

# SALT

## Introduction

Salt is such a common part of our everyday lives, that we are sometimes guilty of taking this important commodity for granted.

Yet without salt some life forms would perish, road transport would be severely restricted in ice-bound countries and the chemical industry could not operate efficiently.

Salt has been a precious commodity since ancient times.

Possibly the earliest traders in salt were the Phoenicians during the period 1200 BC to 300 BC.

So critical was the need for salt in ancient times that it was used as a means of exchange between countries. Others traded it ounce for ounce for gold. The Chinese once used coins made of salt for currency and the Romans conquered Palestine so

they could control salt-producing locations in the Dead Sea.

The outcome of many wars might have been different if soldiers had more salt in their bodies, especially for healing wounds. Special rations of salt provided to Roman soldiers were called *salarium argentium*, from which the English word "salary" was derived.

Also, the expression "not worth his salt" came from ancient Greece where slaves were traded for salt.

Salt is formed by the natural combination of sodium and chloride. Its chemical symbol is NaCl.

## Uses

Only a small fraction of the salt produced around the world every year ends up on the dinner table or is used for cooking.

Most of the salt produced is, in fact, used for



Δ Salt being harvested at Port Hedland. After the "crop" is gathered it is then taken to a wash plant.



industrial purposes — for the production of chlorine, caustic soda and soda ash. Caustic soda, an essential material in the production of refined aluminium oxide, is produced in large quantities from salt.

Salt is also used for food preservation, the curing of hides and as an ingredient in a wide range of other products including plastic, glass, soap, paper and water softeners.

In many of the colder countries of Europe and in North America, salt is used extensively for road maintenance, namely as a de-icing agent.

Some countries also use underground salt mines for storing radioactive materials. This is because such areas have remained stable and dry for millions of years and most of the underground salt mines occur in areas where earthquakes are extremely rare.

#### Occurrence and Origin

Some scientists believe that initially, the world's oceans were not salty. It took millions of years to wash portions of salt locked up in the rocks of continents and for the waters to become brine.

In places where bays existed with very restricted openings to the ocean, salt was deposited in great quantities by solar evaporation as seas retreated. Lake MacLeod, north of Carnarvon, is a good example of this.

In places like Siberia and in Canada, salt deposits were covered by earth sediments to become rich underground seams.

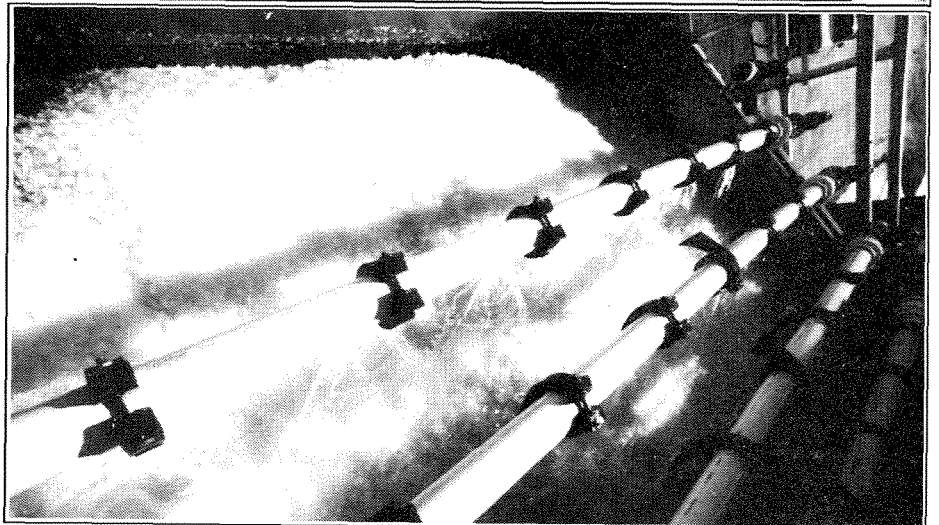
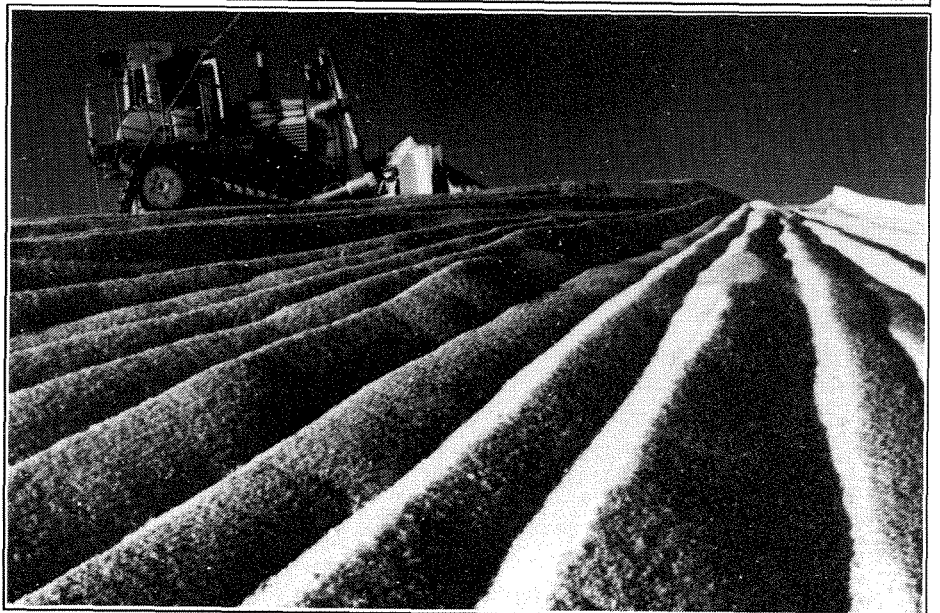
Other major sources for salt are inland waters (such as the Dead Sea bordering Jordan and Israel, and the Great Salt Lake in Utah in the U.S.), and man-made solar salt farms like those in the North West of Western Australia.

