

Salt Partners

Company Presentation

Salt Partners move to establish a working group in Prague

Vladimir M. Sedivy MSc (Hons) Chem Eng, IMD
President
Salt Partners Ltd, Zurich, Switzerland

Salt Partners

February 2009: Flight over Australian Saltfields



In 2009, Salt Partners flew over some of the world largest solar saltfields. Isabella Sedivy was shooting pictures.

GOOGLE EARTH

Salt Partners

Shark Bay Salt Stockpiles



At Shark Bay, the stockpiles are 200m long and 60m wide. Their design capacity is 250'000 t. They were less than half full.

Salt Partners

Onslow Brine Pond No. 1

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland



Onslow brine pond one week after it was hit by cyclone Dominic. Dykes were broken through at three locations. Brine was flowing out, to the sea. It took many months to restore full production.

SALT PARTNERS

Salt Partners Prague, 5.3.2014

Salt Partners

Onslow Salt Stockpile

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland



Onslow stockpile was designed for 500'000 t of salt. On 2.2.2009, there was virtually no salt left. The picture shows the last salt shipment from Onslow in February 2009.

SALT PARTNERS

Salt Partners Prague, 5.3.2014

Salt Partners

Conclusion

Insufficient salt on stockpiles in Australia, together with signs of limited salt availability elsewhere, indicates that the present high quality solar salt production capacity is insufficient. The shortage is likely to accentuate when the present economic slowdown comes to an end and the high growth rates in the Asia-Pacific region are re-established.

Salt Partners

Salt Production World-wide

Salt type	World production
Solar salt	100,000,000 t/y
Rock salt	80,000,000 t/y
Brines	80,000,000 t/y
Total	260,000,000 t/y

SALT PARTNERS

Salt Partners

Salt Consumption World-wide

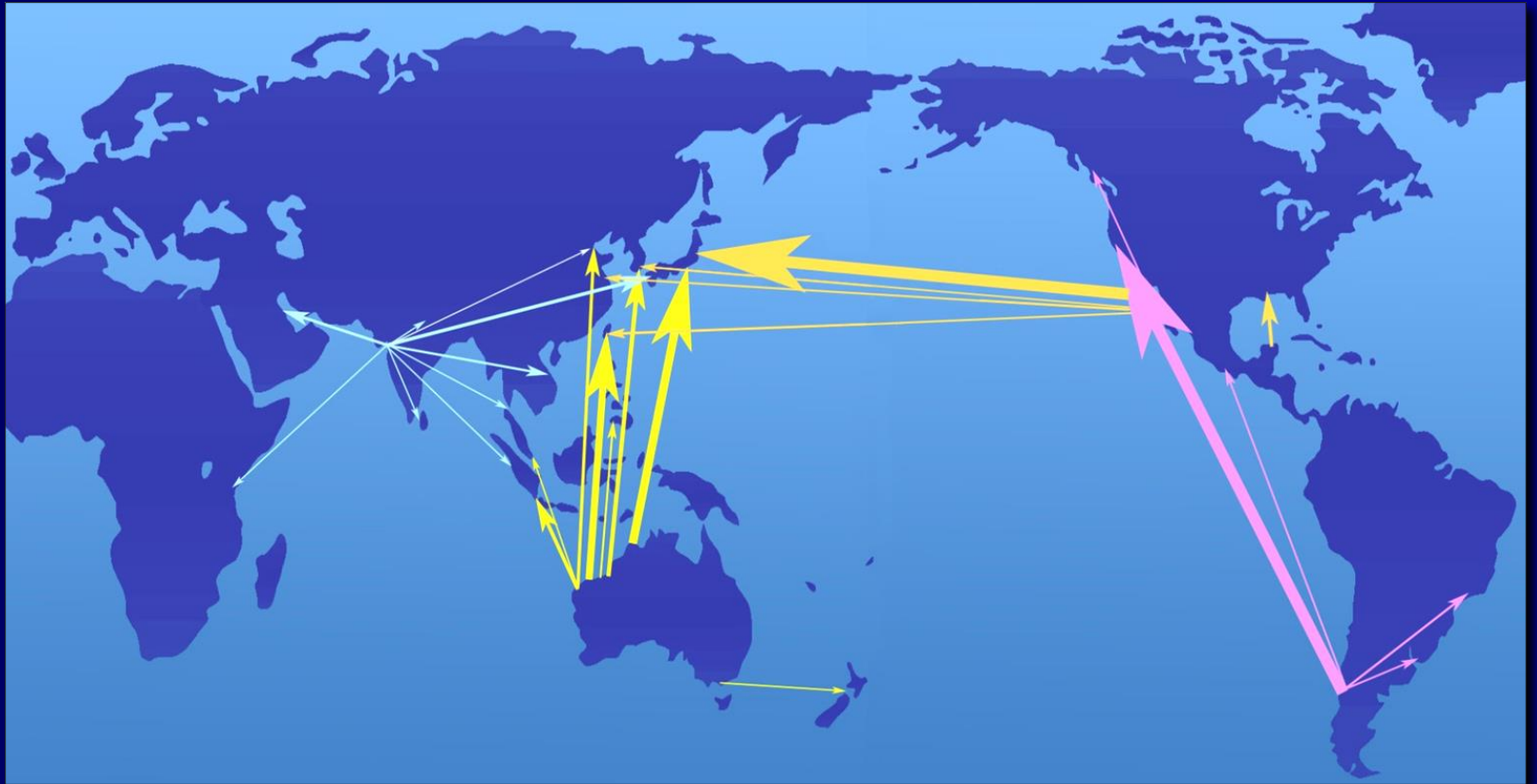
Salt user	Salt consumption
Chemical industry	155,000,000 t/y
Food	45,000,000 t/y
De-icing	30,000,000 t/y
Other	30,000,000 t/y
Total	260,000,000 t/y

