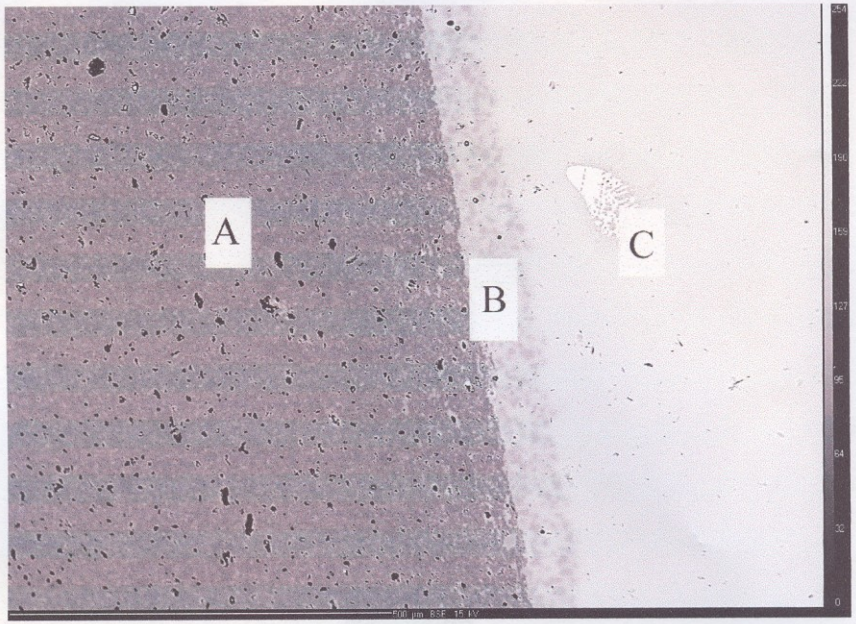
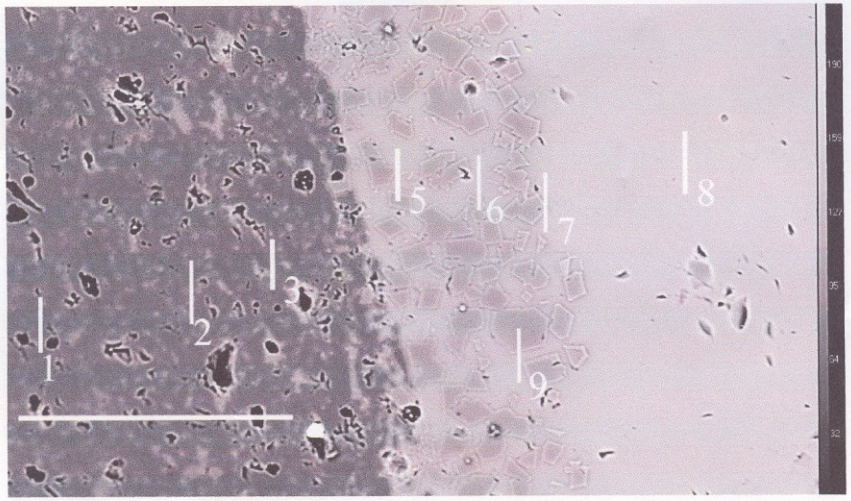
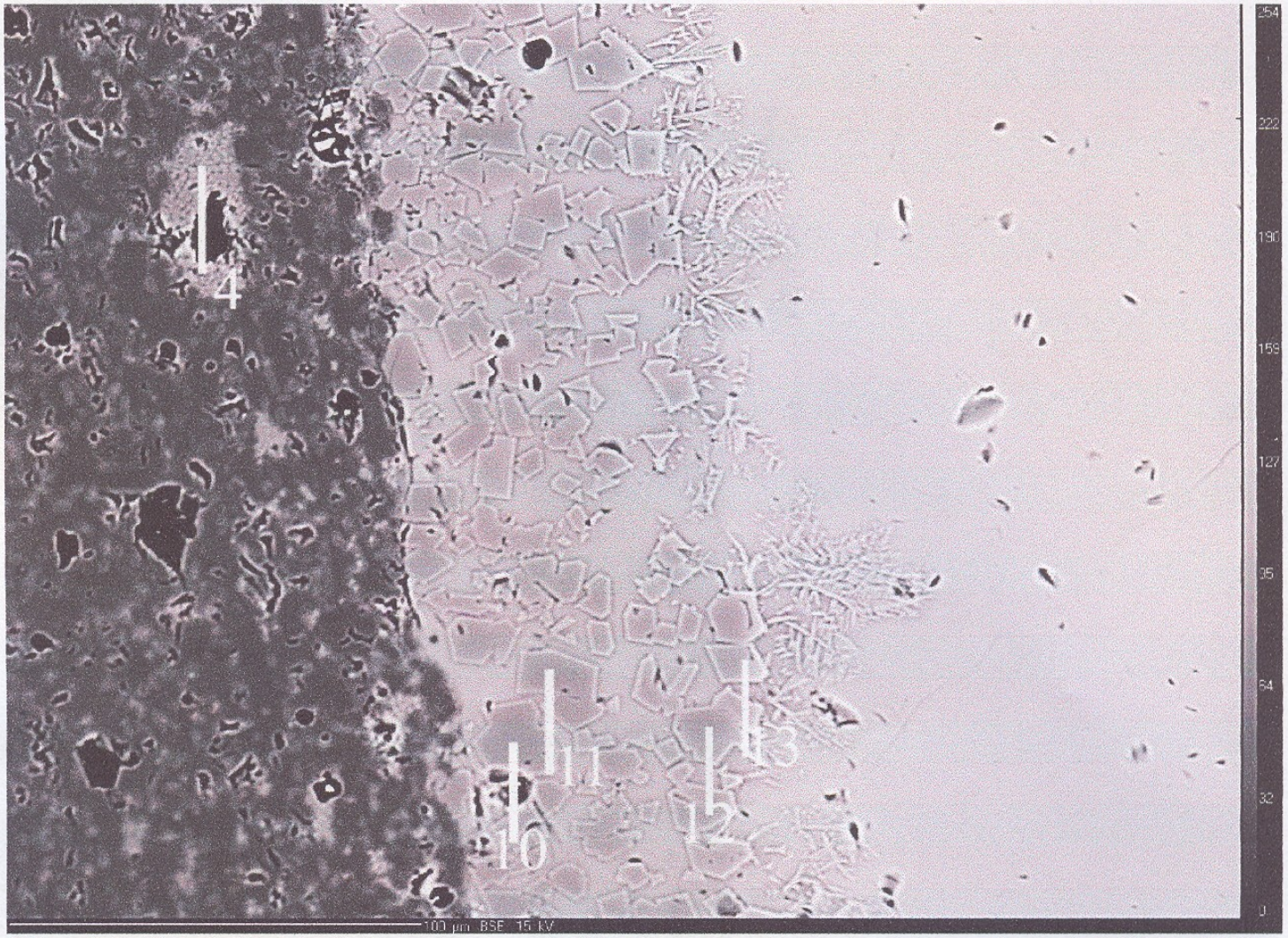