#### World Production

World production of salt exceeded 200 million tonnes during 1991.

Major producers for the year were:

(Details follow on next page)

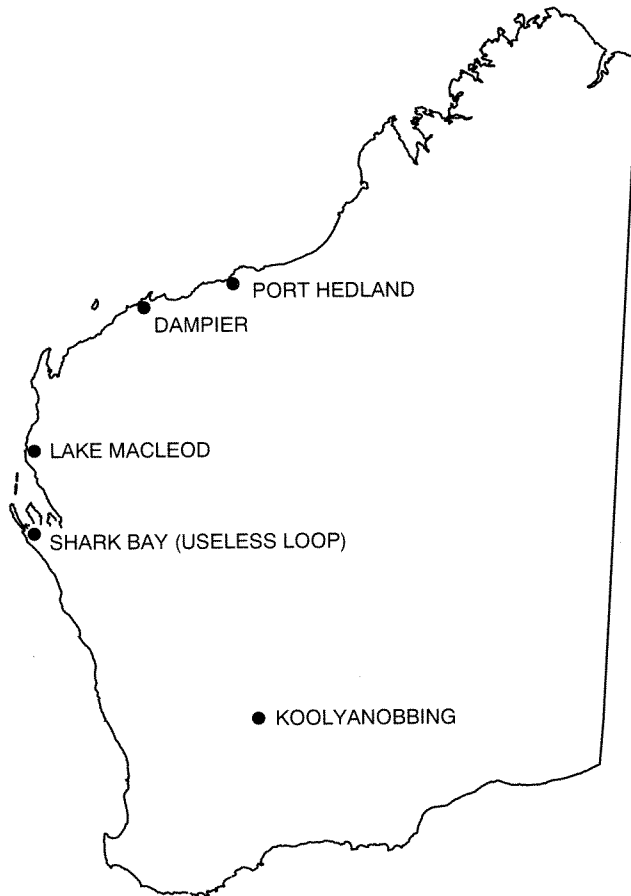


*Top: An aerial view showing how solar salt is produced in concentrator ponds using sea water.*

