

The Nassereith Minewater explosion (Tyrol 1999)

L. Weber, Vienna



The Nassereith Minewater explosion...

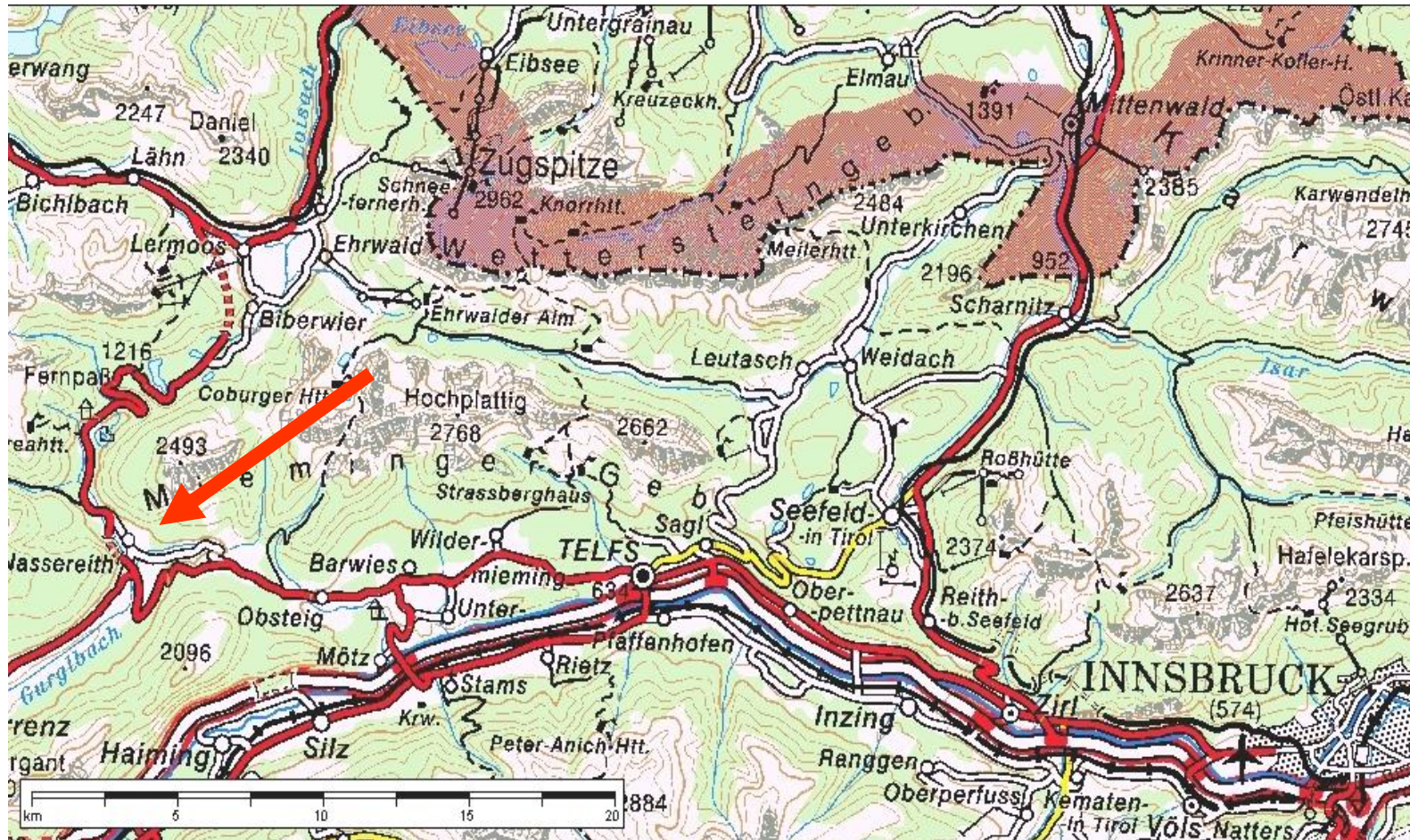


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1. geological framework
2. mining history
3. the „minewater explosion“
4. technical solutions
5. lessons learnt...

