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The Nassereith Minewater explosion (Tyrol 1999) L. Weber, Vienna



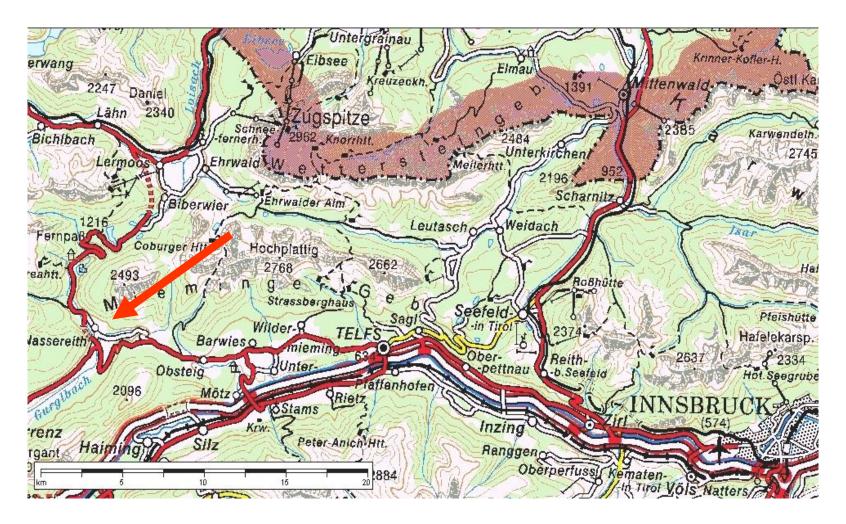
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- 1. geological framework
- 2. mining history
- 3. the "minewater explosion"
- 4. technical solutions
- 5. lessons learnt...



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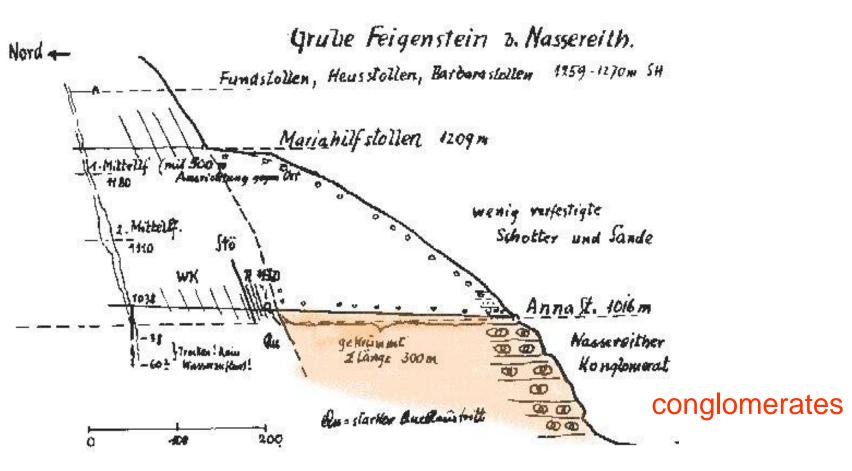
Metallogenetische Karte von Österreich 🔞 🏹 🏹 🖑 🚺 Zurücksetzen Geologischer Gewässer-Geo-Tektonik Acro-Geologie Situation OEK50 Tektonik Löschen Hintergrund 🕨 🕨 Basement magnetik netz chemie Sichmar Sichtbar im Detailmaßstab Alle Suche Suche Lagerstätten 🕨 Suche Suche Lager-Rohstoff-Metallog. Zurück Lager-Dyn. Legende Wertstoff Bezirk stätten stätte gruppe Aktiv DICINDACI 90Z -fernerh Lagerstätte Status Ehrwald, V Lermoos Wertstoff Brand Streichen Symbolorientierung Kelmen Symbolform Ehrwalde Biberwier Symbolfarbe 11216 Symbolgröße Fernpaßg Namlos Coborget Htt Hochplatti 2471 Loreahtt. 12-2768 Q (Otto-Reinhardt-Htt.) 2493 e n g m erspitze Strassbe Dynamische Legende: Heiterwand Wildermieming Anklicken des ent-2639 sprechenden Punktes mit Nassereith der Maus bei vorheriger BarwiesQ Auswahl mit Leuchtbalken Obsteig Detailinformation 2096 über eine Lagerstätte: Motz Linserhoft Drücken des i-Knopfes, anschließende Auswahl der Lagerstätte mit arrenz Mausklick Maßstab 1:125495 X:213360 Y:383085 Lambert Koordinaten 09:34

