



## Remediation of acid mine drainage from the Santa Fe tin mine, Bolivia

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The Santa Fe mine, department of Oruro, is located in the Andean Tin belt, is exploited for tin, zinc, lead and silver. This is an underground mine mined up to the -108 level. Today it is only mined up to the -50 level. Under this level the table water covers the mine. Water reaches the surface with a very acidic composition, with a high content in potentially toxic elements. This water drains directly to the Santa Fe River and contribute to the pollution present in this river that directly affect to the aquatic communities. In addition, population of this area have problems in the supply of drinking water, so remediation by obtaining cleaning water is a priority for this area. This study presents a neutralization-precipitation treatment with lime to the acid water inside the mine.

The ore mineralogy of the Santa Fe mined deposit consists mainly in cassiterite, pyrite, sphalerite, galena, arsenopyrite, argentite and sulphosalts. The host mineral is mainly quartz, with a minor content in feldspars and tourmaline. Alteration minerals as alunite, goethite and pumbarosite are abundant and indicate the occurrence of reactions that lead to the formation of acid mine drainage.

The mean pH of water drained from the Santa Fe mine is 2.2 and chemical analyses show high contents in potentially toxic elements: 27-295 ppm Zn, 0.05-0.2 ppm Pb, 0.06-0.09 ppm Cd, 0.04-0.12 ppm Cu, 113-165 ppm Fe, 4 ppm Mn and 564-664 ppm S. As and Sb were under 0.5 ppm.

A settler tank inside the mine was designed by means of seal a selected gallery to clean the mine water. The function of this gallery is to sediment the sludge resulting from the neutralization - precipitation treatment process to obtain a clear water overflow continuously to the outside.

The neutralization tests indicate that 0.65g/L of lime and 2ml of flocculant should be added to neutralize water up to pH 6-7. A flow rate of 80 L /s was considered. After a geotechnical study, a chamber located in the mine was selected to locate the settler. The volume of the settling tank was determined from sedimentation tests in order to obtain the adequate sedimentation time. According to these results and the availability of galleries the dimensions of the settler tank will be 160x1.8x1.9m. Sludges will be treated by a process of solidification and used to provide physical stability to the gallery.

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