

FINAL REPORT ON MINING EXPLORATION IN JUNIN AND CUELLAJE

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Japan International Cooperation Agency, Metal Mining Agency of Japan

SUMMARY (unnumbered pages, located before page 1 of document)

The study was completed in the Junin/Cuellaje region for the mining project set out in the agreement between Ecuador and Japan on Aug 17, 1994.

The aim of the study was to confirm the economic potential of the mine deposit in order to demonstrate the geology and mineralization of the Junin/Cuellaje area. The object also included the appropriate transference of technology to the Ecuadorian counterpart related to the plan. Besides these objectives, the development study includes, not only reserve calculations, but also considerations about the environmental effects of mining development.

The areas in this study include Junin and Cuellaje. The project is located in the province of Imbabura, approximately 50km north of Quito, and is situated on the west side of the Andes mountains of Ecuador. Between 1991 and 1994, the study included the Junin area. Between 1994 and 1994 the study included the two areas, Junin and Cuellaje.

In agreement with the results of the previous study, copper and molybdenum has been recognized around the ditches and stocks in the granite area (rough translation of this sentence). These results have been made to prove the promise of deposits in the area.

The results obtained during the present study in Junin and Cuellaje can briefly be described in the following way:

In Junin, the studies of the drilling have indicated with certainty the mineralization of the area and the proof of the extensive zone of minerals in depth. The environmental study was also carried out in Junin.

In the area of Cuellaje, the geological, geophysical and drilling studies were carried out in order to extract some promising areas in the region of the mineralized zone.

The field studies were carried out in the period between October 3 1994 and January 15 1995, and July 5 1995 and January 5 1996 and they were carried out by a formal study group of experts from Ecuador and Japan.

Studies performed in the Junin area:

1) 11 deep drillings in the Junin river and the Controversia and Fortuna ravines revealed minerals thinly spread of pyrite, bornite, calcopirite, and small traces in the granite....

Chemical studies obtained the following:

According to the results obtained from the drilling, mineralizations of Copper and Molybdenum are located in their largest amounts in the Junin river and the Controversia and Fortuna ravines.

Based on the distribution in the most disturbed and highest temperature zones, one can infer that the center of mineralization is located between the Controversia and Rica ravines.

In agreement with the results of the analysis of the geochemical company, one can infer that the highest count of Factor 1 are distributed in the Junin river, in the Controversia, Fortuna and Verde ravines and in the non-eastern part of the area. One would hope that the mineralization in Junin extends into an even larger area.

With these results, one needs more detailed investigations of the drillings where the highest mineral deposits are in Junin, and more detailed analysis of the reserves.

2) Environmental studies in the Junin area:

Based on the idea that development in the Junin area could effect nature, society and life, a complete environmental study will be carried out in an area 150km squared, that includes the valley of Aguagrun and Chalguyaku. The present study consists of an environmental study of the actual conditions and evaluations based on the supposition that mineral development will take place.

In order to begin this study, 11 subjects will be selected: topography, ground, water, flora, fauna, countryside, social aspects, air quality, water quality, earth and soil (ruid?) quality. For these subjects there will be studies about the present state, as well as work on the evaluation and prediction of measured studies.

The study on the present state of development in the zone adjacent to the national Cotacachi and Cayapas reserves, was composed of the forests in the north part and agricultural land in the south. The area for the study of mining development is located in the compensatory environmental zone.

The existence of a deep valley of small magnitude became apparent in the middle channel of the Junin river, which has considerable underground water.

Based on the studies to predict and evaluate the effects of mining development, one can deduce the following effects:

Water: change in the flow of the Junin river and its underground water table
Fauna: Retreat of wild animals due to development
Flora: drying up from deforestation
Social aspects: increased employment, preparation of infrastructure, resettlement of inhabitants

Water quality: bad quality from contamination

Sufficient measures to protect the environment, and additional studies and monitoring of the environment will be necessary in order to minimize the negative effects.

The measures of environmental protection consist of minimal cutting of trees, limitation in the construction of roads in the forest, limitation in agricultural and silviculture activities, and control of the construction of mining facilities to prevent waste leakage.

Additional studies include geological studies, meteorological studies, studies of factors which influence flora and fauna, tests for planting selected trees, studies of the ruins, or clear cutting, and studies for the dissolution of garbage/waste from the land.

