Transport of mechanically harvested salt at Nirma salt works, Kalatalav near Bhavnagar, Gujarat. All pictures courtesy Isabella Sedivy.

Indian salt on the move

At the beginning of 2006, salt producers, government authorities, and international experts gathered in Ahmedabad, India to discuss making the Indian salt industry globally competitive

ABOUT 75 YEARS ago, Mahatma Ghandi ignited India's fight for independence by telling people to produce their own salt. His salt march proved successful. Today, India is producing an average of 15m. tpa of salt, with an all time record of 20m. tonnes in 2005. India has become the world's third largest salt producer.

Nirma University at Ahmedabad formed the perfect location for the International Conference on Salt 2006, during 19-20 January 2006, organised by the Salt Commissioner's Organisation, Confederation of Indian Industry, and the Ministry of Commerce and Industry. Ahmedabad is the business capital of Gujarat, the westernmost and fastest growing Indian state.

Along 1,600km of coastline around the Gulf of Kutch, more than 75% of Indian salt is produced in some 10,000 solar salt works, some of them producing more than 200,000 tpa salt. The increasing demand and the recent shortage of salt in the region offers an opportunity for the Indian salt industry to establish itself as a major player in the Middle East and Asia Pacific salt market. However, most of the speakers at Salt 2006 made it clear that to take this opportunity, many improvements are needed.

A question of quality

About 60% of the salt produced in the region is consumed by the chloralkali industry. Impurities in the salt need to be removed prior to using and the cost of impurity removal is high, sometimes exceeding the cost of the salt itself.

Indeed, the question of salt quality was a most controversial issue at Salt 2006. Comparison of relevant figures presented at the conference shows that there is a severe discrepancy between the quality claims of the salt producers and the qualities actually received in the works of the chloralkali manufacturers.

Exports to China & Japan

Hopes of export oriented Indian salt producers in the audience were high, when Mao Quigguo, President of the China National Salt Industry Corp., shared his thoughts concerning the Chinese salt market. China imported from India around 1m. tonnes of salt in 2004 and more than 1.5m. tonnes in 2005. But Mao disappointed listeners by predicting that China's demand for foreign salt will drop in 2006. He told delegates that only the market, ie. the price and the quality, will decide whether China will import substantial amounts of salt from India in the future.

Mr. S. Sundaresan, Salt Commissioner of India, summed up with call for better quality: "The message seems clear, China will not increase imports from India unless we improve our quality".

Improving quality

Roly Mottershead from CGV, Australia, predicted growing demand for salt in the Asia Pacific region, in excess of the global forecast of around 2% per annum. He explained that Australia has been successful in exporting 12m. tpa salt on sustained bases because Australian salt producers are in a position to supply high quality salt all the time. So optimistic are the Australians about their future that they plan a 10m. tpa solar salt project at Yannarie in the Exmouth Gulf in Western Australia.

Vladimir M. Sedivy of Salt Partners, Switzerland, presented an economically priced but very potent way of upgrading solar salt to reach

Salt qualities

		Australian solar salt standard	Quality claimed to be achieved by Indian salt producers	Quality reported by Indian chloralkali manufacturers
Ca	(%)	< 0.04	0.03 – 0.05	0.15 – 0.30
Mg	(%)	< 0.02	0.02 – 0.03	0.06 – 0.20
SO_4	(%)	< 0.12	0.10 – 0.15	0.43 – 2.5

Salt exports from India ('000s tonnes)

Destination	2001	2002	2003	2004	2005 (till June)
China	-	-	-	950	1,210
Japan	210	365	560	580	350
Other	1,400	1,000	660	550	460
Total	1,610	1,365	1,220	2,080	2,020

in excess of 99.7% pure NaCl, which is what the chloralkali industry requires. The HYDROSAL process with hydroextraction of impurities employs counter-current flow of salt against upwards flowing pure brine.