SALT PARTNERS

Salt Partners

Bulk Salt Trade in Asia-Pacific

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

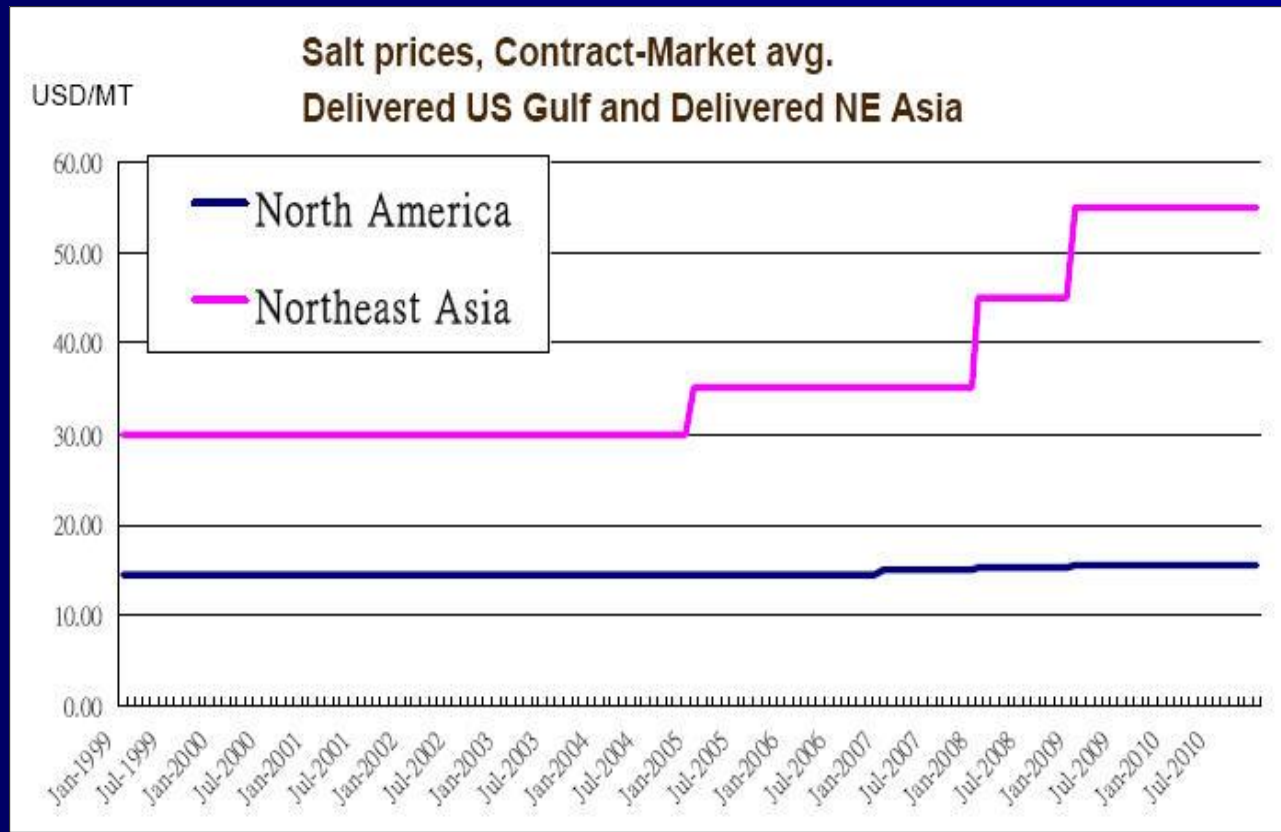


SALT PARTNERS

Salt Partners Prague, 5.3.2014

Salt Partners