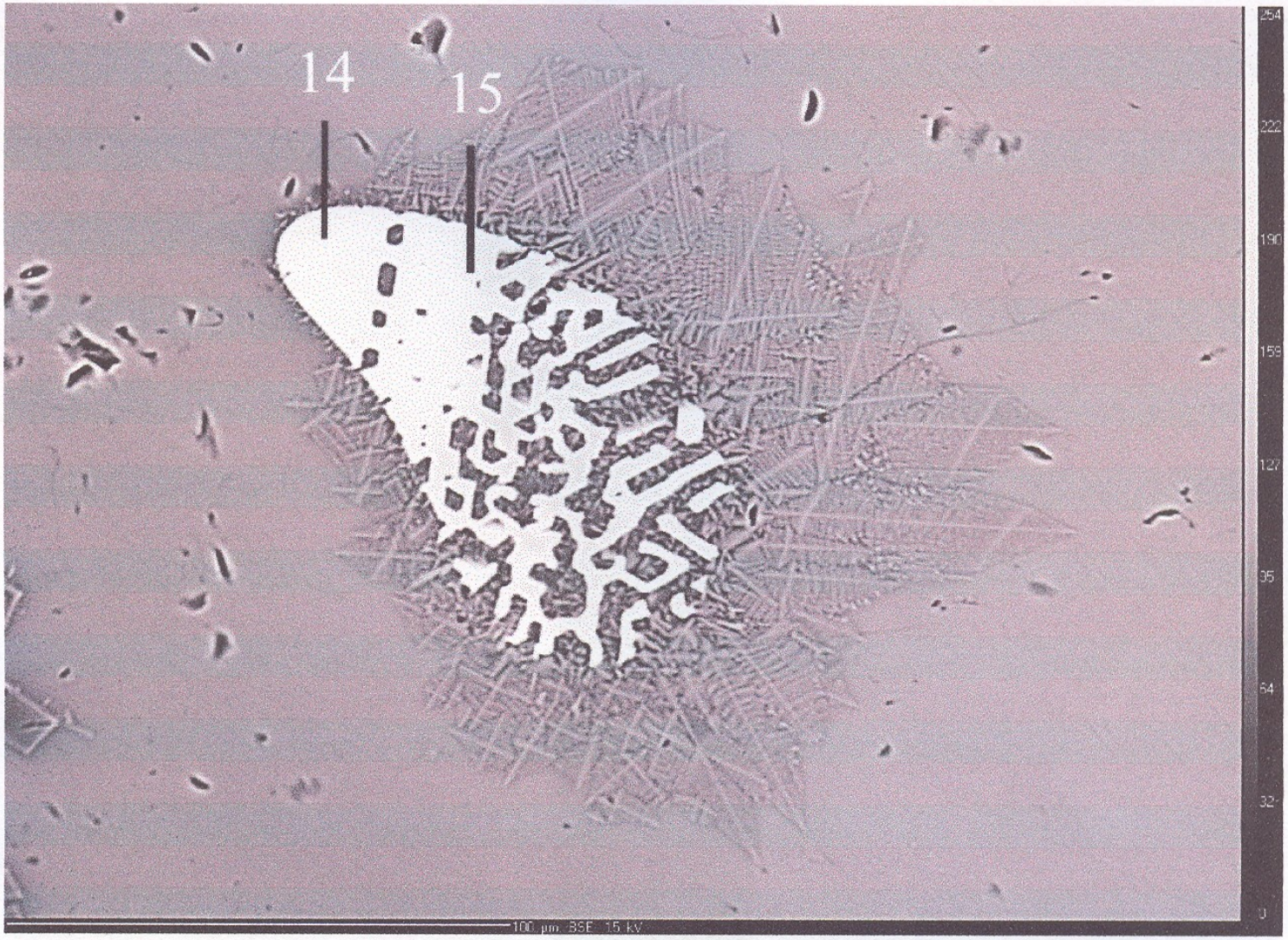
Obr. 34 :Celkový pohled na analyzovanou část výbrusu [A]-oxalový kelímek, [B]-reakční lem taveniny a rozpad kelímku, [C]-korodovaný neroztavený původní minerál (foto BSE, měřítko v dolní části obrazu- 500 μm)



Obr. 35: Detail analyzovaného místa s vyznačenými body, kde byla provedena samotná analýza. (foto BSE, měřítko v dolní části obrazu 100 μm)



Obr. 36: Detail druhé části analyzované oblasti s vyznačenými místy analyzování (foto BSE,



Obr. 37: Detail kostrovitého krystalu s místy analyzování (foto BSE, měřítko v levém dolním rohu obrazu- 100 µm)

the risk of iodine deficiency disorders (IDD)

Table 150 Halite

Mineral	*Formula*	*Color/Luster*	*SG*	*H*	*Crystal system/ habit*	*Occurrences*
Halite Greek *hals* = the sea	NaCl 34.34% Na 60.66% Cl	colorless, white, yellow, orange, reddish, purple, and blue; vitreous; transparent to translucent	2.2	2	cubic; xls often cavernous or hopper-shaped; massive, compact, or granular	extensive in sedimentary deposits; as an efflorescence in playa deposits; as a sublimation product near volcanism

Source: various including Roberts et al., 1990

Consumption of salt in the United States

(tonnes)