The environmental monitor will be working on the flora, fauna, air and water quality.

3) Based on the studies of mineralization in Cuellaje the chemical tests show that the standards are too low in copper to indicate any potentially important mining area. With these tests, there is no proven important mining deposit in Cuellaje, therefore mining studies should be performed outside this area.

2-7 Prognosis and Evaluation

Pg 130: 2-7-4 Flora and Fauna Prognosis:

1) The mining installation consists of the exploitation of open sky, road, waste site, office, latrines etc. The 46km squared area of primary forest, rain forest, subtropical forest and cloud forest was clear cut. **The north part of the clear cut area was found to be 4km from the Cotacachi Cayapas reserve, so that the area invaded the outer limits of the reserve.**

One can assume that massive deforestation will dry out the area causing desertification, change the local climate, and alter the vegetation around the limit of the clear cut area.

The direct influence on the Cotacachi Cayapas reserve will not be small. One needs to change the development plan to be in accord with the results of the detailed study of flora and fauna.

There is a great wealth of fauna in the area of investigation, large mammals and fish abound. The large mammals are decreasing rapidly because of farming and hunting. Just as the fish have disappeared from returning to the river water of bad quality, influenced by the oxidization of the mineralization in the past, one would think that the fish (peces?) will not live in the high parts of the river. At the moment, the majority of the fish are not alive.

Accompanied with mineral development, the vital area for fauna will be influenced, especially the large mammals because of the massive deforestation and noise of the blasting.

Besides this, one would think that the drying up of the forest will influence both land and aquatic animals.

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2) Evaluation

The influence of mining development on the flora and fauna in the reserve area of Cotacachi Cayapas will not be small, due to the invasion of amortization 5km in width. One must continually carry out investigations outside the Cotacachi Cayapas reserve and monitor the flora and fauna. It is very important and necessary to change the plan of development based on the results of the investigations and monitoring.

If it is possible to access the most interior parts of the region, the mining development will have a huge influence on the rainforest, the mountains and the highest parts of the rainforest. Therefore, one must restrict not only the construction of new roads to access the interior but also the cutting down of existing forests.

Furthermore, during the operation of the mine and following the termination of the mine, one must make sure the recovery plans are instituted, including replanting in order to restore the vegetation and protect from erosion. In the case of replanting, there are suitable dominant plants species of the land.

2-7-5 Countryside

The proposed area of development includes, from the crest between Magnolia and Loma Negra, to the area surrounding La Libertad, and Selva Alegre localized on the south side of the Junin River. Appendices 52 and 53 are photo displays of the predicted area of development between Magnolia and Loma Negra. The area is clearly altered by the exploitation of open sky, area de presa de despedicios y area de presa de relave (?).

2) Evaluation

One must reforest and protect the area from erosion, at the very earliest, once the work is done.

2-7-6 Social Conditions

1) Prediction

a) Socio-economic progress

1) Crop Progress

Inside the area of investigation, the transferring of agricultural development from the beginning of the 20th century was initiated in Apuela and Penaherrera. The trajectory of progress is indicated in Appendix 54.

The beginning of cultivation between 1915 and 1939 was localized in the north of Cuellaje, Barcelona to the west, the surrounding area of Garcia Moreno and Magnolia to the southeast, and was expanded from Apueala to Penaherrera. Between 1940 and 1959 the afroecuadorians worked alongside the Junin river, and cultivated to el Limon, Chalguayaca, and the area surrounding Garcia Moreno.

Pg 132: And from 1960 to the present, cultivation was in Junin and Chontal Alto alongside the Guayllabamba river.

Until now, one can assume that the front part of the cultivation extended into and around Junin, the wooded zone around Chontal Alto and the lower areas of the Guayllabamba river. Just as the proportion of the cultivated area in 1990 was 25.7%, the proportion of progress of cultivation was 17.6% during 26 years (1964-1990). If cultivation progresses at the same rate (17.6%), between 1990 and 2016, 43% will be cultivated and primary forest will be lost in the area of investigation. The center of cultivation will be limited to the west part of the area of investigation.

Therefore, if the road work between the area of investigation and the Province of Pichinchas is open in the future, the crops alongside the Guayllabamba river will be used up more quickly.

In the case of undertaking mineral development, one can assume that the progress of cultivation will not change for the most part. But it is the opinion that cultivation will decrease alongside the decreasing agricultural population.