Salt Prices in US Gulf and North East Asia

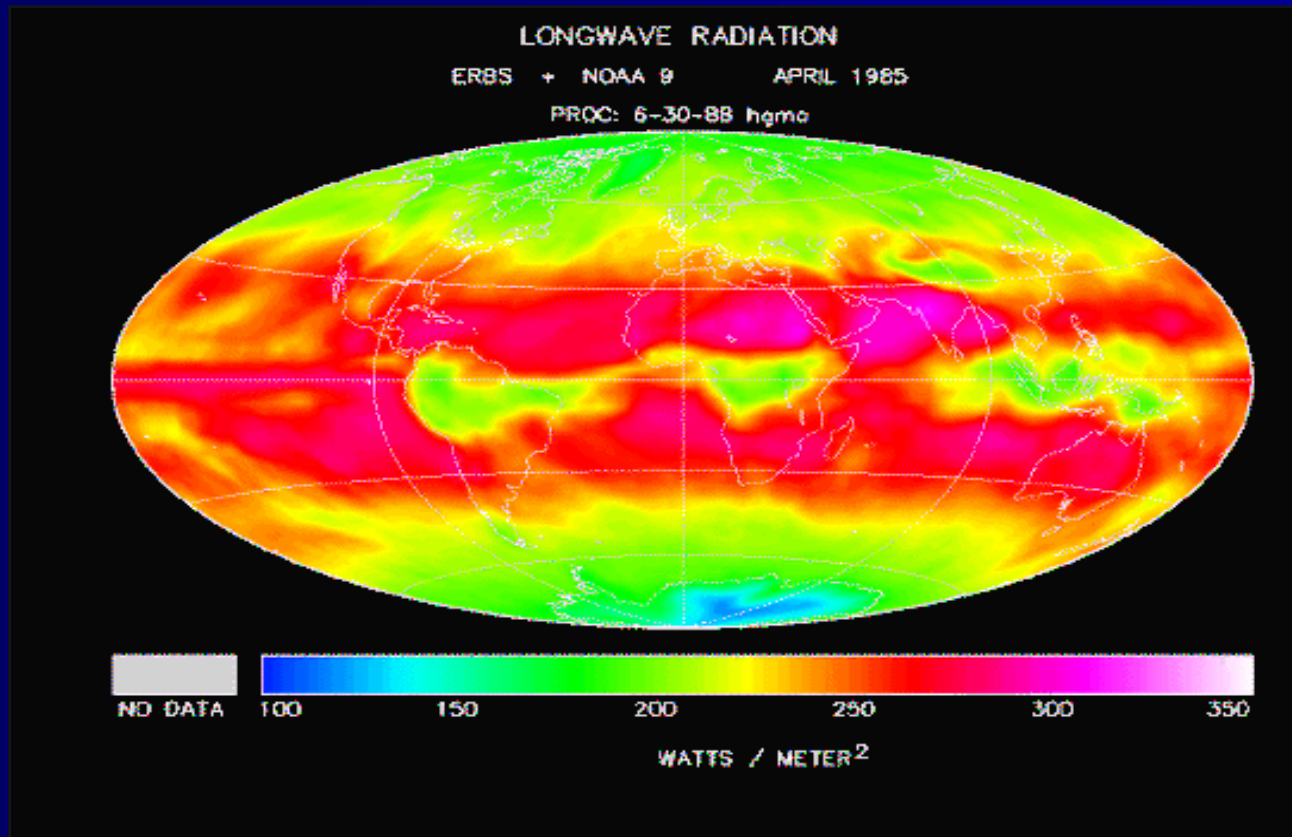


In the four years between 2005 and 2009, salt prices delivered in North East Asia-Pacific region have risen by USD 25 per ton, equal to 83%, or equal to 16% per annum.