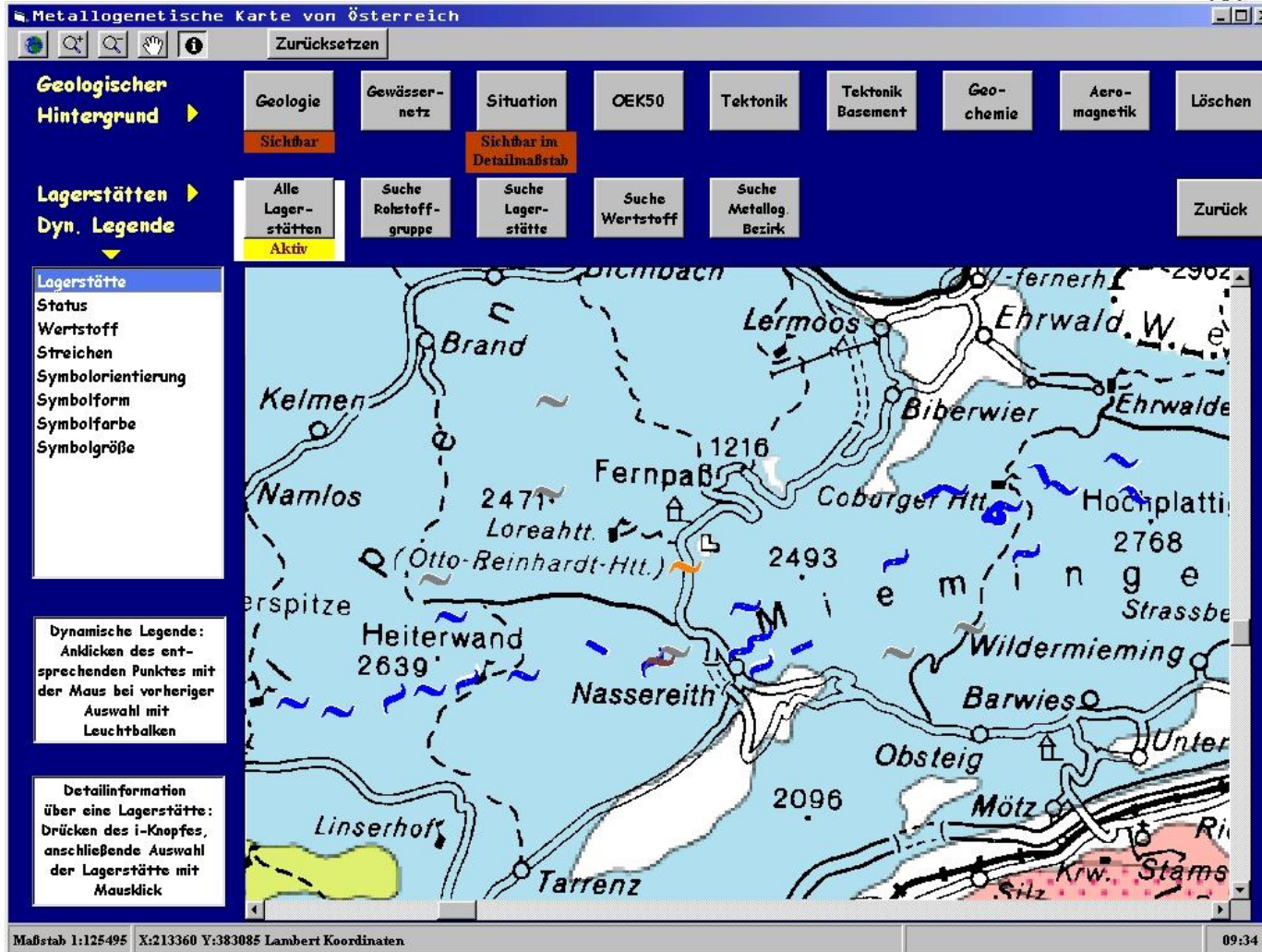
The Nassereith Minewater explosion...



