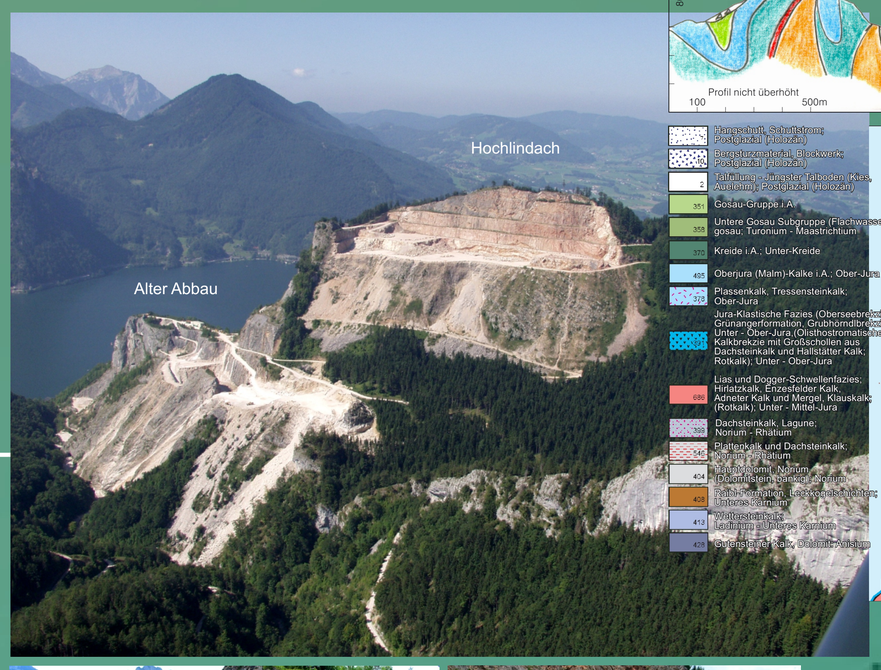
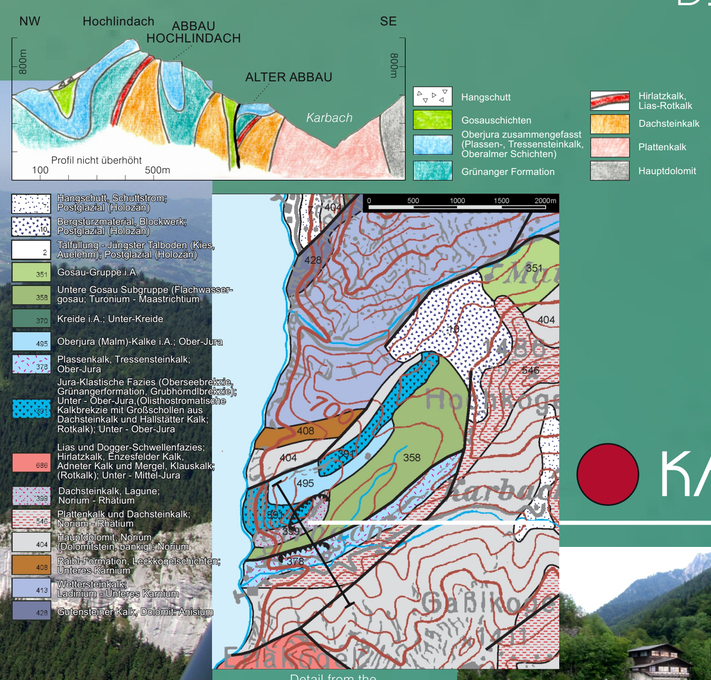
B. MOSHAMMER (Geological Survey Austria)

assisted by

K. FISCHER (Solvay Ebensee),
A. RANZENBACHER (Gmundner Zementwerke AG),
R. KASSMANNHUBER (Baumit Bad Ischl),
A. MULLEGGER (stone mason Reiterndorf)
and N. KIENESBERGER (stone mason Grieskirchen)

KARBACH - HOCHLINDACH Solvay Ebensee





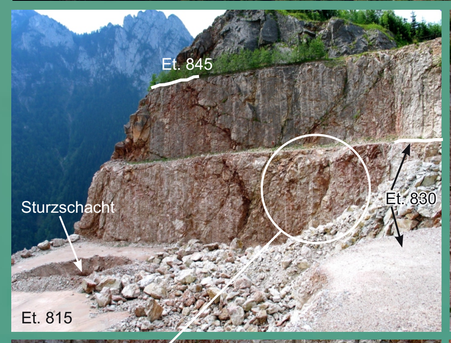
Detail from the geological map of Upper Austria 1:200 000

Building of the washing and sieving processing plant at Karbach. In front of it loading of a cargo ship with processed material.

