AIM AND SCOPE OF THE WORK

Common salt or sodium chloride is widely distributed on the earth and is found in all rocks, clays, animal and vegetable life, rivers, lakes and all waters. In rich concentrations it occurs in sea water, inland saline lakes, saliferous earth and as rock salt. It is an important basic raw material for many heavy chemicals like soda ash, caustic soda, chlorine, sodium, sodium sulphate, in glass, ceramics, textile, soap, paper, rayon, plastics, drugs, rubber, leather, dairy industry and in fish and meat curing.

In India, salt is produced from sea water all along its 5600 km coast-line and from inland sources. Country's annual production of 5 million tons (1968) is entirely by solar evaporation of sea water and inland brines. Ninety thousand hectares of land is under salt production with a licenced capacity of 9.5 million tonnes. Production target for 1970-71 has been fixed at 7.5 million tonnes.

The climatic conditions of dry weather, low rain fall and high evaporation rates are particularly favourable in Gujarat and Tamil Nadu. Maharashtra and Andhra Pradesh have less favourable conditions and the remaining coastal states have almost unfavourable conditions. The Sambhar Lake and other sources of sub-soil brine in Rajasthan and the Little Rann of Kutch also produce salt and the climatic conditions there are very favourable. Of the country's 5 million tonnes of salt production, Gujarat contributes 54 per cent, Tamil Nadu 15 per cent, Rajasthan and Maharashtra 10 per cent each.
and remaining 21 per cent is produced in Andhra Pradesh, Orissa and West Bengal.

In the Little Rann of Kutch sub-soil brine is used to produce 5 lakh tonnes of salt, and in Rajasthan, the Sambhar Lake and other sub-soil brine sources produce 5 lakh tonnes. At Sambhar Lake proper, the rain water brings the salt from the catchment area and the saliferous earth also contributes the salt. The whole area of the Lake (about 230 sq km) gets filled up with a shallow sheet of water which is concentrated to obtain salt, sodium sulphate and sodium carbonate.

In all solar salt works brine is concentrated over extensive areas (1 hectare for 100-150 tonnes of salt); it is necessary that the soil of the salt works should be suitable for maximum production. The crystallizer area of the salt works, constituting about 13 per cent of the total area, is of vital importance as salt is crystallized and harvested over this area. The soil of the crystallizers needs maximum attention and care. The present crystallizers of almost all Indian salt works are made up of natural soil by puddling, tamping and rolling. The bearing strength of these beds is very low and they need heavy recurring expenditure. They require repairs and renovation every year in the beginning of the season and some times more frequently. Therefore the salt manufacturing process starts late. Such crystallizers are suitable only for manual harvesting of salt which is also a time consuming method. Many salt industries in the country
are now inclined to use the mechanical salt harvester to quicken the harvesting process and to solve the problem of employing huge labour force. The essential need for the use of salt harvester is the stable soil below the salt layer which can take the load of harvesting machines. A suitable soil treatment method is needed to increase the strength of the crystallizer beds and to reduce the maintenance cost.

A few salt works face the problem of percolation of brine through soil. Such loss of brine reduces the yield and as the density of brine increases, percolation poses a greater threat. The quantity of brine lost by percolation depends on many factors such as the type and texture of the soil, heterogeneous nature of the strata, density and depth of brine. Therefore it is not possible to predict the percolation losses quantitatively unless the soil characteristics are studied. On measuring the losses due to percolation, it would be possible to compare the cost of soil treatment with the losses.

There is no precise method available which can be used to measure percolation losses under the conditions existing in the salt works. Measurement of evaporation rate of brine and substracting it from the total loss of brine can give exact percolation losses. Apart from this aspect, the studies on the evaporation of sea water are also important for the layout of the salt works. At places were the precipitation of rain exceeds the evaporation and is spread over large period of the year, it is not possible to obtain salt by solar evaporation. Soil below the evaporating sea brine plays an important role
by absorbing and storing the solar energy and thus increasing the rate of evaporation. The factors affecting the rate of evaporation are the colour, texture and perviousness of the soil. Studies on the evaporation of brines over soils can be used for the measurement of percolation losses and to know the effect of soil nature on the rate of evaporation.

The Little Rann of Kutch, north of Saurashtra, is being exploited for the recovery of salt and magnesium chemicals using the sub-soil brine as starting material. It produces about 5 lakh tonnes of salt annually. The Great Rann of Kutch with its area of 17,000 sq km remains unexploited for want of essential needs like water, power and transport. With the increasing demand of salt and by-products and possibilities of getting water, power and transport facilities in Kutch, the soils and brines of the Great Rann need thorough investigation. Salt based industry in Kutch area would help in the developing the industrially backward area. No data are available on the soils and brines of the Rann. Collection of the basic data and exploratory survey of the soils and brines would reveal the possibility of utilising the vast resources of the salt and by-products from the Great Rann of Kutch.

Considering the diversified role of the soil in the manufacture of salt and by-products, the present work was carried out in three parts: i) studies on the soils of salt works, ii) studies on evaporation and measurement of percolation on soil beds, and iii) studies on the soils and brines of the Great Rann of Kutch.