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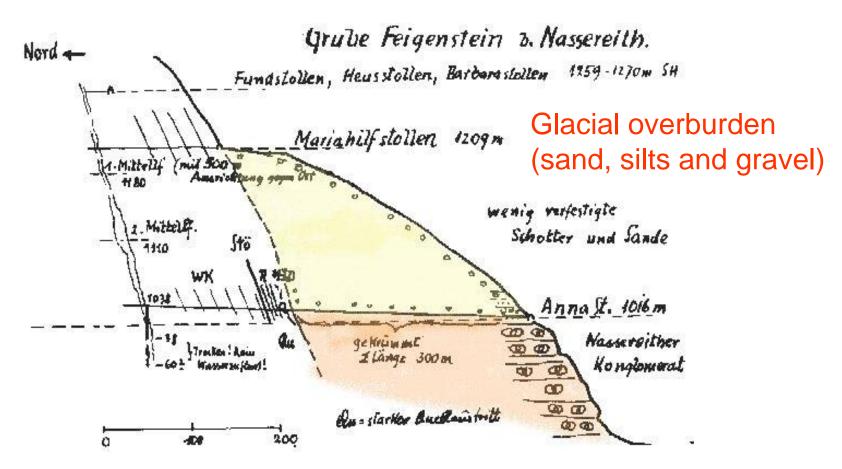


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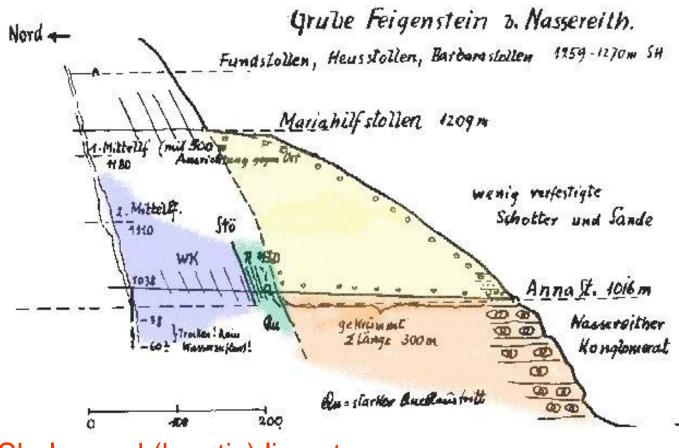
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Shales and (karstic) limestones



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- 1. early 1700: first mining activities
- 2. 1763: construction of Anna-adit
- 3. 1881: holding of the mining rights only, no mining activities
- 4. 1939: change of ownership; some documents lost ?