CMAI

Salt Partners

Solar Energy on the Planet Earth



Locations with highest rates of evaporation, suitable for solar salt production:

Caribbean Sea
North Africa
South Africa
Middle East
Western India
Western Australia

In China, the Gulf of Bohai receives only half the solar energy available at the most suitable locations.

NASA

Salt Partners

Salt Partners Prospect New Solar Saltfields



Salt Partners assist their clients to prospect sites where new solar saltfields could be established.

Salt Partners

Walvis Bay (Namibia) harvesting system



Walvis Bay salt harvesting system was supplied by ROV Durrant Engineering Pvt. Ltd., South Africa. Harvester moves on Caterpillar trucks both on the salt and on the crystalliser floor. Salt is loaded directly to the trailers.

SALT PARTNERS

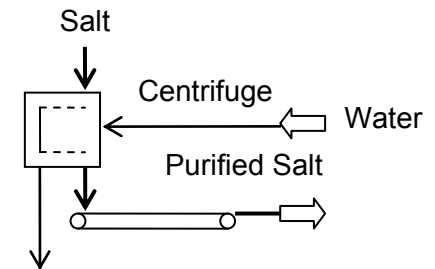
HYDROSAL Process

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

**Centrifuge separates
salt and brine**

**Conventional
washing with water in
the centrifuge**

Salt Partners Prague, 5.3.2014



Salt Partners

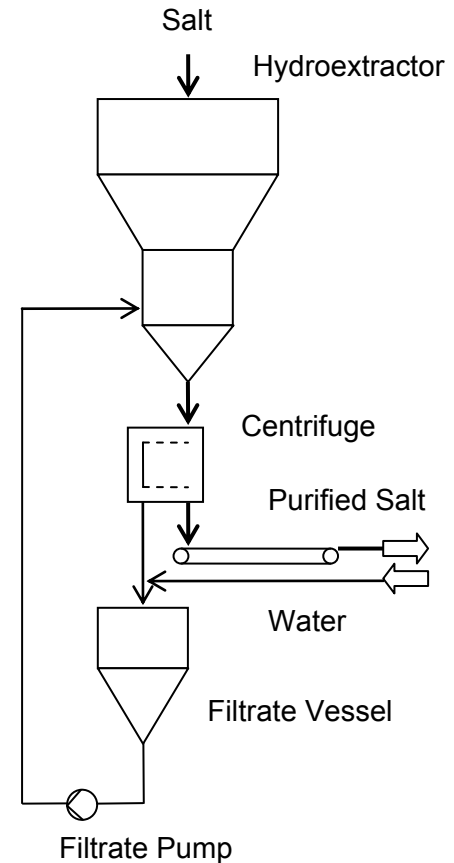
HYDROSAL Process

Dissolve salt fines in water and use this pure brine to remove impurities from salt in the hydroextractor

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

Salt Partners Prague, 5.3.2014

CH-8053 Zurich
Tel.: +41 (44) 422 26 82
Fax: +41 (44) 422 26 83
www.salt-partners.com



Salt Partners

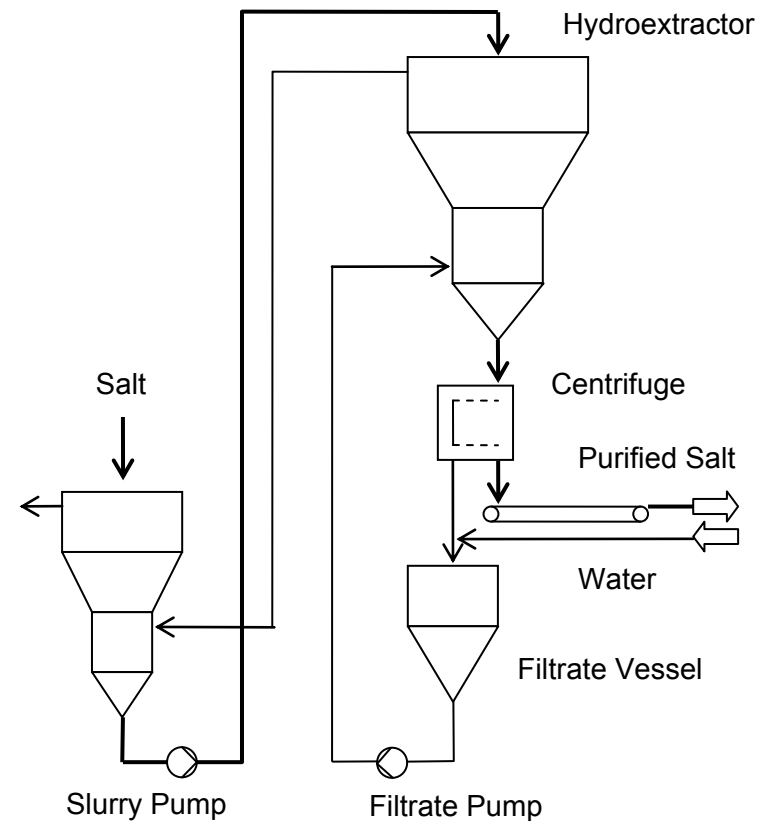
CH-8053 Zurich
Tel.: +41 (44) 422 26 82
Fax: +41 (44) 422 26 83
www.salt-partners.com

