Potentialities of Manufacture of Salt at Mandi

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The potentialities of natural brine springs at Maigal and Bhatogi of Mandi salt works of Hindustan Salts Ltd in Himachal Pradesh are examined with a view to tapping these resources for the manufacture of good quality of salt by solar evaporation, economically.

In addition to mines of salt at Guma and Dhrang, natural brine springs are also available for Mandi salt works at Maigal and Bhatogi. At Maigal, 14 natural springs are reported to yield about 4000 gallons of brine per hour of the concentration varying between 8 and 10°Bé. Presently, only a few streams are tapped for short duration of a few months in a year and about 50-100 tonnes of solar salt are manufactured annually. The manufacturing operations are carried out in the cement pans constructed at Maigal before about 20 years. An area of about 20-25 acres of Neol is levelled and necessary arrangements for carrying the brine through the pipes and channels are also existing. In addition to above sources, about 1000 gallons per hour flow of 23°Bé brine is available from Bhatogi mines which collapsed a few years back. Bhatogi brine supply is not considered as perennial supply. However, advantage can be taken to utilize this brine of high concentration for the manufacture of salt till the period the supply is made available.

Climatic conditions

The rainfall at Dhrang and Maigal is about 150-175 cm. on the average annually, but majority of rainfall is experienced during the period of July, August, and first half of September. While winter rainfall is also quite common in this region, sometimes heavy showers are also experienced during the months of April and May. Thus the salt manufacturing season by solar evaporation is restricted to a very short duration, and best advantage is required to be taken of whatever period is available.

The winter days and nights are quite chilly. The maximum temperature recorded during summer months from April to July is above 100°F. There is a great difference between the minimum and maximum temperature during the summer months. The minimum temperature recorded during summer nights is from 60° to 72°F. The relative humidity recorded during the salt manufacturing season is favourable and shows promise for manufacture of salt by solar evaporation.

Being located at a high altitude and surrounded by hilly region, velocity of the wind is low.

Summing up, it may be stated that though the climatic conditions are not favourable for the manufacture of salt, but still it is possible to manufacture salt at a competitive price with that obtained at a heavy cost from Kharaghoda and Sambhar Lake. What is necessary is to adjust the process by utilizing the latest technique of salt manufacture and by taking utmost care to utilize maximum period during the salt manufacturing season.

It is understood that at no time any attempt in the past has been made to record the meteorological data which are useful in the manufacturing operations of salt. Therefore, it is essential that a meteorological station is set up at this place.
Soil

In this rocky region, it is advantageous to construct cement pans without incurring much expenditure. The cement pans which have been in existence for the last 20 years or so have stood very well. The construction of cement pans in this region is both advantageous and economical for the reason that the life of cement pans can be extended for a very long period, and secondly, as this brine does not contain any appreciable quantity of soluble impurities, salt of high grade can be manufactured. While recommending the construction of cement pans it is not being suggested that the salt manufacture cannot be carried out here on soil beds. At Neol, soil conditions are found to be satisfactory and in fact if the panbeds are prepared in the conventional way, hard and firm panbeds can be prepared and the percolation losses as well as the contamination of the soil from the bed can be prevented to a great extent. At Neol, it is reported that the soil is experiencing heavy percolation, which may be due to soil having lost its salinity due to longer duration of rainfall being experienced in this area and due to not utilizing this area for salt manufacture so long. However, it is hoped that in all probability when this area is utilized constantly for salt manufacture for about 2-3 seasons, the percolation losses will be minimized greatly and there will be no difficulty on this account. In the beginning, if percolation losses are found to be heavy, use of polythene sheet is recommended so that even during the initial stages of salt manufacture, good crop of salt may be obtained. Necessary precautions are required to be observed while lining the panbeds with polythene sheet. It is understood that polythene lining so far carried out for this region has not been of a great success, which may be on account of not following the correct procedure.

