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Mr. K.C. Charron,  
Chief, Industrial Health Division,  
Room 714, Jackson Building,  
Ottawa, Ontario.

DISPOSAL OF ARSENIC TRIOXIDE AT NEGUS MINE, YELLOWKNIFE, N.W.T.

Negus mine is currently producing and stockpiling an arsenical concentrate. The management now proposes to install a Dorrcro roaster, which will be used to roast these concentrates. For the first eighteen months after installation the roaster will treat both current and stockpiled concentrates. By the end of this time the stockpile will all have been treated, and the roaster will thereafter operate on current production.

The roasting of this arsenical concentrate will produce a fume of arsenic trioxide, and Negus mines is obliged, in common with the Giant Yellowknife and the Con Mine, to find some means of catching and disposing this fume. The Negus management concedes, and the present writer concurs, that the best method of catching and disposing of the arsenic trioxide is by a Cottrell precipitation or bag house, dry material being stored underground in a permafrost zone. This method is being adopted by the Giant Mine, a Cottrell being under construction at the present time.

However, the Negus management contends that they cannot afford the expense of a Cottrell precipitation. They also assert that a bag house, which would be cheaper, cannot be used in their case, because of the high sulphur dioxide content of the roaster gases produced by the Dorrcro roaster. Tests by the Dorr Company indicate that the sulphur dioxide content will be about eight percent. Thus Negus feels that they are obliged to adopt the wet collection method now used by the Con Mine.

In the case of the Con Mine, the wet collection method using the C.M. and S. impinger is claimed to operate at high efficiency satisfactorily. The arsenic trioxide is obtained mixed with water as a slurry, which is presently pumped out to a surface pond, said to be water-tight. The solids settle out in the pond, and the clear water is then pumped back to the impinger for re-use. This method of disposal has been in operation for about six months. It appears to be satisfactory, although no organized campaign has been arranged to search for leakage of arsenic from the pond.

Unfortunately any pond placed on the Negus property would, if any leaks occurred, drain toward Yellowknife Bay, from which drinking water is drawn. Negus therefore proposes to set up a pond underground using an opening to be slashed out 100 feet long, 10 feet wide, and 100 feet deep. They feel that such an opening can be made leak-proof by grouting and suitable damming of the openings.

The present writer feels that any method of wet storage of arsenic trioxide should be regarded as experimental, especially since no careful search for leaks has been made in the case of the Con Mine. Even though no leaks can be detected at present, there is the long-term action of the solutions on concrete and rock minerals to be considered. An additional hazard appears to exist in the underground storage proposed by Negus, since the upper 50 feet of the site selected will be in permafrost, that is, after the storage site is filled and closed up, freezing will set in. The effects of the expansion produced by freezing are impossible to predict.

It must be observed that the freezing can be prevented by a change of storage site to an area outside the permafrost zone. This would not alter the fact, however, that the wet storage of arsenic trioxide above or below ground is relatively untried, and may yet lead to difficulties through leakages. It is to be stressed that those acquainted with underground engineering feel



satisfied that the grouting technique can make for as safe storage, or better, than a surface basin.

In view of the permission granted to Con for surface storage, it would seem that North West Territories Administration can hardly place an impediment in the way of the Negus, for this method at least. It is possible that although no suitable surface storage appears to exist at Negus' property, a site could be leased from Con for the purpose, having drainage from Yellowknife Bay.

Mr. Christie, Mr. Homulos, Dr. Downs and I do feel, however, that dry storage underground in a permafrost zone is the best solution. It is felt that, if a Cottrell is too expensive, wet collection may not be the only alternative. A bag house should be considerably cheaper, and, although Negus claim it to be unsuitable in their case, it is not certain that an exhaustive examination of this possibility has been made. New synthetic fabrics are available to-day, and, in addition, the possibility of diluting the roaster gases may not have been explored.

It would seem that there are two alternative courses to be taken in connection with Negus' problem

(a) Use the dry collection dry storage method  
or

(b) Use C.M. & S. wet collection method in which case the choice of above or below ground storage would presumably depend upon the opinion of qualified experts such as Mr. Christie, Chief Mining Inspector, Mr. Homulos, the Resident Mining Inspector, or others of similar experience and standing in the field.

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