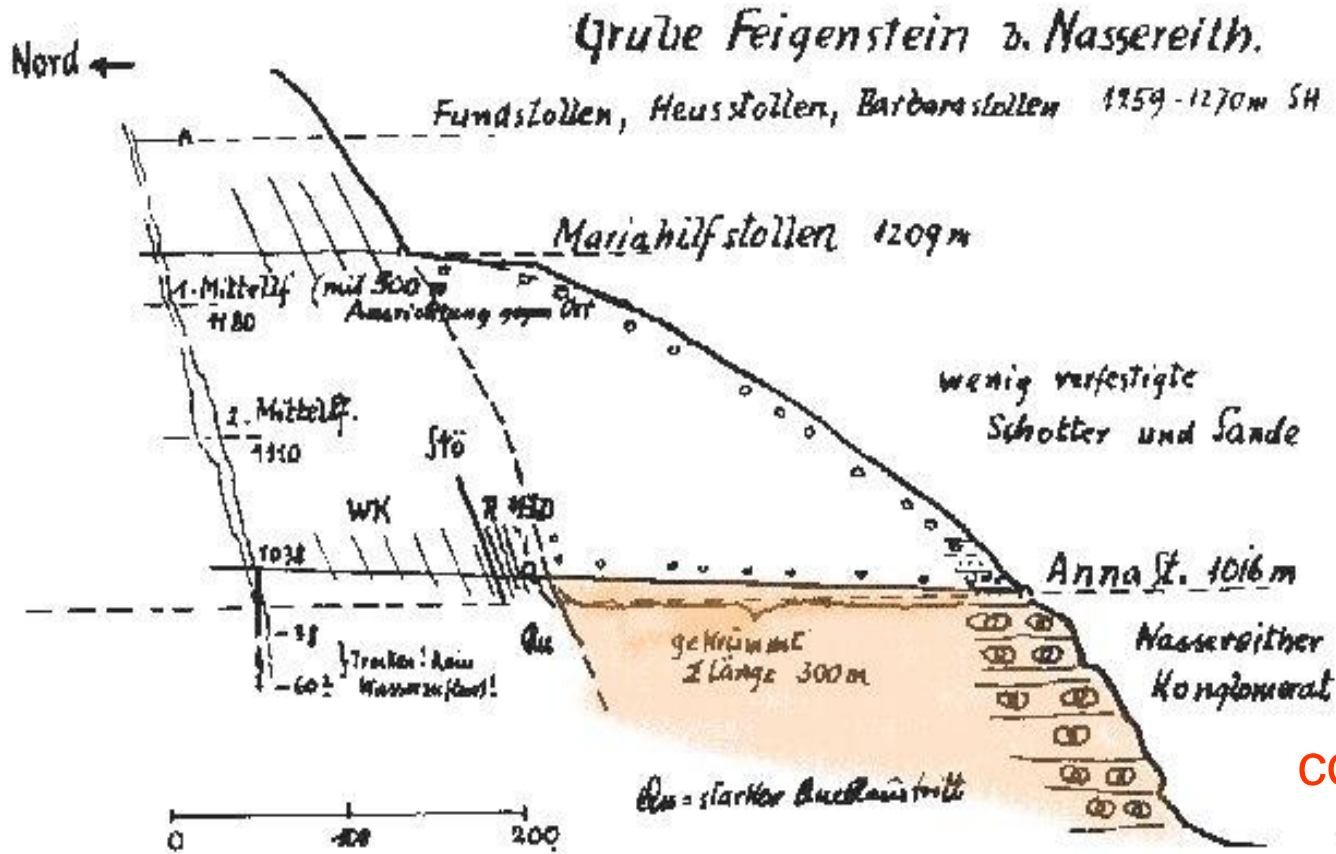
The Nassereith Minewater explosion...