Soda is produced from the carbondioxide of the calcite and the sodium of the brine.

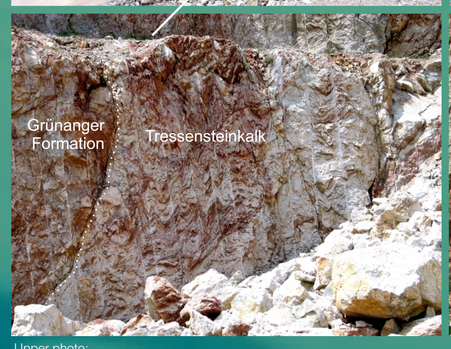
Processing and Selected Products

The roads to the quarry are not equipped for heavy load transports. Therefore all equipment for the quarry has to be shipped.



Ca. 60 m high south oriented wall which consists of Grünanger Schichten up to about level 865 and higher up of Upper Jurassic limestone (mainly Oberalmer Schichten). Right outside of the photo to the east there is an updoming of Dachsteinkalk.

Hochlindach



Upper photo:
The westerly wall of the quarry Hochlindach is made up of Grünanger Schichten (red weathered, with up to 1 cubic metre large components). Towards the north to the right contact to Tressensteinkalk (Upper Jurassic).
Lower photo:
Tectonically overprintet contact between massive Grünanger Schichten and thin bedded intensively folded Tressensteinkalk.

Sedimentary contact of Grünanger Schichten which are conglomeratic at the base overlying Dachsteinkalk on level 830. View of the north-dipping nodular bedding plane seen from below as the underlaying Dachsteinkalk was removed.

Bedding and diagenetic structures (partially calcitic filled vugs) in the Hirlatz-kalk rsp. Liassic Red Limestone on level 830.

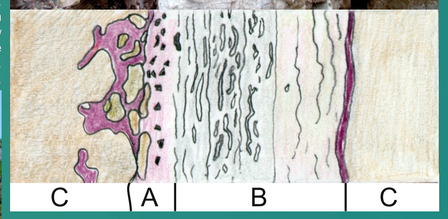
Fissure in Dachsteinkalk within the transitional zone to Grünanger Schichten. Its infilling is made up by a breccia with components of Hirlatzkalk and Dachsteinkalk and red micritic groundmass. Tape measure: 25+5 cm.

Old quarry, SSW direction:
Almost completed retention basin for storing the muddy content (< 0,04 mm) of the water from the wet sieving process at the lake shore. The southern wall consists of dolomite bearing Plattenkalk, which is unusable for its chemical constitution and left untouched.

Old Quarry

Enlarged detail of the Plattenkalk sequence between thick limestone beds. Long side of the photo 48 cm, tape measure 10+5 cm.

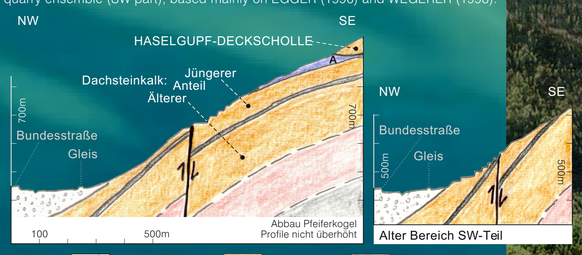
Interpretation of the facies:
A: Reworked horizon: Limestone nodules of the underlying bed C are deposited within red marls. They are covered by reddish coloured dolomite containing black pebbles.
B: Pure dolomitic stromatolith (algal laminite) with geopetally filled vugs, i.e. in the former hollow space first some sediment is deposited. The remaining vug was closed with calcitic cement.
C: Limestone bed, 1,5 to 2 m thick.