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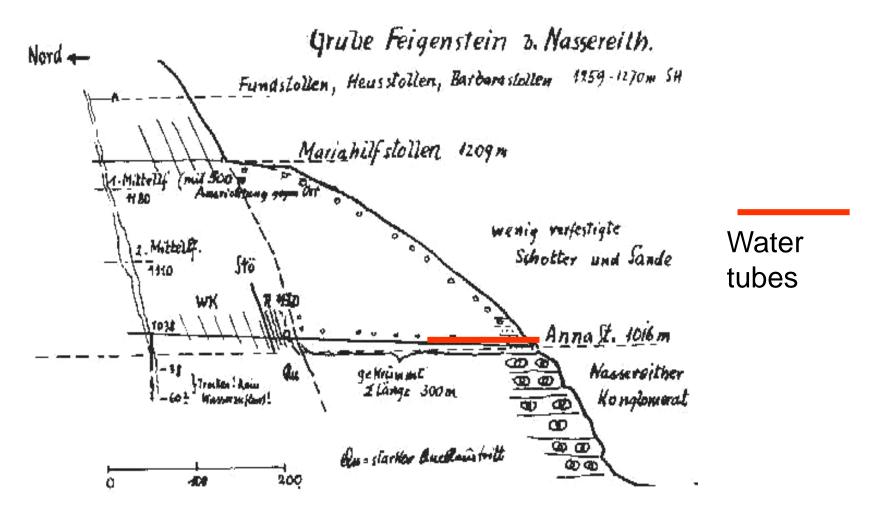
- 1. Report 1932: Seepage of water from the collapsed mouth of the Anna-adit (ca. 2-3 l/s)
- 2. 27. July 1948: Water outburst (ca. 500 l/s)
- 3. First sanation under high risks !!

4. 21. and 23. July 1955 Water outbursts

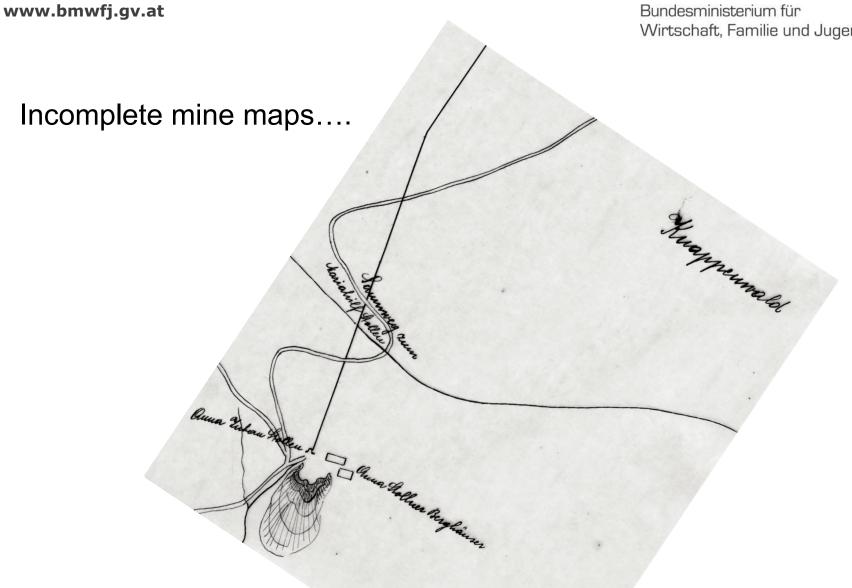
5. "Sanation" (complete opening of the Anna-adit; construction of a drainage system with 118 concrete tubes, closing of the front entrance)