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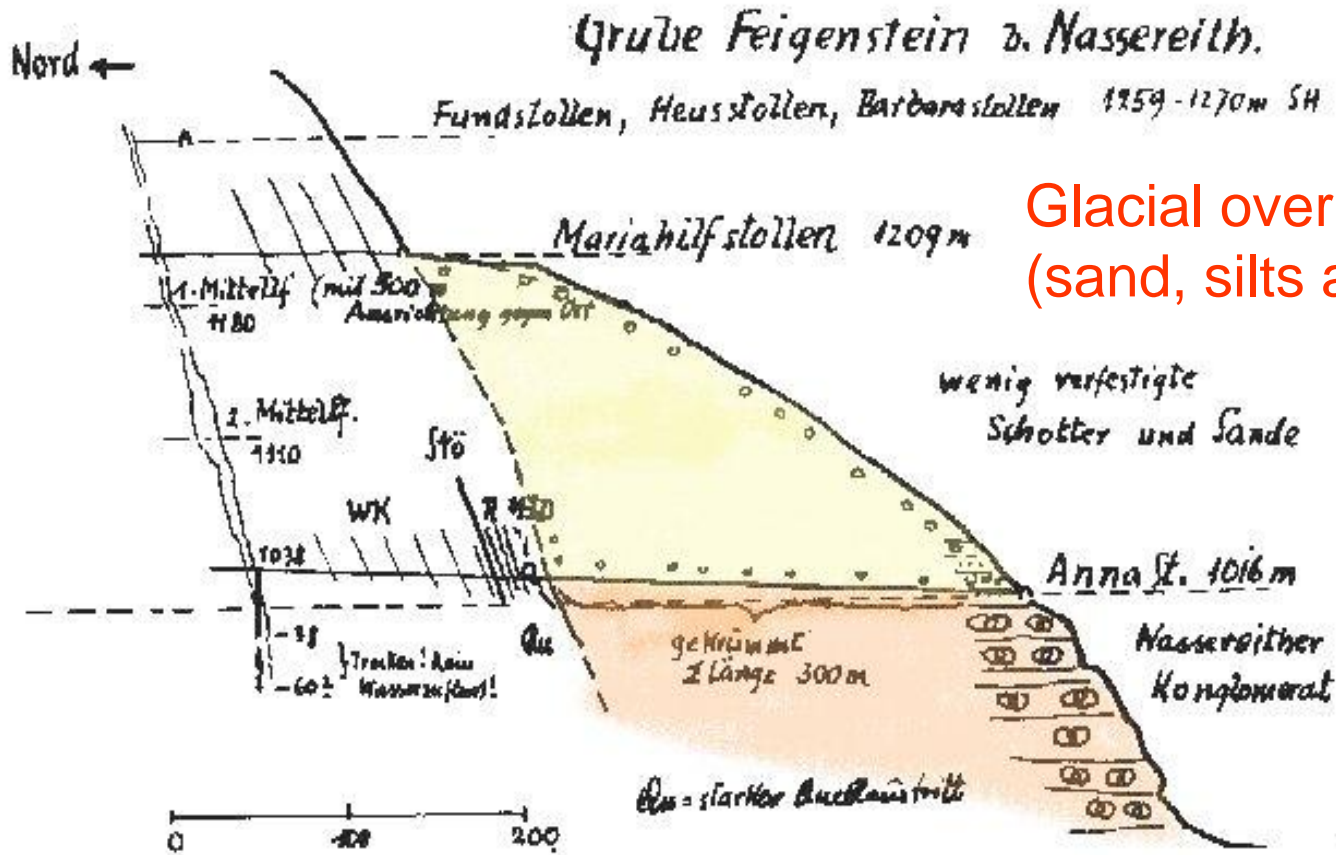


The Nassereith Minewater explosion...