*Middle: The salt harvesting process begins with "ripping" the new crop.*

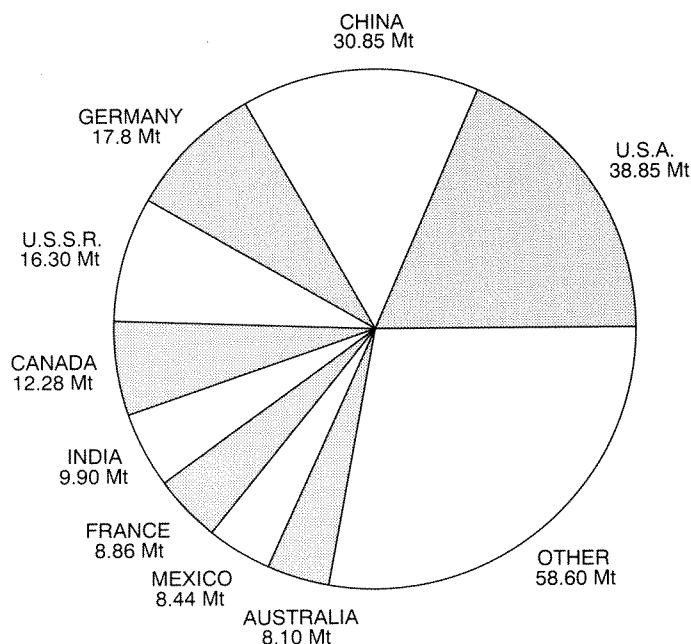
*Bottom: After being harvested the salt is washed and then dried ready for export.*

## SALT PRODUCTION SITES IN W.A.



## 1991 WORLD SALT PRODUCTION

Total Production : 209.988 Million Tons (Mt)



The United States	38.9m tonnes	19%
China	30.8m tonnes	15%
Germany	17.8m tonnes	8%
The former USSR	16.3m tonnes	8%

Australia is ranked ninth among the world's leading producers with just over 8 million tonnes, representing 4% of the world market.

However, Western Australia and Mexico are currently the biggest traders in salt to the world's chemical industries.

### The Solar Salt Process

Solar salt is produced by the evaporation of saline water in shallow artificially maintained ponds. The process begins when seawater is pumped from a tidal inlet into multiple (usually six or eight) concentrating ponds.

The salinity of the seawater is increased as the saturated brine solution flows from one pond to the next, progressively evaporating along the way. By the time the brine is ready to leave the final concentrating pond, the original seawater has been saturated from 17% to about 90% sodium chloride (salt).

The brine is then moved (either by pumping or gravity feed) to the next series of ponds which are known as crystallising or "pickling" ponds. Further evaporation occurs until eventually a layer of salt, usually 25-30cm thick, is deposited on top of a pre-existing floor of compacted salt which serves as a road-base for harvesting equipment.

### Harvesting the Salt

Harvesting of salt is a mechanical process that commences with "ripping" the new crop. Laser-controlled harvesters then scoop up the salt and discharged it into road trains.

After harvesting, the crystallisers are cleaned and refilled with brine.

### The production time-cycle

In general terms, it takes about 12 months to produce the brine for the concentrating ponds and another 12 months for the crystallising process.

Production of salt from Lake MacLeod

takes only about 12 months because its brine is sourced from natural underground caverns below the bed of the lake. These caverns are about 10km long and provide a constant flow of brine solution for ponds within the confines of the lake.

### Washing and stockpiling

The newly harvested salt is then transported to a washplant where it is washed with saturated brine and "scrubbed" to remove soluble impurities (magnesium, sulphate, calcium and chloride) and insoluble solids (gypsum and soil).

The washed salt is drained on stainless steel mesh belts before being conveyed

to a stockpile where it is left to drain and dry.

After about two months the salt is reclaimed to another stockpile to await shipment.

### A Western Australian perspective

A total of 6.9 million tonnes of salt worth about \$153 million was produced and exported from Western Australia during 1991.