Brine

It is not economical to utilize brine of 8-10°BÉ, available from the natural streams straightway in the manufacture of salt due to short duration of salt manufacturing season and due to not very much favourable climatic conditions prevailing in this area. Therefore, it is necessary that this naturally available brine is concentrated by using unsaleable pieces of mined salt for raising density of brine to 24°BÉ., i.e. to the point of its saturation or thereabout, and/or flowing this weak brine into the salt-beds, which are reported to be available almost all along the natural springs, and then to utilize this saturated brine, on settling, for the manufacture of salt. In utilizing the unsaleable pieces of salt, obtainable from the mine, the cost of salt is likely to be raised for the manufacture of salt. But if the second alternative is found to be workable, the cost of production of salt can be reduced to a very reasonable extent. However, this aspect can be considered by the mining experts.

Manufacture of salt by solar evaporation

As the rainfall in this region is interrupting the salt manufacturing season, the process of salt manufacture is to be modified to suit the local climatic conditions. Construction of cement pans in this region is advantageous for two main reasons. Firstly, the time lag for constructing soil bedpans after the monsoons can be avoided in case of cement pans taking advantage of maximum dry days. Secondly, the winter rainfall commonly experienced here may cause, even after taking all possible precautions, contamination of mud particles either picked up from the panbeds or from the sides of the crystallizer pans with the salt crystal in case of soil-beds, which can be
avoided in case of cement pans. Again there will be advantage of better rate of evaporation in the cement pans. On the whole, the economics of construction of cement pans in this area appears to be quite bright, which can be confirmed by actually working cement and soil bedpans for one season.

Shallow charging of brine into the pans in this area cannot be considered suitable because of interruption due to rainfalls especially during the winter season. With a view to taking advantage of the great difference in the maximum and minimum temperature for the day and night, the depth of brine to a minimum of 7.5-10 cm. is required to be maintained in the pans. Also with a view to discharging the rainfall as it falls on the brine layer, suitable arrangements in discharging the fresh rain-water as it falls has to be provided to all the pans.

The locations of pans preferably may be done on various gradients, so that the brine can be flown from one pan to another at the lower levels. This will keep the brine in motion and thereby maximum advantage in the rate of evaporation can be taken. Depending on the season, the extraction of crop can be done at an interval of, say, 2-7 days.

**Development of Neol area**

The Neol area is very advantageously situated and if systematically developed can prove to be a useful area for processing the entire brine of the natural springs. Fortunately, there are natural gradients which can be taken advantage of for the construction of pans. In case the soil beds are required to be constructed, size of pans of, say, 90×30 m. may be kept with a suitable provision of flowing the brine from one pan to another. However, in case the cement pans are to be constructed, the size may be restricted to about 30×12 m. In either case suitable areas have to be reserved for storage of salt and for storing brine for setting purposes.

**Use of organic dyes**

As the season is limited and rate of evaporation is rather low, use of organic dyes which accelerate the rate of evaporation considerably may be used with advantage for increasing the production of salt per unit area.

It is expected that if the entire brine of natural springs can be tapped and concentrated by either of the two alternatives suggested above and the saturated brine of the Bhatogi mines are also utilized in full, the yield of salt in this area can be raised to about 20,000 tonnes. This quantity will be in addition to the production of salt by mining processes.

**Caustic soda manufacture**

The use of natural brine which is almost devoid of any soluble impurities can be made for manufacture of caustic soda. Advantage can be taken of plentiful and cheaper hydroelectric power available at Jogandranagar. This scheme is worth consideration, but its success mostly depends on the consumption of both caustic soda and chlorine, in the nearby areas.

**Forced evaporation**

Obviously, when it is possible to utilize natural brine to manufacture salt by using solar evaporation which certainly is the cheapest way of manufacture of salt in this region, processing the brine by forced evaporation will be a costly proposition. Again, in the nearby locality, no cheap fuel is available. It is possible only to use forced evaporation in the manufacture of salt provided the installed capacity of the unit is very large and cheaper fuel is available in the vicinity.

Summing up, it may be said that the possibility of manufacture of salt on larger scale in this region by the use of solar evaporation is bright and it is worth developing this source for making this area self-sufficient in the manufacture of salt.