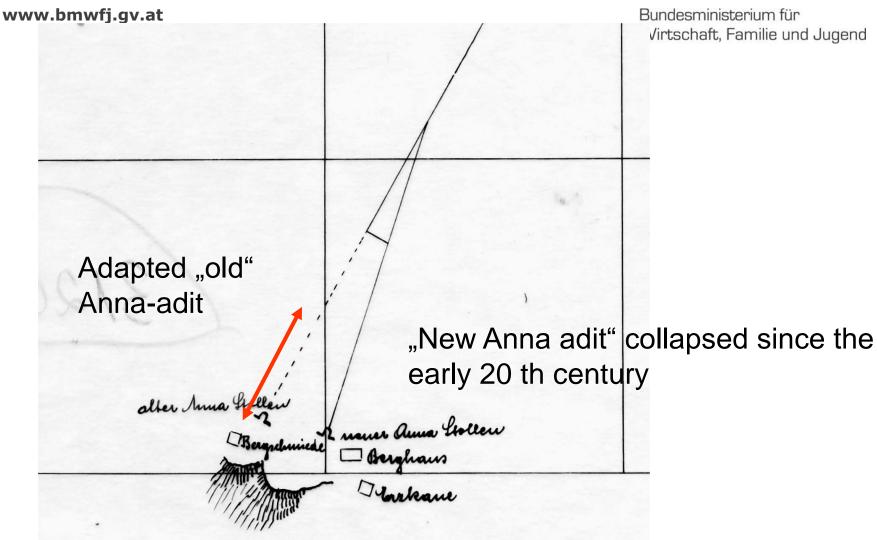
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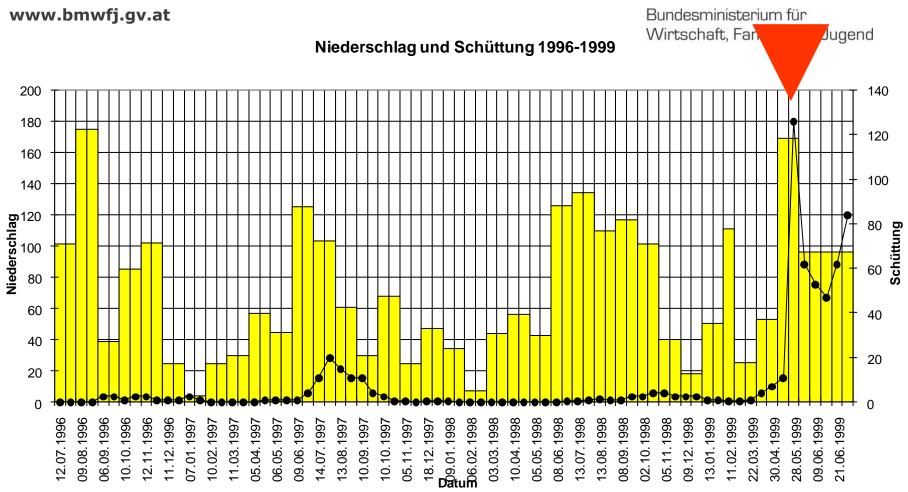




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> Dewatering tubes in the former front entrance of the old Anna adit





Heavy precipitation in autumn 1998 and spring 1999 !



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Mean precipitation Station Nassereith

1-6/97	392 mm
1-6/98	346 mm
1-6/99	705 mm



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26. Juni 1999 00:17 "Mine water explosion"

"explosion" of the collapsed front area of the new Anna-adit, outburst of > 2000 m³ water within a few minutes, outwashing of the canyon, additional mobilisation of debris mudflow of several 10.000 m³ damaging the valley below the adit

great surprise: mine-water explosion affected the "new" Anna-adit only

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location of the "old" Anna-adit (with water tubes)

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blowed-out mouth of the parallel "new" Anna-adit

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Permanent outflow of several hundreds l/s water

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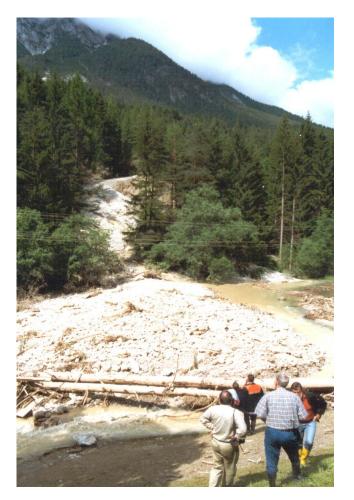
damages of the debris flow ...

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damages of the debris flow ...

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damages of the debris flow ...

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7/10/1999

Glacial overburden: rhythmic strata of sand and gravel with silty strata

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Suffosion holes in glacial sediments due to seeping water, weakening the stability of the slope





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Immediate safety measures

large scale restriction to access (remote) control of water outflow from the adit around the clock (quantity – opaqueness)

Further measures:

detailed documentation of springs first draft of a remediation project

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Radio controlled water and mud registration)



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Shotcret of the surface; construction of "open air" steel support)

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armed shotcret Support of the old Anna adit; heading step by step)...

careful control the water outflow of the parallel new Anna-adit for safety reasons...