The major exporters were:

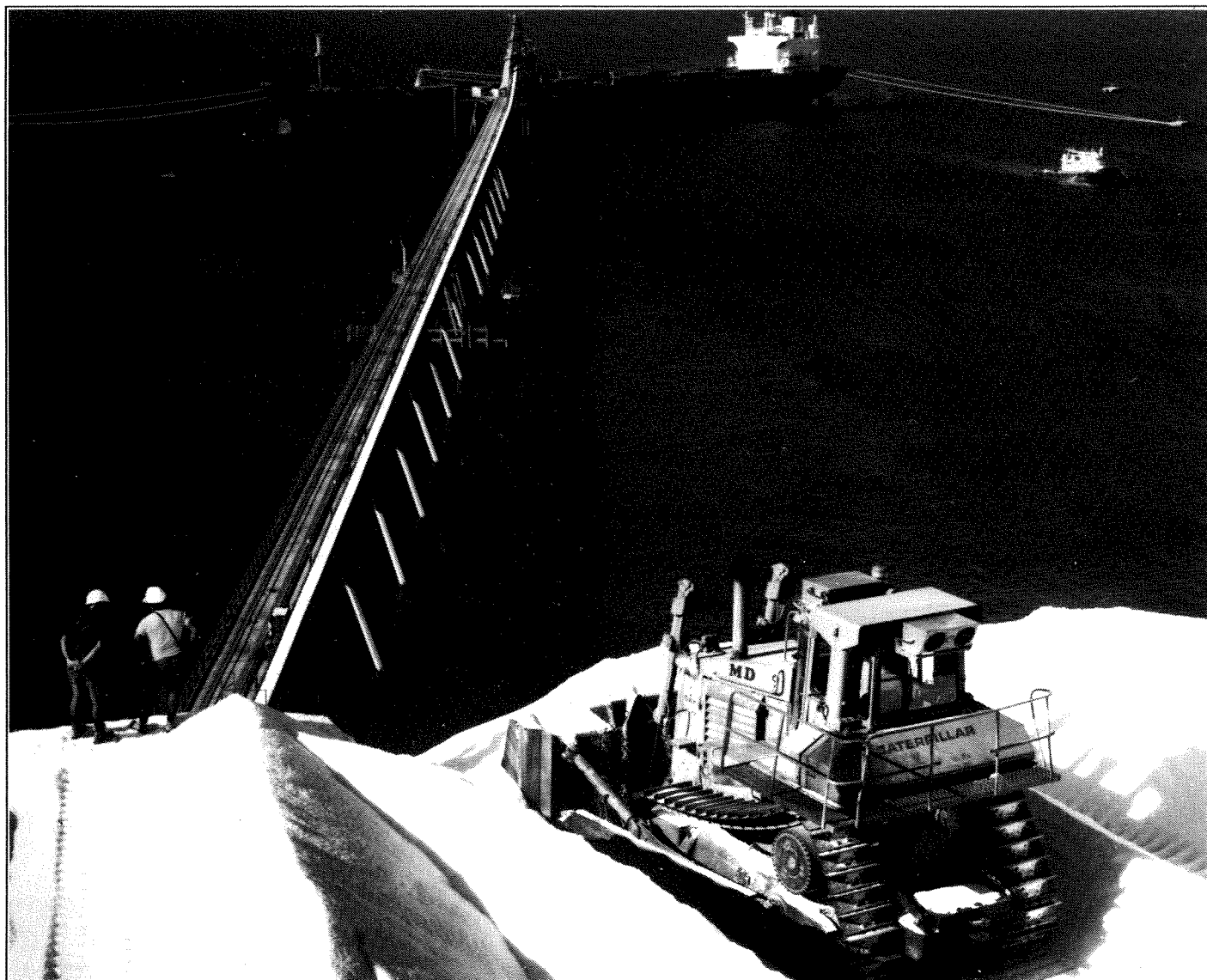
- Dampier Salt shipped 4.1 million tonnes in 1991;
- Leslie Salt (2.25 tonnes); and
- Shark Bay Salt (0.55 tonnes).

WA was responsible for 97% of Australia's total salt exports during 1991.

Most of the salt harvested from the Pilbara and Gascoyne regions of Western Australia is shipped to Taiwan, the Philippines, Indonesia, Singapore, Thailand and Korea where it is used for chemical industrial purposes. Other markets exist in the United States, Brazil and Africa.

The WA salt industry employs about 500 people directly, and another 800 people in the wider State economy.

■ *Produced by Communications Branch,  
Department of Minerals and Energy,  
Western Australia. 6/93*



Δ Salt being stockpiled along a section of the North West coast, ready to be shipped overseas to markets including Japan, Taiwan and the U.S.A.