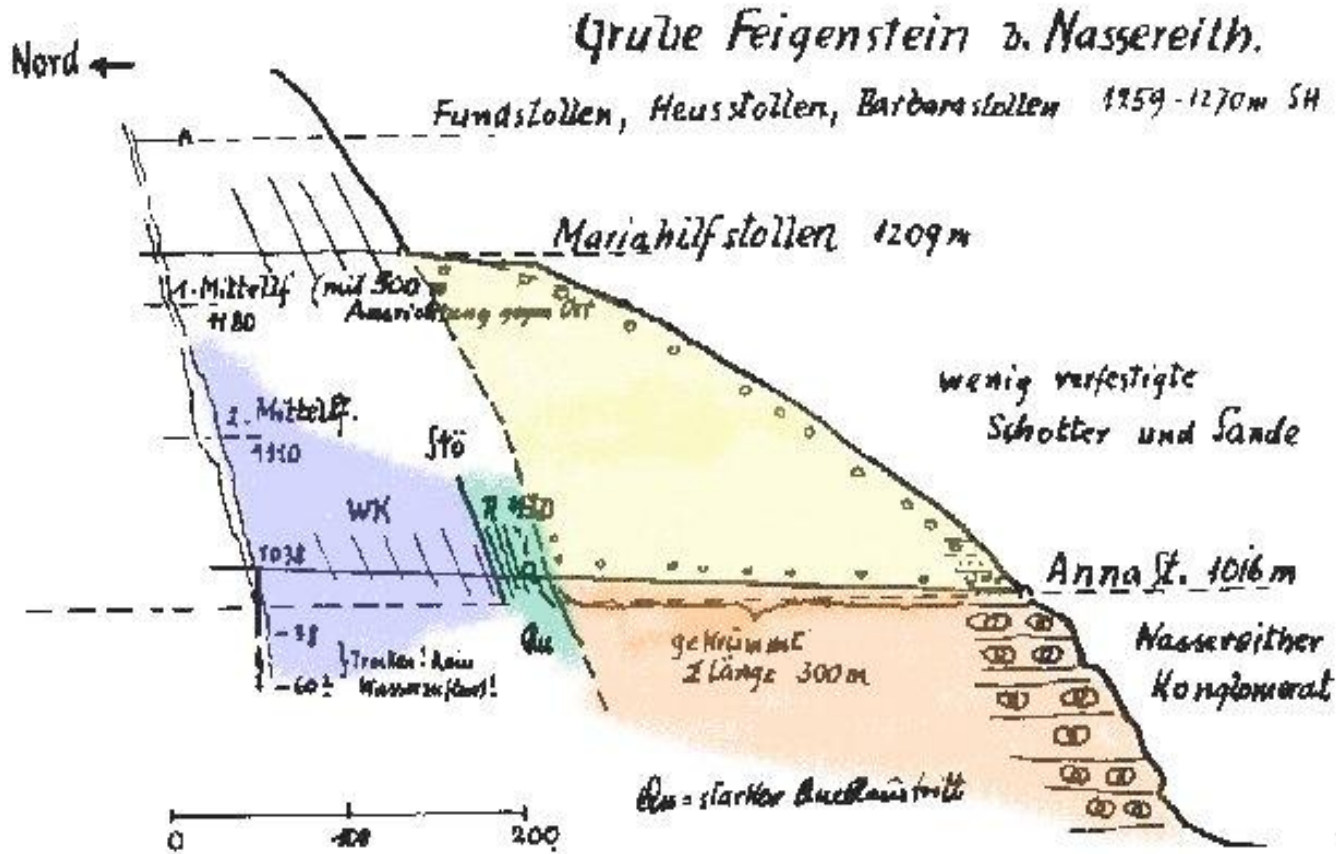
conglomerates

The Nassereith Minewater explosion...



Glacial overburden
(sand, silts and gravel)

The Nassereith Minewater explosion...



Shales and (karstic) limestones

The Nassereith Minewater explosion...



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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 ?

The Nassereith Minewater explosion...