HYDROSAL Process

**Hydraulically
transport salt to the
hydroextractor and
return the transport
brine to the elutriator**

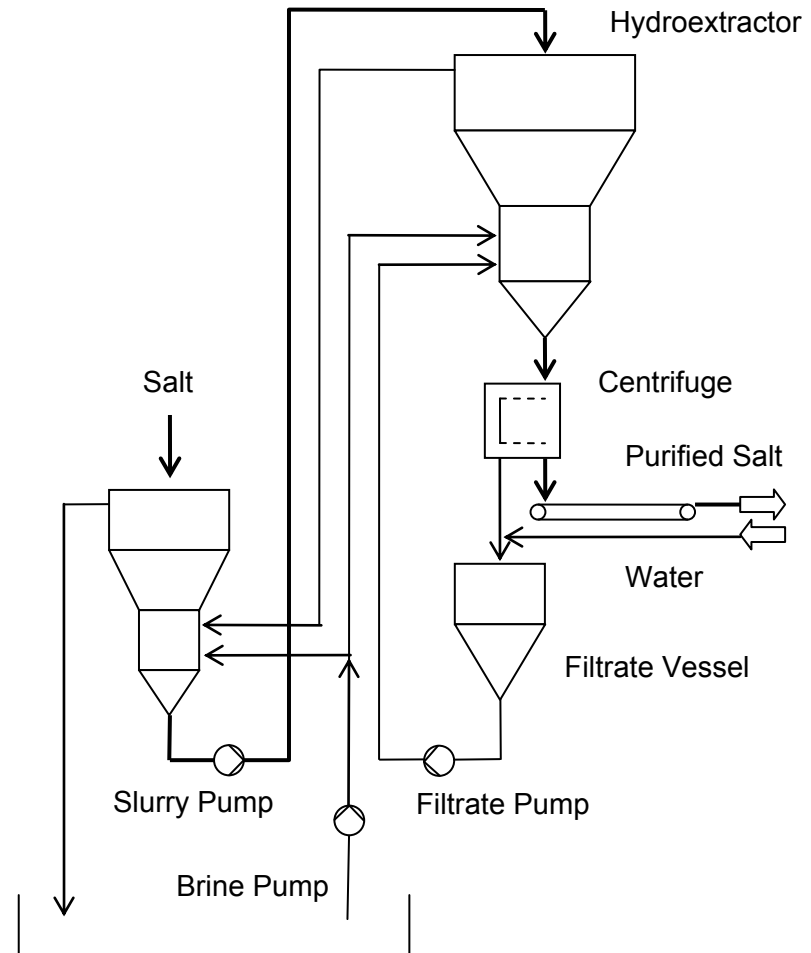
Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

Salt Partners Prague, 5.3.2014



HYDROSAL Process

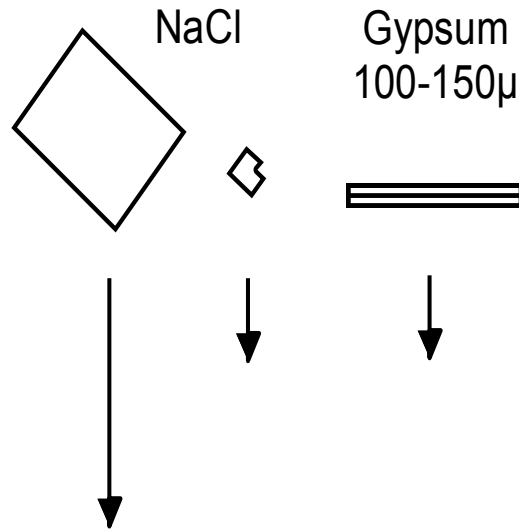
**Circulate impure
brine to control
hydroclassification
and elutriation
efficiency**