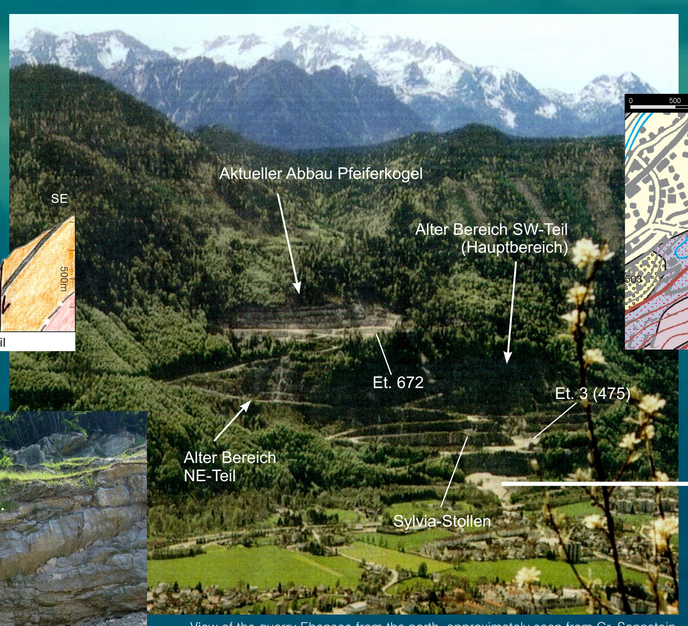


Old quarry, level 14 (630) with falling shaft (the lower one). On the upper end the unloading site for trucks (level 16). In the background there is the western coulisse of the higher quarry Hochlindach.

Old quarry, level 16 (660):
Plassenkalk of high chemical purity in typical light colour. Striking laterally to the left clastic sediments of the Gosau group crop out implying tectonical contact.

Hypothetical NW-SE profiles of the quarry Pfeiferkogel and of the middle part of the old quarry ensemble (SW part), based mainly on EGGER (1996) and WEGERER (1998).





View of the quarry Ebensee from the north, approximately seen from Gr. Sonnstein. Due to activities of recultivation, like planting and staining, the old quarry-ensemble fits quite inconspicuously into the country. The recent quarry Pfeiferkogel is operated in terraces from bottom to top.

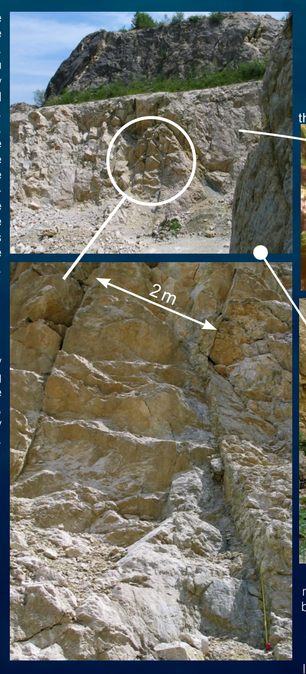
Detail from the geological map of Upper Austria 1:200 000

Talfüllung - Jüngster Talboden (Kies, Auelehm); Postglazial (Holozän)
Rutschhang, Massenbewegung, Sackungsmasse; Pleistozän - Holozän
Talfüllung - Älterer Talboden (Kies, Sand); Deltaablagerungen (Salzkammergut); Postglazial (Holozän)
Moräne (Würm)
Eisrandterrasse (Würm)
Ruhpolding-Formation; Ober-Jura (Radiolarit - Kieselgestein); Ober-Jura
Allgäuschichten (Liasfleckenmergel, Liasbrekzie); Unter-Jura
Lias und Dogger-Schwellenfazies; Hirlatzkalk, Enzesfelder Kalk, Adneter Kalk und Mergel, Klauskalk; (Rotkalk); Unter - Mittel-Jura
Kössen-Formation, Schattwald-Formation; Rhätium
Dachsteinkalk, Lagune; Norium - Rhätium
Plattenkalk; Norium - Rhätium

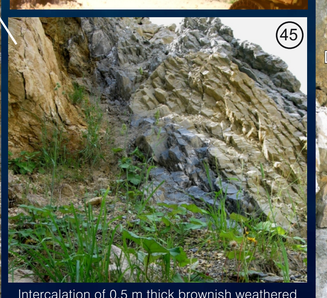
Southeast corner in quarry Pfeiferkogel:
Up to 4 m thick siliceous limestones (Scheibelbergkalk s. l., Liassic) form the tectonically overprinted sediment in superposition to Dachsteinkalk. Their ESE dipping normal faults show tectonical extension.