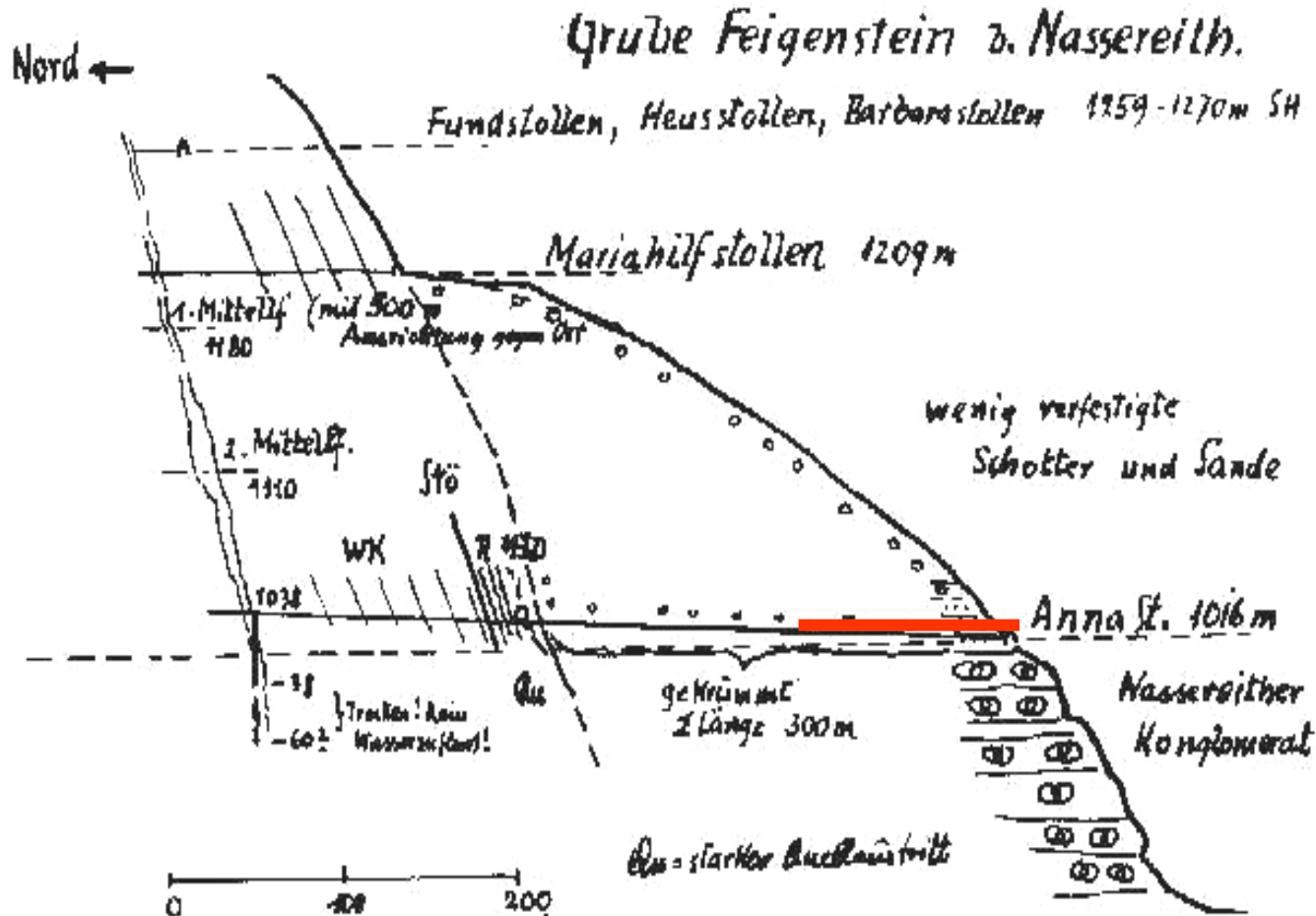
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1. Report 1932: Seepage of water from the collapsed mouth of the Anna-adit (ca. 2-3 l/s)
2. **27. July 1948: Water outburst (ca. 500 l/s)**
3. First sanitation under high risks !!
4. **21. and 23. July 1955 Water outbursts**
5. „Sanation“ (complete opening of the Anna-adit; construction of a drainage system with 118 concrete tubes, closing of the front entrance)

The Nassereith Minewater explosion...