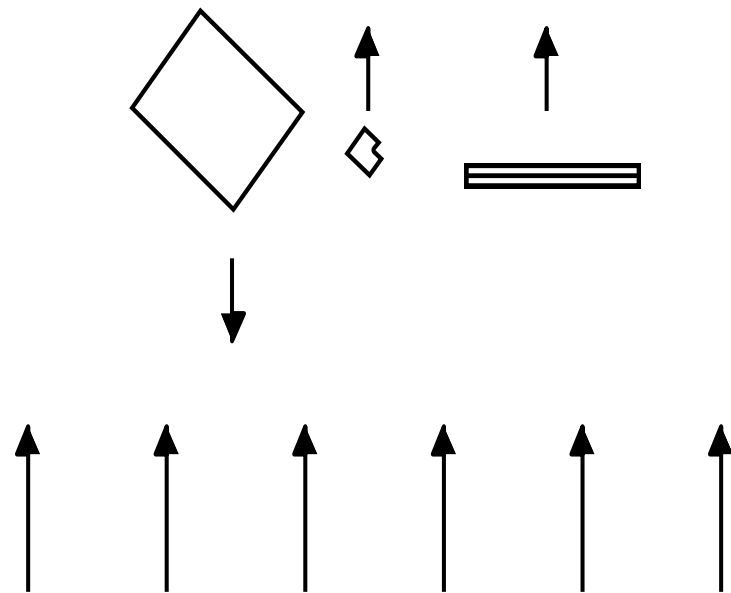
Salt Partners

Elutriation

Settling velocities in brine



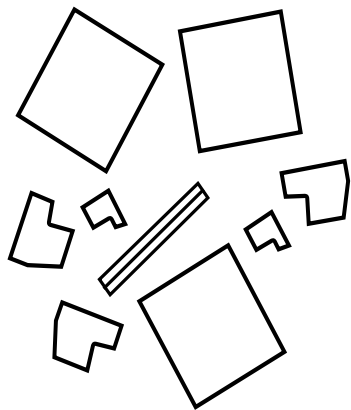
Elutriation in upwards flowing brine



