the photographic process became more spontaneous and less rigid. At this site, I asked Chirino to point out a rock with a high amount of copper. The piece he suggested appeared greener than the rest and had clearly fallen from the top of the slag-heap. Like the disordered earth and broken architecture, the act of photography became increasingly fragmented as I worked around the stone chosen by Chirino, examining it from different angles. I took a fragment of this rock as a prime example of a copper 'specimen' from the site. Mimicking the scientists who collect samples for their investigation, I took this piece to a high-technology environment in the University of Brighton where it was examined by Dr. Norman Moles, Assistant Head of Environment and Technology School at the University of Brighton, using an X-Ray Diffractometer.

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The installation of Miss Chuquicamata, the Slag consists of fifty-six photographs (15x21 cm each) mounted on aluminium and acrylic. The photographs are presented in an exhibition context along a horizontal line. The sequence follows my own fieldwork on 20 September 2012, giving the viewer an insight into my walking practice as an artist and opening windows to visualise the fragmentation and disintegration of the mining town. From left to right, the installation begins with an aerial satellite view of mining enclave, followed by a photograph of an arch called 'Cecilia', recalling a beauty contest that took place every spring in Chuquicamata (the title of the piece Miss Chuiquicamata, the Slag also references this event); the installation finishes with a photograph of Daniel Chirino's former family home half buried under the slag-heap and the X-Ray examinations mentioned earlier.

This essay is an extract from Ignacio Acosta's PhD thesis *The Copper Geographies of Britain and Chile: A Photographic Case of Study* (2016), which has been completed as part of *Traces of Nitrate: Mining history and photography between Britain and Chile* (www.tracesofnitrate.org) developed in collaboration with Art and Design Historian Louise Purbric and photographer Xavier Ribas, a research project based at the University of Brighton and funded by the Arts and Humanities Research Council, UK.

Endnotes

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15 Schmitz, C. (1986) 'The Rise of Big Business in the World Copper Industry 1870-1930', *The Economic History Review* 39, p. 396.

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Satelite view of Chuquicamata, cortesy of Servicio Aerofotogramétrico SAF, Chile.