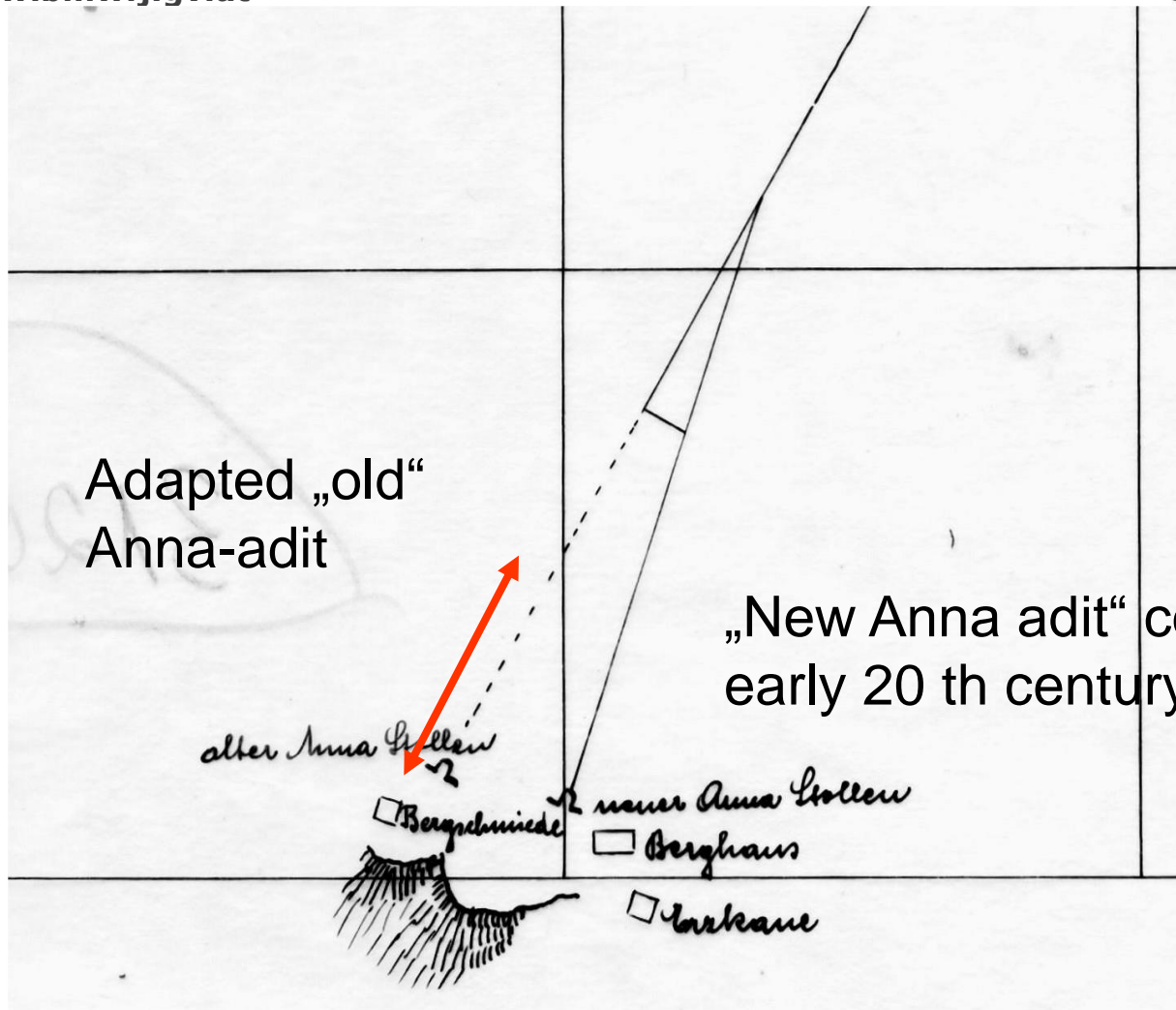
Water tubes

The Nassereith Minewater explosion...

Incomplete mine maps....



The Nassereith Minewater explosion...