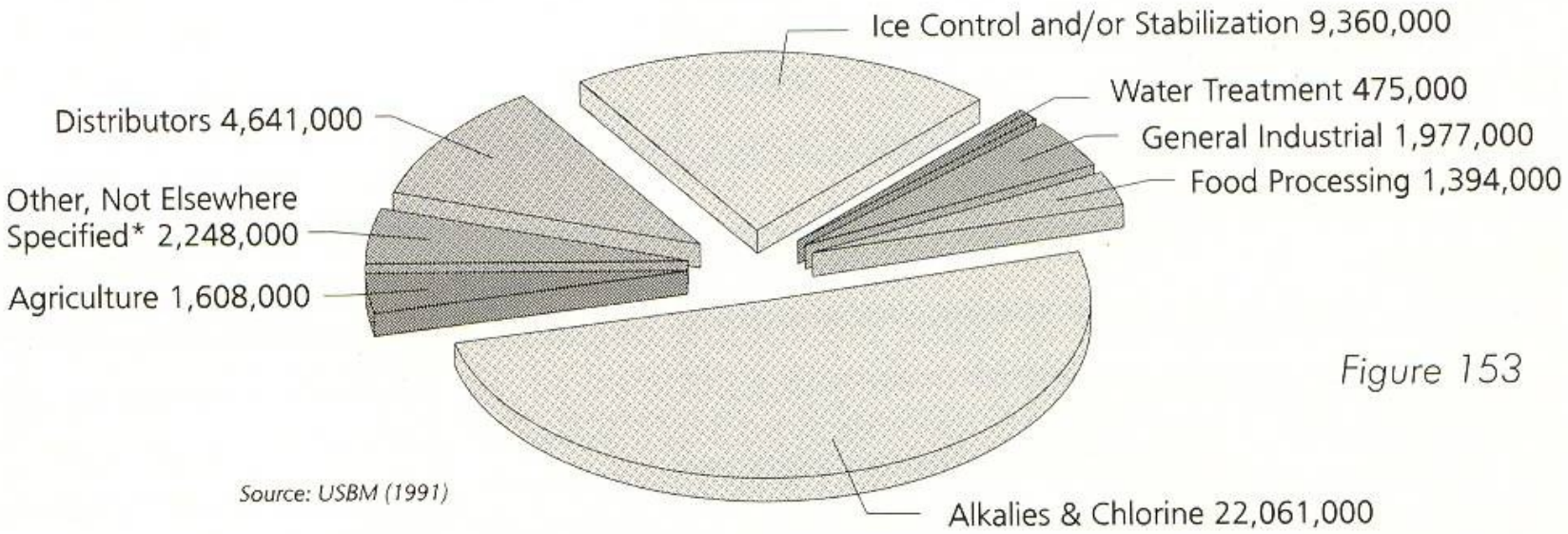


Figure 153

Source: USBM (1991)

Genetic Types

Sodium chloride, NaCl, or rock salt occurs in solid form as the mineral halite (Table 150) which, when pure, consists of 39.34% Na and 60.66% Cl_2. Sodium chloride deposits are found in solution in the first four types or in the solid state in the last two:

- ☐ Seawater
  examples: the oceans and seas of the world
- ☐ Lacustrine
  examples: Lake Baskunchak, Elton Lake, Gulf of Kara-Bogaz-Gol, Russia; Great Salt Lake, Utah, and Searles Lake, California, in the United States
- ☐ Groundwaters (brines)
  examples: Smackover Formation, Arkansas, United States; Solivar near Presov, Slovakia
- ☐ Lake basins of the playa type
  examples: various lakes in California including Searles Lake; numerous salars in Peru, Bolivia, Chile, and Argentina, for example Salar de Atacama in Chile, Laguna Salinas, Peru, Salar de Hombre Muerto, Argentina, Salar de Uyuni, Bolivia
- ☐ Bedded salt deposits
  examples: *Precambrian* - Australia, Iran; *Cambrian* - Australia, Northwest Territories, Canada, Iran; *Ordovician* - Williston Basin, Wyoming, United States; *Silurian* - Salina Basin, United States, Canada; *Devonian* - Williston Basin, Wyoming, United States; *Mississippian* - New Brunswick & Nova Scotia, Canada; *Pennsylvanian* - Paradox Basin, Colorado, United States; *Permian* - Permian, Supai, and Williston basins, United States; Mexico, Brazil, Germany; *Triassic* - Isthmus of Tehuantepec, Mexico, Ethiopia, France, Germany, Greece, UK: *Jurassic* - Gulf Coast, United States, Cuba, Chile, Germany, Tanzania; *Cretaceous* - Florida, United States, Mexico, Bolivia, Brazil, Colombia, Russia, Libya, Morocco; *Eocene* - Green River Basin, Wyoming, United States; Iran, Morocco; *Oligocene* - France, Germany, Spain, Iran, Iraq, Spain, Turkey; *Miocene* - Algeria, Cyprus, former Czechoslovakia, Poland, Spain, Trucial Coast; *Pliocene* - Nevada & Utah, United States, Italy, Jordan; *Pleistocene* - California & Nevada, United States; Mexico, former USSR, Israel
- ☐ Salt domes
  examples: Gulf Coast of the United States and Mexico; Zechstein Basin in Germany

