1990

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EQUIPMENT AND PROCESSES FOR ROASTING ZINC CONCENTRATES AT COMINCO'S TRAIL ZINC SMELTER

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Zinc Operations, Cominco Ltd., Trail, B.C.

INTRODUCTION

The zinc smelter of Cominco Ltd. at Trail, B.C. is the largest in the western world. A total of 550,000 tonnes of concentrate are processed at the smelter annually. Approximately 80% of the zinc concentrate is roasted and the remainder is treated by aqueous oxidation pressure leaching. The zinc concentrate roasting and sulphur dioxide gas processing plants have undergone many changes over the years. This paper describes the processes and equipment currently used for concentrate roasting, SO_2 gas cooling and cleaning, mercury removal, sulphuric acid production, liquid SO_2 production, and tail gas SO_2 scrubbing. The recent installation of an advanced process control system for the operation of these integrated processes is also described.

OVERVIEW OF COMINCO

Incorporated in 1906, Cominco Ltd. is an integrated natural resource company with principal activities in mining, smelting and refining, mineral exploration and fertilizer production.

Cominco is one of the world's largest producers of zinc and lead, accounting for about 10% of mine production in the western world. The company also produces and sells copper concentrate, copper sulphate, silver, gold, cadmium, bismuth, indium, and germanium concentrate, and generates electrical energy.

Cominco is an important producer of fertilizers, which are marketed primarily in Canada and the United States. The principal products are ammonia, urea, ammonium nitrate, ammonium phosphate, ammonium sulphate and potash. The company also produces elemental sulphur, sulphuric acid and sulphur dioxide.

Cominco's zinc and lead smelting activities are centered at the integrated zinc / lead smelter in Trail, where the company operates a modern electrolytic zinc refinery that has, currently, the largest zinc capacity in the world.

OVERVIEW OF ROASTER / SULPHUR RECOVERY COMPLEX

The zinc operations at Trail, B.C. processes about 550,000 tonnes of zinc concentrate annually for the production of zinc metal. About 80% of this concentrate is processed by roasting and the balance of the concentrate is processed by pressure leaching.

Lead-Zinc '90
Edited by T.S. Mackey and R.D. Prengaman
The Minerals, Metals & Materials Society, 1990

RB 2h 90

tablish and maintain the alignment of the electrode wires in the pipes. The wires were changed from lead-coated mild steel to lead-coated tungsten to improve electrode performance.

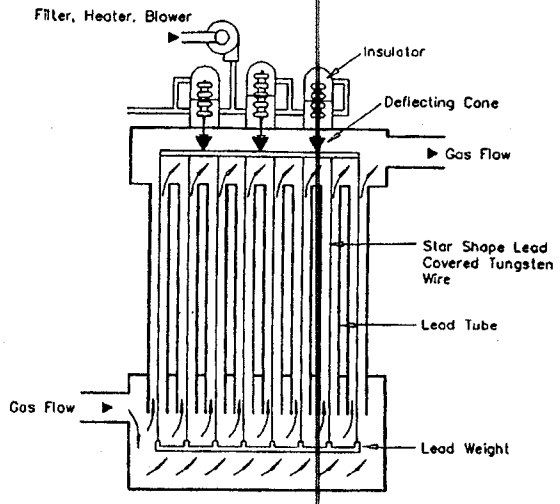

Fig.8 Mist Treater Arrangement

The secondary mist treaters are of similar design but have smaller capacity. Each treater contains 128 electrodes and pipes and is designed to handle 375 m^3/min of gas.

These secondary treaters have been in service for 19 to 28 years, having performed reliably with routine maintenance. The only significant changes made in their design in recent years have been the conversion of the electrodes from lead-coated mild steel to lead-coated tungsten, the installation of sloped floors to facilitate cleaning, and enlargement of the access doors.

The overall efficiency of their operation is impaired to a degree by the configuration of the electrical controllers. There is, at present, only one controller to supply power to the mist treater groups, each comprising one to four treaters. This results in the potential loss of power on several secondary mist treaters if electrical short-circuits develop in one unit. A study is underway to install one controller per secondary mist treater.

Mercury Removal Plant

The concentrates processed at the Trail zinc smelter contain an average of 35 ppm of mercury.

To satisfy environmental control regulations, it is necessary to remove mercury from the sulphur dioxide gas before it enters the sulphuric acid plants. This was achieved in 1983 with the installation of the Boliden Norzink mercury removal process. The key element of this process is the recirculation of mercuric chloride solution at a rate of 6500 L/min through a packed tower (Fig. 9). The mercuric ion content of the solution is maintained at 1.0 to 2.0 g/L, and the chloride ion content at 2.0 to 3.0 g/L.