The purification efficiency of the HYDROSAL process is typically 95%. Using saturated brine, the process results in a tiny loss of around 2-4%. This compares favourably with the 15-20% losses in local salt washing plants, which were mentioned by Mr. D. S. Jhala, President of the Indian Salt Manufacturers Association in his presentation on Indian salt industry.

Professor Steven Davis from the State University of Florida, the world leading expert in the field of biological management of solar salt works, introduced this subject to the attentive audience. His research has shown that proper control of the biological ecosystem in the evaporation and crystallisation ponds leads to significant improvements.

For example, biotechnological control of brine leakage in one of the largest salt fields in Australia resulted in an increase of salt production by 12%. Control of algae like Dunaliella salina can shift the balance in favour of red halophilic bacteria, an organism that colours brine red, improves evaporation, cleans the brine from organic substances, resulting in growth of large, glass clear salt crystals.

Improving infrastructures

In the session concerning infrastructure, salt manufacturers asked for more and better roads and ports with larger jetties and lower handling costs. These demands were confirmed by a study presented by Bhaskar Subramanian of Price Waterhouse Coopers. Indian transportation costs are around twice as high as in Australia. Mr. H. K. Dash, the CEO of Gujarat Maritime Board listened attentively and promised improvements.

Stockpile of washed salt at Nirma salt works, Kalatalav near Bhavnagar, Gujarat, stored for soda ash production.

Presentation of Vladimir M. Sedivy of Salt Partners, Switzerland, concerning salt upgrading and refining at Salt 2006.

Table salt

Salt refining capacity in India was reported by Mr. M. A. Ansari, Deputy Salt Commissioner, to have touched 5m. tpa. However, the fastest growing segment of the edible salt market is vacuum salt because it is free of black spots.

Eörs Kondorosy from Swiss company Evatherm introduced an interesting recrystallisation process. Raw salt is dissolved in undersaturated brine at about 108°C. At this temperature, impurities like gypsum do not dissolve. The saturated brine passes though a series of crystallisers where the brine evaporates and cools down under increasing vacuum. The result is a very pure salt that facilitates stable iodisation.

The recrystallisation process works without expensive heat exchangers and uses only about half the energy needed for multiple evaporation. Mr Kondorosy surprised delegates by saying that Evatherm is presently building salt recrystallisation plants in Pakistan and in Bangladesh. Mr Kondorosy believes that in the future, Indian salt for human consumption will be refined by recrystallisation.

Dr Fritz Wilke of Deep Underground Engineering, Germany, identified the solution mining projects of Hindustan Salts at Mandi, Himachal Pradesh, and ONGC at Bikaner, Rajasthan as another potential source of pure salt in India. He explained the steps to be followed when identifying the rock salt geology and mechanics, drilling, completing bore holes and leaching salt in caverns. He introduced systems and facilities employed in solution mining plants.

The development of an underground salt cavern during the leaching process must be carefully monitored. This is done by sonar surveying, the speciality of Dr Andreas Reitze of SOCON, Germany. He astonished the delegates presenting a range of Hi-Tec tools packed with electronics in metal cylinders that are being sunk into the caverns and convert sonic signals into three dimensional computerised models through which observers can virtually fly – a science fiction spectacle played by Dr Reitze from his laptop to the amazed audience.

Making Indian salt competitive

To reach global competitiveness, the Indian salt industry will have to employ advanced technologies to make better salt, improve productivity and logistics, take advantage of economy of scale, protect itself against shortages, become recognised as a reliable supplier of substantial quantities of high quality salt and reach profitability that ensures future growth.

Contributors: Lorenzo Petro, Binkert Ltd, Laufenburg; Vladimir M. Sedivy, President, Isabella Sedivy, Partner, Sedivy & Co., Salt Partners Ltd, Zurich.

"China will not increase imports from India unless we improve our quality", Mr. S. Sundaresan, Salt Commissioner of India.