Table

Table 79 **Calcium Sulfate**

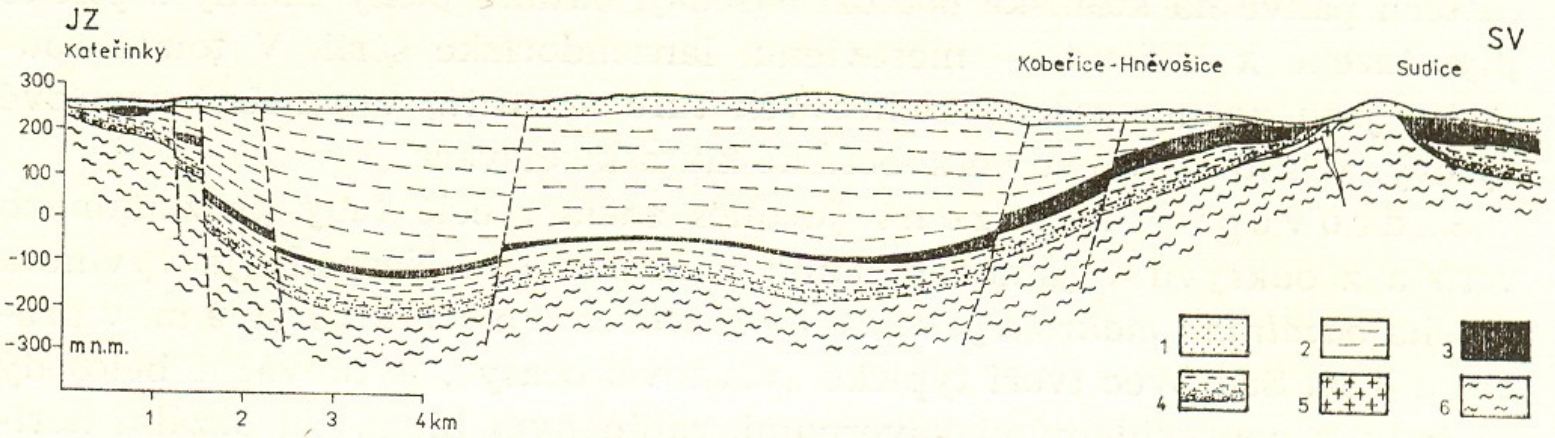
Minerals	*Formula*	*Color/Luster*	*SG*	*H*	*Crystal system/ habit*	*Occurrences*
Anhydrite Greek anhydros = dry or without water	$CaSO_4$ 41.2% CaO 58.8% SO_3	colorless, white, gray, bluish, pinkish, reddish, brownish; transparent - translucent; vitreous - greasy to pearly	2.96-2.98	3½	orthorhombic; equant xls, thick tabular; usually massive, coarse to fine granular, fibrous	assoc. with gypsum, salt beds, dolomite, a limestone; hypogene mineral in hydrothermal vein deposits; cavities in igneous trap rock; rarely as a sublimation product
Gypsum the Greek *gypsos* = *plaster*, an ancient name	$CaSO_4 \cdot 2H_2O$ 32.6% CaO 46.5% SO_3	colorless and transparent (selenite), white, gray, yellowish, greenish, reddish, or brownish when massive; subvitreous, xls pearly on cleavages	2.32	2	monoclinic; thin to thick tabular xls, short to long prismatic, acicular; lenticular, rosettes; fine to coarse granular (alabaster); fibrous (satin-spar); distorted formations on cavern walls (helectites) concretionary	widespread in sedimentary deposits, especially Permian and Triassic formations; saline lakes and playas; as an efflorescence on certain soils; oxidized portions of ore deposits; deposits assoc. with volcanic activity

Source: various including Roberts et al., 1990

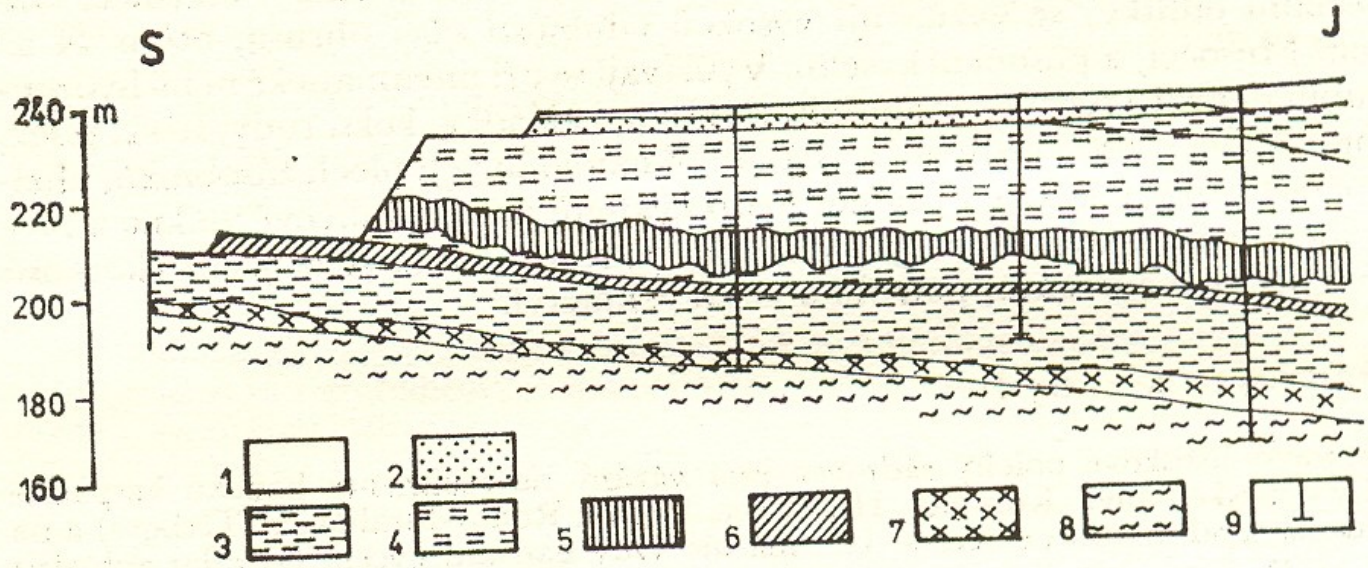
Genetic Types

Calcium sulfate is somewhat soluble, and under certain conditions precipitate anhydrite and gypsum. In addition, gypsum may form through the hydration of the more common anhydrite down to a depth of about 700 m. Genesis of anhydrite and gypsum is quite simple, although the details are less so. Deposit types are as follows:

- Bedded primary deposits
  - in deep, large-scale basins
  - in sabkhas or salt flats
    examples: Trucial Coast of the Persian Gulf (present day); southeastern Indiana (Mississippian), Ohio and New York in the United States, and Ontario, Canada (Silurian); Jamaica
- Secondary deposits
  - infiltration deposits
  - surface concretions
    examples: Wadi Hoff, Wadi Gibbu, and Wadi Garrawi, Eastern Desert of Egypt
  - gypsite
    examples: Kern County, California, United States
  - gypsum Sands
    examples: White Sands, New Mexico, United States; Cuatrocienegas, Coahuilla, Mexico
- Gypsum Cap Rock
  examples: Gulf Coast of the United States and Mexico