2) Population and Conditions of Life

Recent indications in the percentage of population show a decline, particularly in the urban part of each population, but on the contrary, rural populations have shown a slight increase.

The educational standards, medical treatments, and quality of life should be improving gradually.

Also, if the creation of roads in the area of investigation and the Province of Pichinchas open up in the future, the time to go between this area and Quito will be markedly shorter (approximately 3 hours). The inhabitants of the area of investigation will go directly to Quito and Garcia Moreno etc, and it is believed this will become an important place of traffic.

In the case of undertaking mineral development, approximately 500 people of the new town, perhaps the average of the population in the area of investigation will know one another, therefore education, medical treatment, sanitation, water, recreational installations, communication, and other public installations will be acquired. On the other hand, crime, traffic accidents, etc, will increase as the traffic population increases.

3) Industry and income

In the future, the only industry will be agriculture and agricultural products will be increasing, as will the areas of cultivation. The devastated grounds in the high mountains will increase, mainly because the high mountains are not possible to cultivate, primarily due to low temperatures. If good forms of agriculture were to be gradually

introduced to intensive agriculture, one would think that new areas of cultivation would be incorporated into the area of cultivation.

In the case of mineral development, there will be increases in second and third industries accompanying the mining and the opportunities of employment will be increased.

Therefore, incomes will increase and conditions of life will improve.

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b) Ruins and Cultural Property:

Ruins and related pots or vessels of the “Imbara Civilization” were discovered along the Intag river, in the east parts and south of the area of investigation. Moreover, fragments of vessels that one assumes are related to this civilization, were found during the field investigation. In this way it is possible that the ruins of this civilization extend inside the central part of this investigation. If it is the case that the ruins and cultural property do clearly exist, this is very important and one must change the development plan based on these conditions.

c) Resettlement of Inhabitants

The resettlement of the inhabitants of Junin, El Pelado, Barcelona, and part of La Libertad, a total of approximately 100 families, is necessary for developing an open pit mine.

The resettlement of the inhabitants of the community of Junin involving approximately 40 families, is necessary for the development of mining.

In the case where the resettlement of the inhabitants cannot be undertaken, it is necessary to change the plan of development.

d) Communities:

Since differences have not occurred in the understanding between the locals and those undertaking the mining project, counter to any rapid occurrence of problems, one hopes that there is a good foundation for communication between the locals and the communities.

Especially, one must put into effect a process in advance for the establishment of problems such as explanations, excursions, etc.: against mineral contamination, including air and water quality etc.

e) Treatment of waste and sewage water

[Cutting down on industrial waste such as overload and relaves (?), are piled up in the areas in order to presas de despedicios y presas de relaves, the establishment and stability of the duration must be designed.] - rough translation with unknown English equivalents

Household waste is not transported outside the region and is treated by an incineration facility and treated in the area of development.

Waste water in the development area is treated in the waste water treatment facilities, therefore the treated water is drained into the rivers.

2) Evaluation – In the case of carrying out the mining project, expansion of the opportunities of employment will improve the quality of life, hygiene and medical treatment, improvement of economic conditions and of well-being should be promoted.

Roads must be improved, including paving them in relation to the increase in traffic.

In order to better understand the presence and value of the ruins and cultural property it is very important and necessary to change the development plan under those conditions.

One must employ an advanced process in order to establish problems such as explanations, excursions, etc, to fight mining contamination, including the quality of water, the quality of air, etc.

One must sufficiently explain to the inhabitants the resettlement program, the security of the resettlement site, and the guaranty of the consensus of the inhabitants. In the case where the agreement of the inhabitants cannot be attained, one must change the development plan.

Industrial and residential waste is not transported outside the area of development and is not treated in this area.

Waste water in the area of development is treated in the waste water treatment installations, therefore the treated water is sent into the rivers.

2-7-7 Air Quality

(1) Prognosis

Caida de polvo

Present Conditions

The quality of air in the area of investigation is very clean, without dust.

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List of Fauna in the area of investigation:

MAMMAL LIST:

- Main species – marsupials including opossums
- Bats – vampire bats
 - sloths
 - tapirs
 - wildcats – tiger, panther
 - bullfrog
 - treefrog
 - lizard
 - mice
 - snakes – boa constrictor

Junin, Magnolia and Barcelona were listed on one of the two pages, with Junin having almost all the above animals in its area.