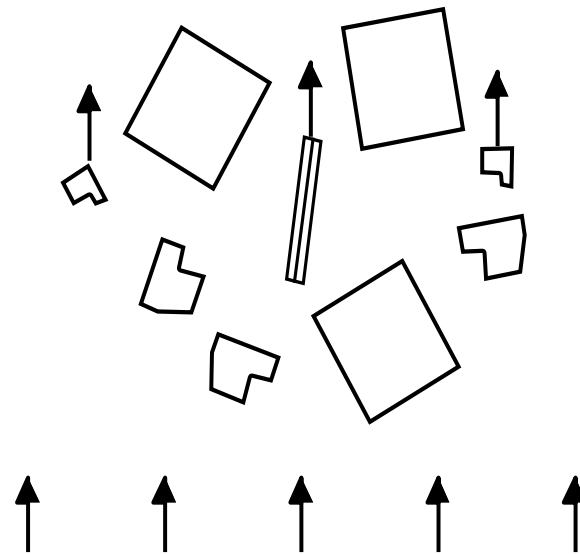
Salt Partners

Hydroclassification

Salt bed with buried impurities



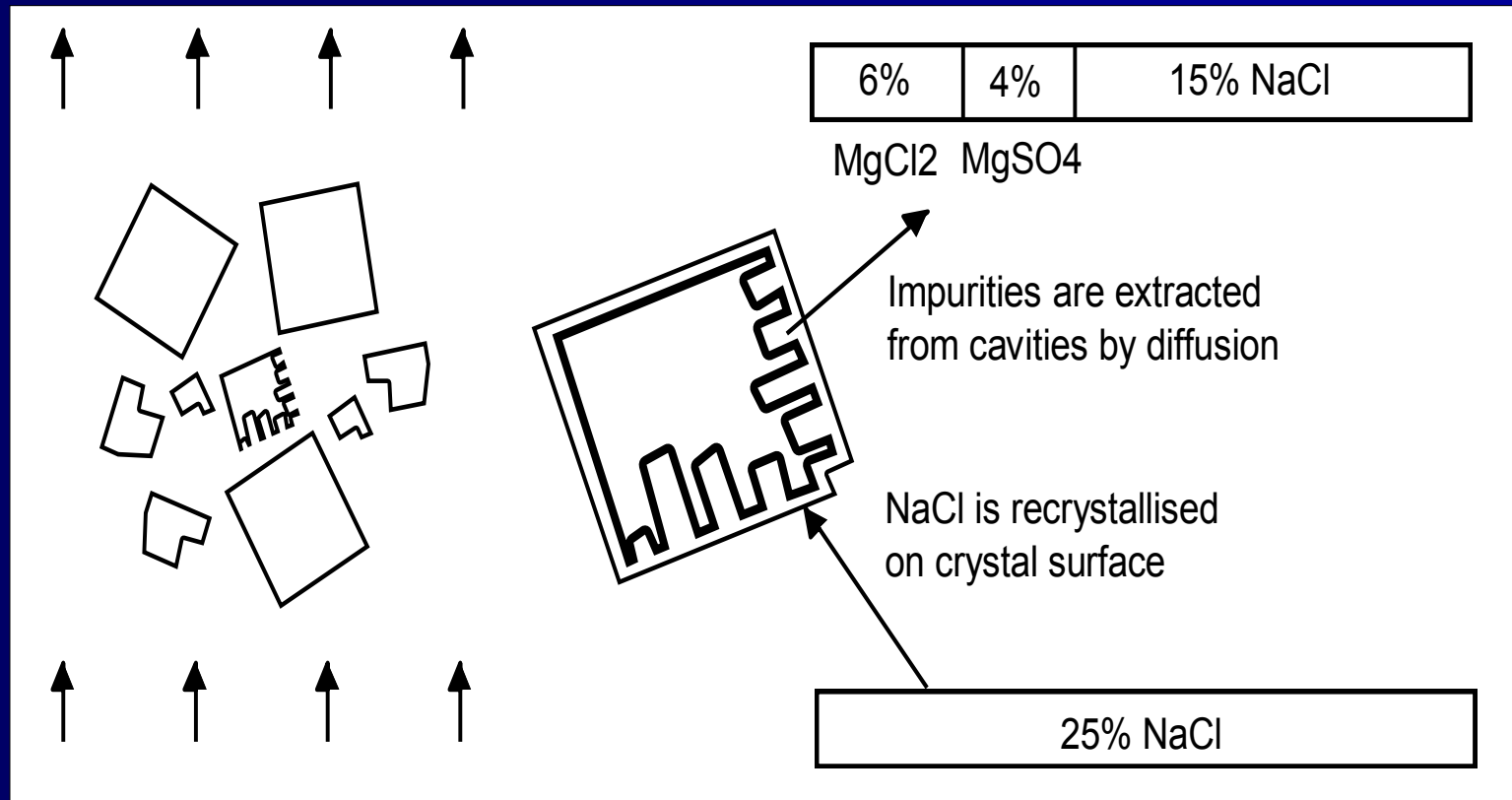
Hydroclassification of impurities
in partially fluidised salt bed