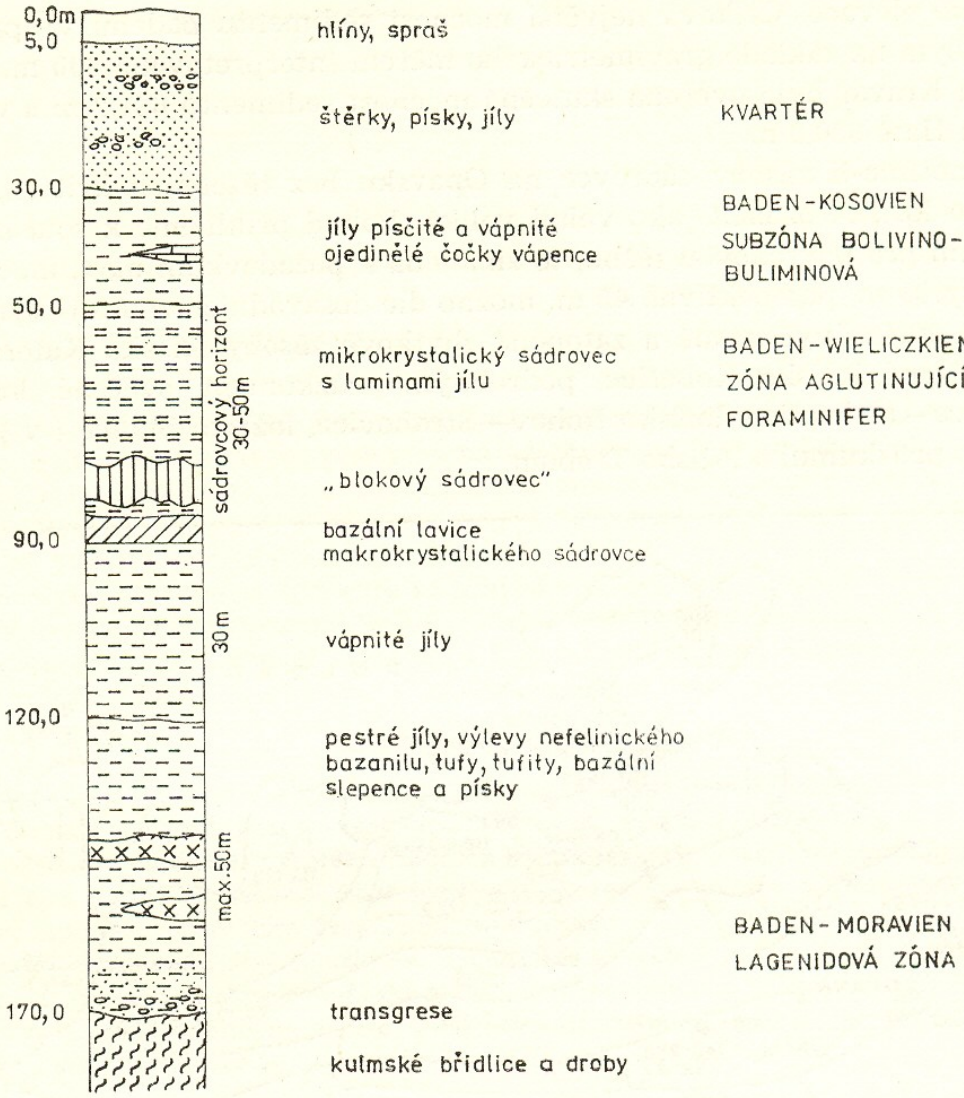


64. Geologický řez opavskou pánví (V. Mátl)
1 — kvartérní štěrky, písky a hlíny; 2—5 — miocén (baden, dř. torton): 2 — jíly písčité a vápnité (kosovien, subzóna bolivino-buliminová); 3 sádrovcový horizont (wieliczkien, zóna aglutinujících foraminifer); 4 — bazální štěrky a písčité jíly (moravien); 5 — výlevy nefelinického bazanitu, tufy, tufity (moravien); 6 — kulmské břidlice a droby (visé-kyjovické vrstvy).



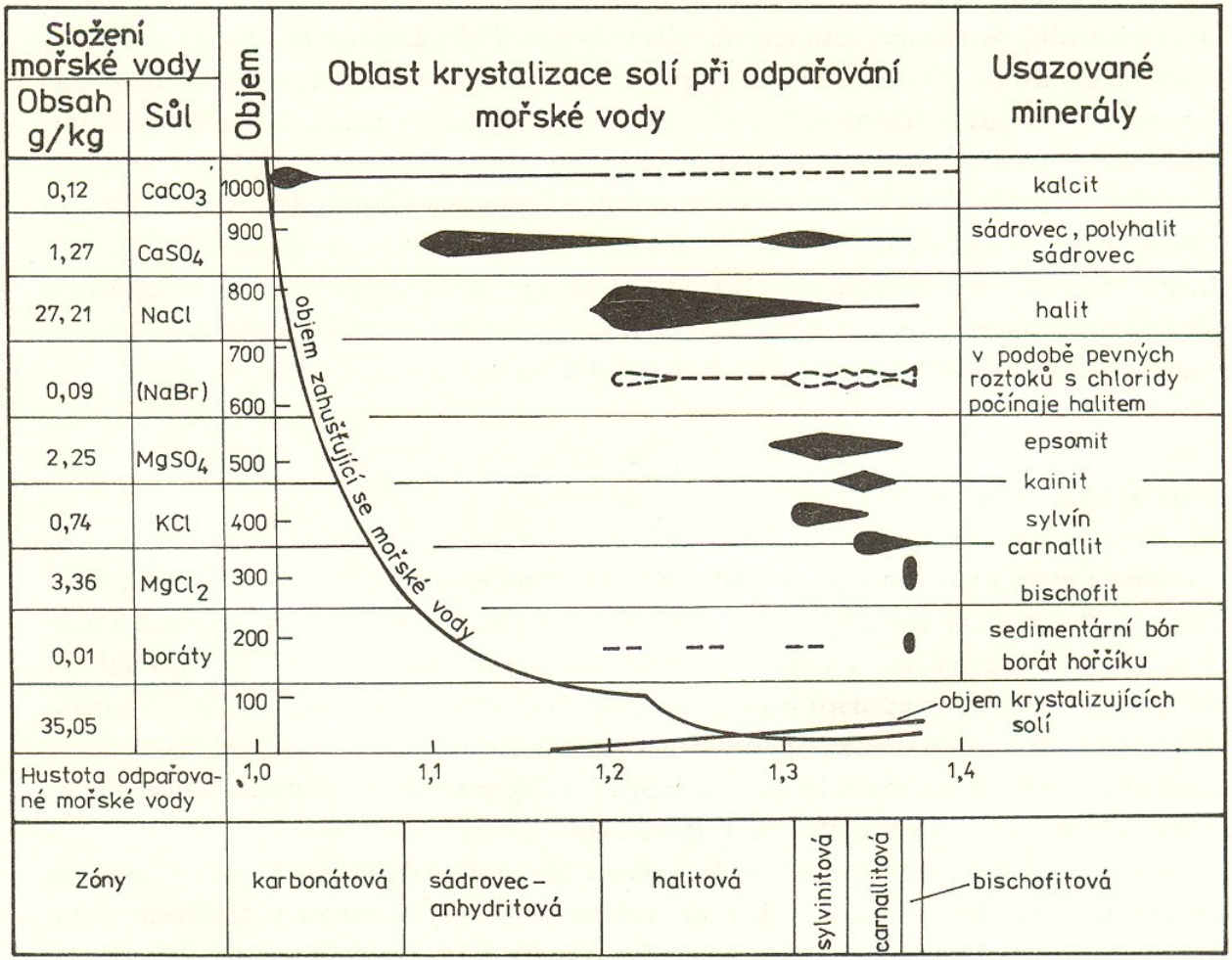
Obr. 73. Geologický řez předpolím jižní těžební stěny ložiska sádrovce v Kobeřicích (podle Mátla in *Kužvart* ed. 1977)