Old Quarry Ensemble

East face of the protruding middle part on level 3. Limestone with ≥ 2 m bedding width with only centimetre thick marl layers in between. Partially faulted. Top presumably to the left. The whole sequence belongs probably to the younger part of the Dach-steinkalk. The lower plane of the limestone bed in the foreground to the right is identical with the one in the left corner of photo 45.



SW part of the old quarry ensemble. Excavated limestone is deposited temporarily on level 3. To the right, there is the coulisse of this part of the quarry.
On the left one can see the protruding middle part which houses the Sylvia gallery.
The faces are artificially grey stained except for the lowest one. The multiple benches are planted.



Intercalation of 0,5 m thick brownish weathered marls (interpreted as marl series of the Nor / Rhät boundary rsp. as Kössen Beds) followed upwards by a 2 m thick bedded, ochre and greyish-blue weathered limestone-marl-alternation. The latter consists of 2-4 cm black heavily bioturbated layers of marl and <5-8 cm thick limestone beds.

In the eastern part of level 3 (floor with office, 475 m above sea level) a depression was excavated. In its deeper grass covered eastern part it serves as rain water retention basin. The walls of the depression show the natural, light beige unweathered colour of the Dachsteinkalk, whereas the upper faces show the grey camouflage staining, imitating natural weathering.

Detail of the western part in the eastern depression. Fault zone with red-green, sandy marls. Dipping of the fault and of the bedding plane are perpendi-cular to each other. The adjacent lime-stone to the north is transformed into a fault breccia. Tape measure 80 cm.

View of level 690 from SW presenting the southwestern continuation of the following photo to the right.

Level 690, middle part, view towards SW: Flexures and bendings in the tectonically deformed Dachsteinkalk. A characteristic limestone-marl-sequence stretches along the face from the middle part of the photo to the west [compare the left photo] and probably marks the Nor-/ Rhät boundary. It should be identical with 45 in the old quarry ensemble.

Coarse nodular bedding plane of a lime-stone bed, which typically occurs in the proximity of the limestone-marl-sequence.

The originally highly nodular bedding plane, marked by the 1 metre tape measure, was smoothed by tectonic deformation.

Sedimentary structure in the limestone-marl-sequence on l. 690, interpreted as wave ripples. Width of photo: 30 cm.

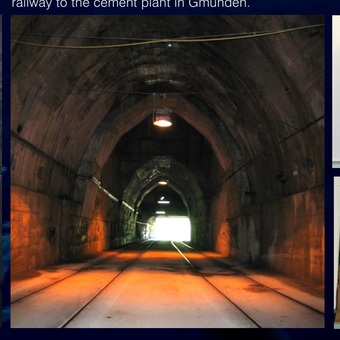
Pfeiferkogel

Floor (= level 672) and quarry wall with the levels 690 and 712 in the western area of quarry Pfeiferkogel, seen from the south. To the left on the edge of the quarry the primary crusher is situated on top of the falling shaft with its feeding device for trucks.

Processing and Products

Conveyor belt in the Sylvia gallery, which carries the coarsly crushed material from the quarry Pfeiferkogel to the underground processing plant inside the old quarry were it undergoes crushing and dry sieving. The distant exit is seen.

Even the loading of the railway waggons is performed in the underground. All of the worked material is transported via railway to the cement plant in Gmunden.



The extracted and processed Dach-steinkalk is the main raw material component for the cement production. In this process The other major raw materials are marl and sandstone, both coming from **the quarry in the Flysch-zone quite near the cement** plant in Gmunden. Various cement types are produced for a **range of applications.**

PFEIFERKOGEL EBENSEE Gmundner Zementwerke