Salt Partners

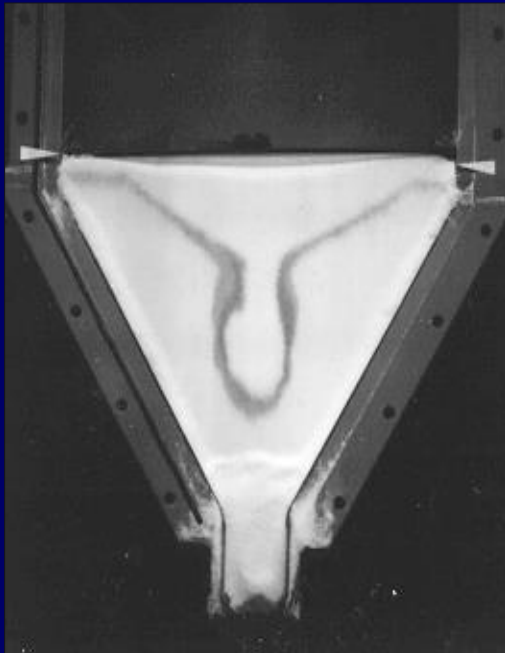
Hydroextraction

Hydroextraction / Displacement crystallisation

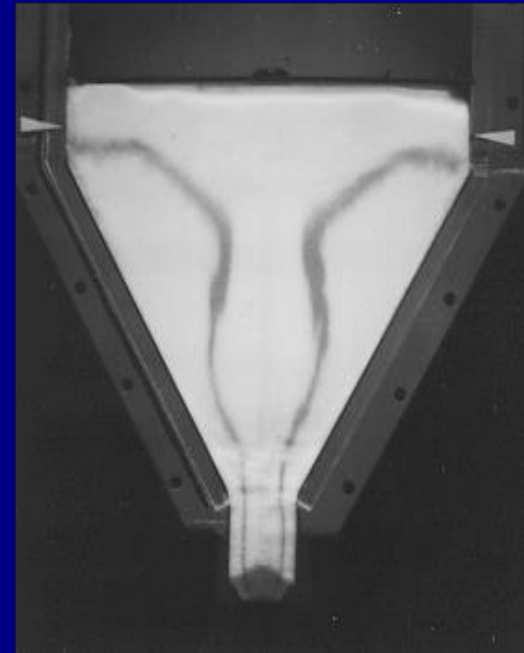


Salt Partners

Hydroextraction does not work in all vessels



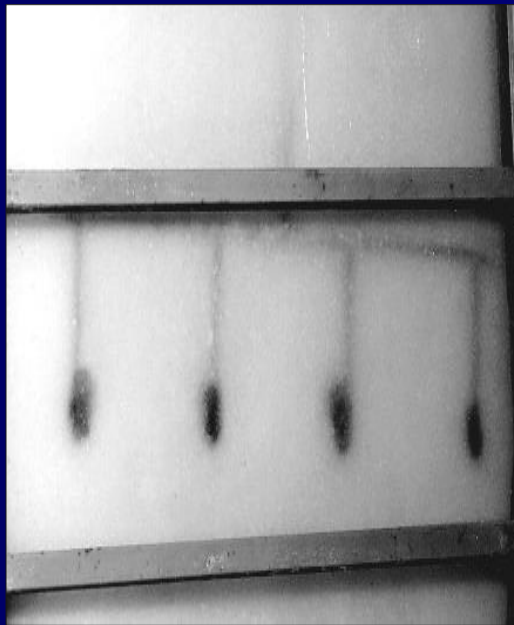
In this vessel salt flows out mainly through the centre



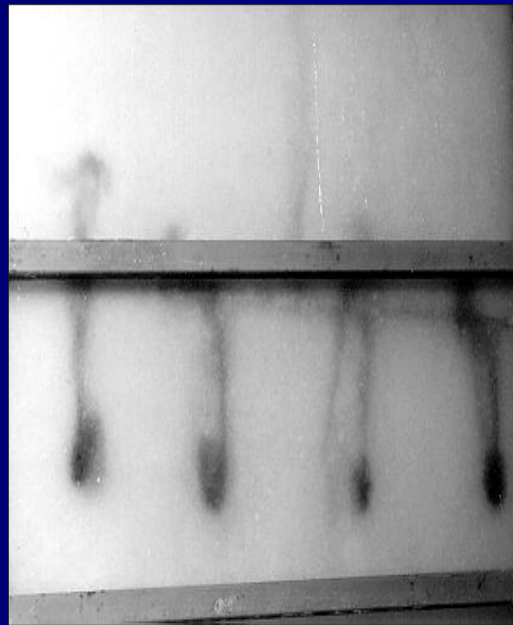
In the centre of the vessel
rat hole develops

Salt Partners

Hydroextraction works only with plug flow of salt



Picture 1: Injection of black ink into brine flowing upwards through salt flowing downwards in plug flow



Picture 2: Black ink flows upwards with brine in counter-current flow



Picture 3: Second black ink injection. There are no traces of black colour in the salt flowing downwards in plug flow

Salt Partners

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

SALEXPOR 15 t/h solar salt refining plant in Portugal

Salt Partners Prague, 5.3.2014



Salt Partners



Solution mining for natural gas storage, co-generation, brine purification, salt crystallisation and refining plant in Portugal

Salt Partners

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

**40 t/h salt upgrading
plant in Portugal
producing purest
industrial salt in Europe**

		Performance test
Ca	ppm	0.6
Mg	ppm	0.2
SO4	ppm	53

Salt Partners Prague, 5.3.2014



Salt Partners

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland

100 t/h industrial salt upgrading plant in Spain

Salt Partners Prague, 5.3.2014



Salt Partners

Salt Drying on Stockpiles



Drip-dried salt is wet when stockpiled. The brine flows slowly to the ground and out of the stockpile (see bottom left).

Salt Partners

Vladimir M. Sedivy
Salt Partners Ltd, Zurich, Switzerland



**Why not
turn your
salt into
gold?**

SALT PARTNERS

Salt Partners Prague, 5.3.2014