1 až *2* — kvartér: *1* — hlíny a sprašové hlíny, *2* — písky a štěrky, *3* — písčité a vápnité jíly (baden děvínské série, subzóna bolivino-buliminová), *4* až *6* — baden děvínské série, zóna aglutinujících foraminifer: *4* — mikrokrystalický sádrovec s jílem, *5* — „blokový" sádrovec, *6* — bazální sádrovec, *7* — čedič a čedičová vulkanoklastika (baden-moravien, lanzendorfská série), *8* — droby a břidlice (kulm), *9* — vrty



63. Ideální profil miocénu opavské pánve se sádrovcovým horizontem v okolí Kobeřic (stratigrafie podle I. Cíchy 1959 b).

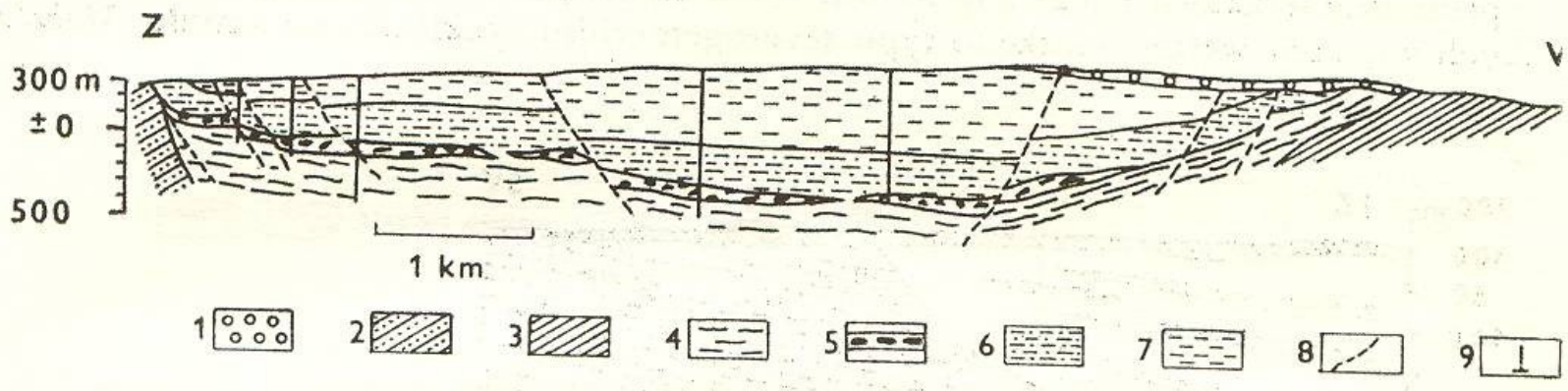
Nepřítomnost zkamenělin v ložiskách evaporitů vysvětloval Walther (1903)



20. Sled vylučování solí z mořské vody při zmenšování jejího objemu se současným zahušťováním při odpařování (podle Valjaško in Strachov, 1962).

Tabulka 6. Zastoupení solí v mořské vodě a v evaporitech
(podle Schmalze, 1969, in Hsü, 1972)

Sůl	V jednom litru mořské vody je obsaženo (v cm^3)	V průměrném evaporitu (v cm^3)	Mocnost solí usazených z vrstvy mořské vody 1500 m mocné (v m)
$MgCl_2$	1,48	0,02	2,20
KCl	0,43	0,23	0,65
$MgSO_4$	0,94	0,30	1,41
$CaSO_4$	0,59	4,29	0,89
NaCl	12,87	10,89	19,31
$CaCO_3 + CaMg(CO_3)_2$	0,06	1,04	0,18



Obr. 76. Geologický řez ložiskem kamenné soli Solivar-Soľná Baňa (podle *Slávika* 1967)
1 — aluvium, *2* — břidlice a pískovce vnitrokarpatského flyše (eocén), *3* — břidlice s vložkami pískovce (eggenburg), *4* až *7* — karpat: *4* — vápnitý jílovec, *5* — solná brekcie, *6* — vápnitý jílovec s anhydritem, *7* — vápnitý jílovec, *8* — poruchy, *9* — vrty

it underlies about 2,550 km² of eastern and northeastern Ohio,
ping southeastwards so that the top is 425-450 m deep in
effield, Lorain County, 920 m at Barberton, and 2,240 m in
arshall County, West Virginia. There are four salt beds, each
h a maximum thickness of 100 m, within a thick sequence
limestone and dolomite. Solution mining is used at op-
ations near Akron and Rittman (Akzo Salt and Morton
ernational); underground mining takes place at
hiskey Island near Cleveland (Akzo Salt)
d at Fairport (Morton International).

West Virginia the Salina salt is more
an 2,000 m below the surface. So-
tion mining is employed at
stersville, near Moundsville
anlin Chemicals), and at New
artinsville (PPG Industries).
espite the fact that salt under-
s half of Pennsylvania, the
ate is not a commercial salt
oducer.