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> installation of dewatering tubes to avoid uncontrolled water flows in the glacial sediments

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stabilisation of huge caves, caused by the minewater explosion

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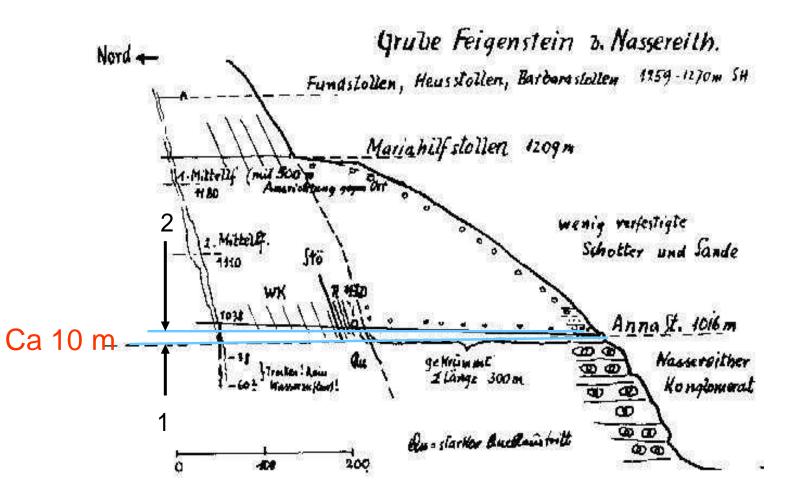
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Mine water explosion was primarely induced by retention of water;

Ingressing water in the mine system: periodically higher than water outflow via drainage system:

Uncontrolled "natural" dewatering causing suffosion and destabilisation of the glacial overburden...

Lessons learnt...



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Periodic rapid flow of water (several hundreds of I/s), causing blank bottoms of the adit...



Lessons learnt...



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Periodic rapid flow of water (several hundreds of I/s), causing blank bottoms of the adit...



but

Lessons learnt...



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Undersized drainage system, causing retention of water and flooding the parallel new Anna adit



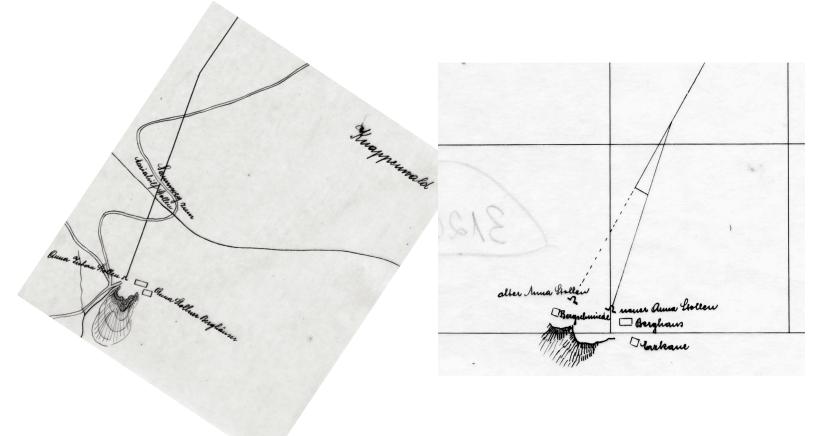


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Careful checking of the mine maps for actuality and completeness...







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Main consequences for closing down mine sites

Sufficient geological and hydrogeological knowledge is essential for any closing measures...

Need for representative qualitative (quantitative) water balances to compare inflow vs. outflow, periodical changes

In case of karst phenomena: free and controllable dewatering;

Careful check of the actuality of the mine maps...





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Closing of mines is expensive...