S Gulf Coast

298,000 km² area extend-
g from Alabama westward
southern Arkansas and
xas, and southward into the
ulf of Mexico, constitutes the
ulf Coast Basin. The strati-
aphic section is some 1,000
thick along the northern
order in southern Arkansas,
ncreasing dramatically to

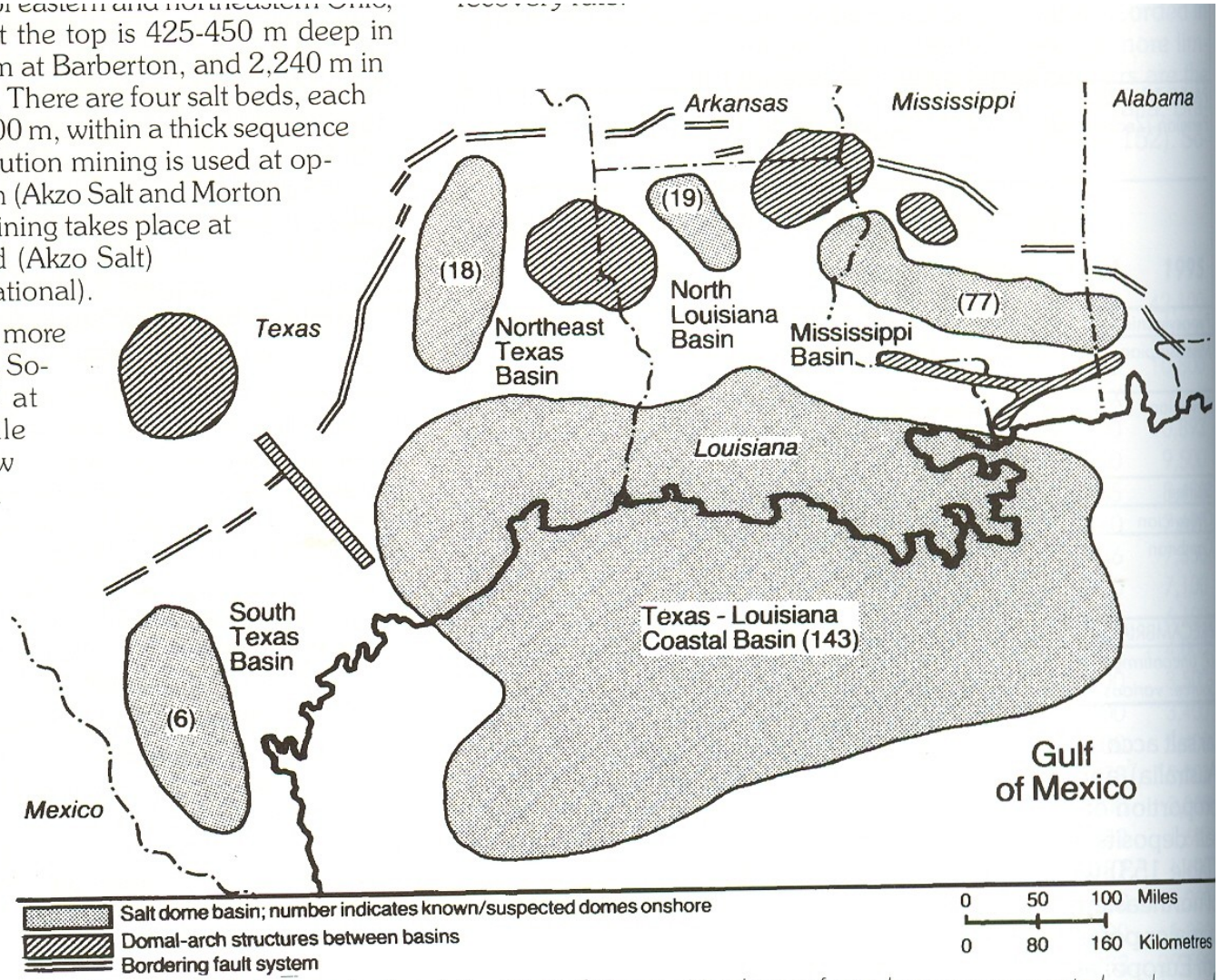


Figure 155 Salt dome basins of the US Gulf Coast. Numbers refer to known or suspected onshore sal domes. Source: Anderson, et al., 1973

Beds) (Notholt and Highley, 1975).

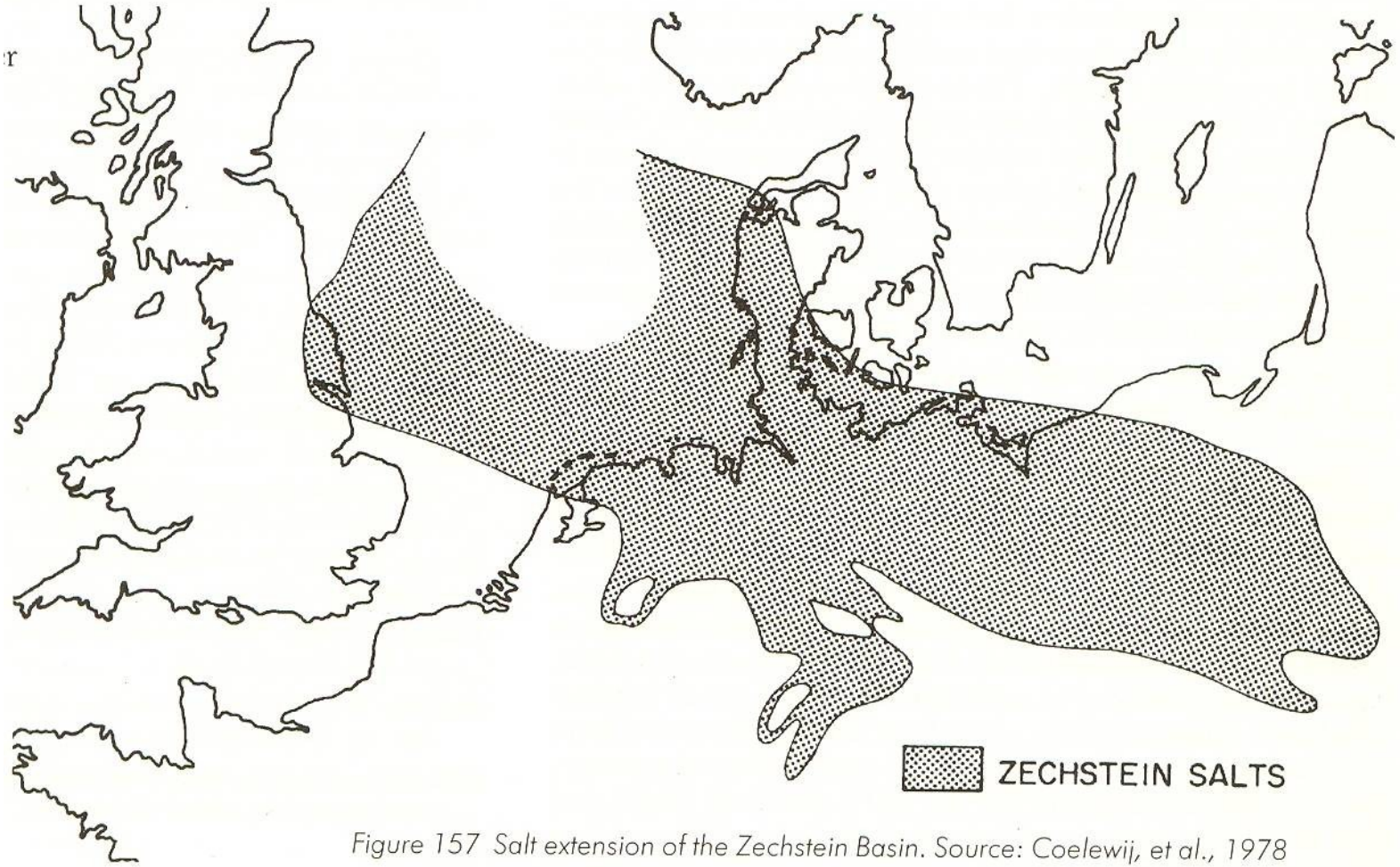


Figure 157 Salt extension of the Zechstein Basin. Source: Coelewij, et al., 1978

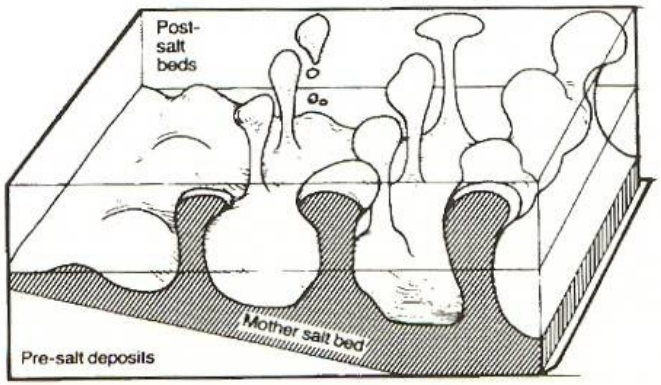
Table 154 German Salt Formations

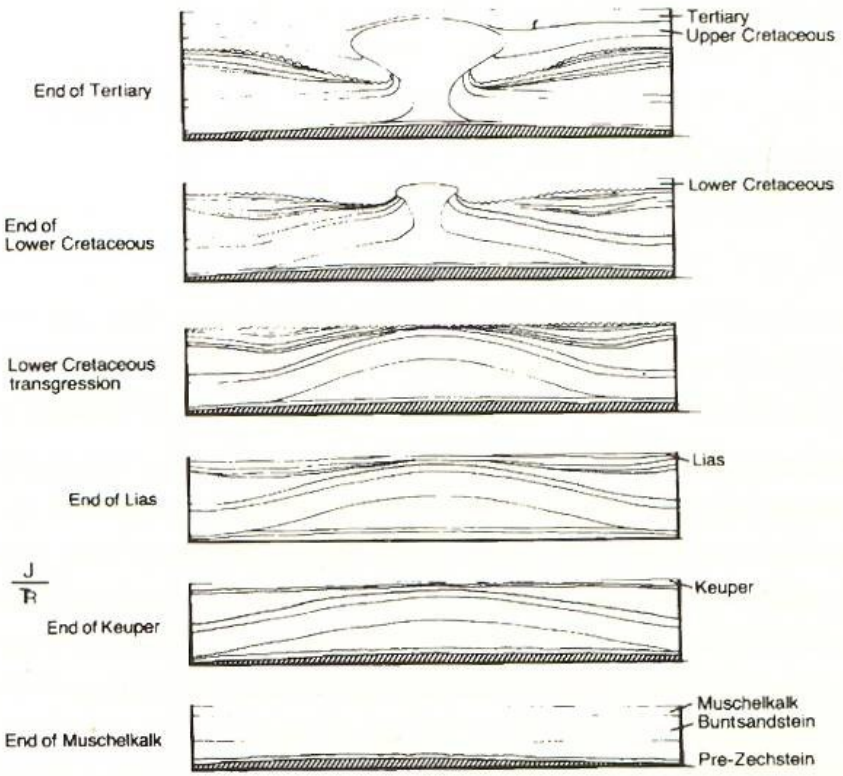
CENOZOIC
- Quaternary
  - Alluvium
- Pleistocene
- Tertiary
- Pliocene
- Oligocene
  - salt and potassium salts in the Upper Rhine River area
- Eocene
- Paleocene

MESOZOIC
- Cretaceous
- Jura
- Malm salt in Munder marl in northwest Germany
- Dogger
- Lias
- Trias
  - Keuper
    - salt in gypsum in Keuper of western Germany
  - Muschelkalk
    - salt in Middle Muschelkalk of western Germany
  - Buntsandstein
    - salt in Röt, north Germany
    - salt in Werfener Beds of Triassic Alps

PALEOZOIC
- Permian
  - Zechstein
    - salt and potassium salts in the Upper Zechstein of central Germany
  - Rotliegendes
    - salt in northwest Germany
- Carboniferous
- Devonian
  - salt-water springs — East Prussia
- Silurian

Source: Lefond, 1969


Post-
salt
beds
Mother salt bed
Pre-salt deposits


End of Tertiary
Tertiary
Upper Cretaceous
End of
Lower Cretaceous
Lower Cretaceous
Lower Cretaceous
transgression
End of Lias
Lias
J
Tr
End of Keuper
Keuper
End of Muschelkalk
Muschelkalk
Buntsandstein
Pre-Zechstein