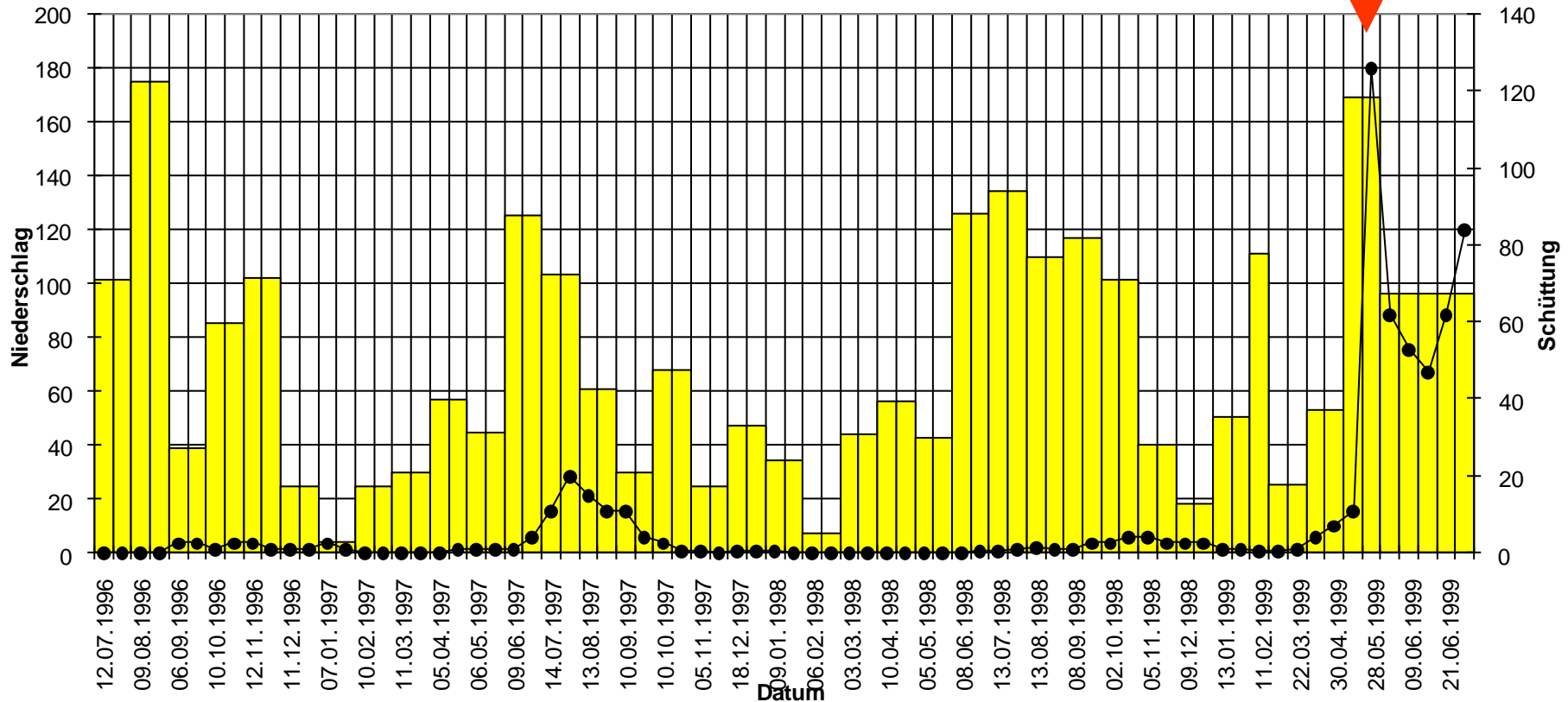
The Nassereith Minewater explosion...



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

The Nassereith Minewater explosion...

Niederschlag und Schüttung 1996-1999



Heavy precipitation in autumn 1998 and spring 1999 !

Mean precipitation Station Nassereith

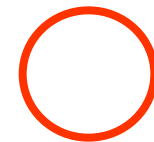
1-6/97	392 mm
1-6/98	346 mm
1-6/99	705 mm

26. Juni 1999 00:17 „Mine water explosion“

„explosion“ of the collapsed front area of the new Anna-adit, outburst of $> 2000 \text{ m}^3$ water within a few minutes, outwashing of the canyon, additional mobilisation of debris mudflow of several 10.000 m^3 damaging the valley below the adit

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

The Nassereith Minewater explosion...



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

The Nassereith Minewater explosion...

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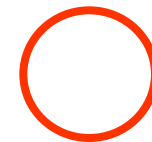


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Nassereith

7/7/1999 11:18



blowed-out
mouth of the
parallel „new“
Anna-adit

The Nassereith Minewater explosion...



Permanent
outflow
of several
hundreds l/s
water

The Nassereith Minewater explosion...



damages of
the debris
flow ...

The Nassereith Minewater explosion...



damages of
the debris
flow ...

The Nassereith Minewater explosion...

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damages of
the debris
flow ...

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Glacial over-
burden: rhythmic
strata of sand
and gravel with
silty strata

The Nassereith Minewater explosion...

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Suffosion holes
in glacial sedi-
ments due to
seeping water,
weakening the
stability of the
slope

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

Technical solution...

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Radio controlled water and mud registration)

The Nassereith Minewater explosion...



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Technical solution...

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Shotcret of the surface; construction of „open air“ steel support)

Technical solution...

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

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

Technical solution...

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installation of
dewatering tubes
to avoid un-
controlled water
flows in the
glacial sediments

Technical solution...

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stabilisation of
huge caves,
caused by the
minewater
explosion

The Nassereith Minewater explosion...

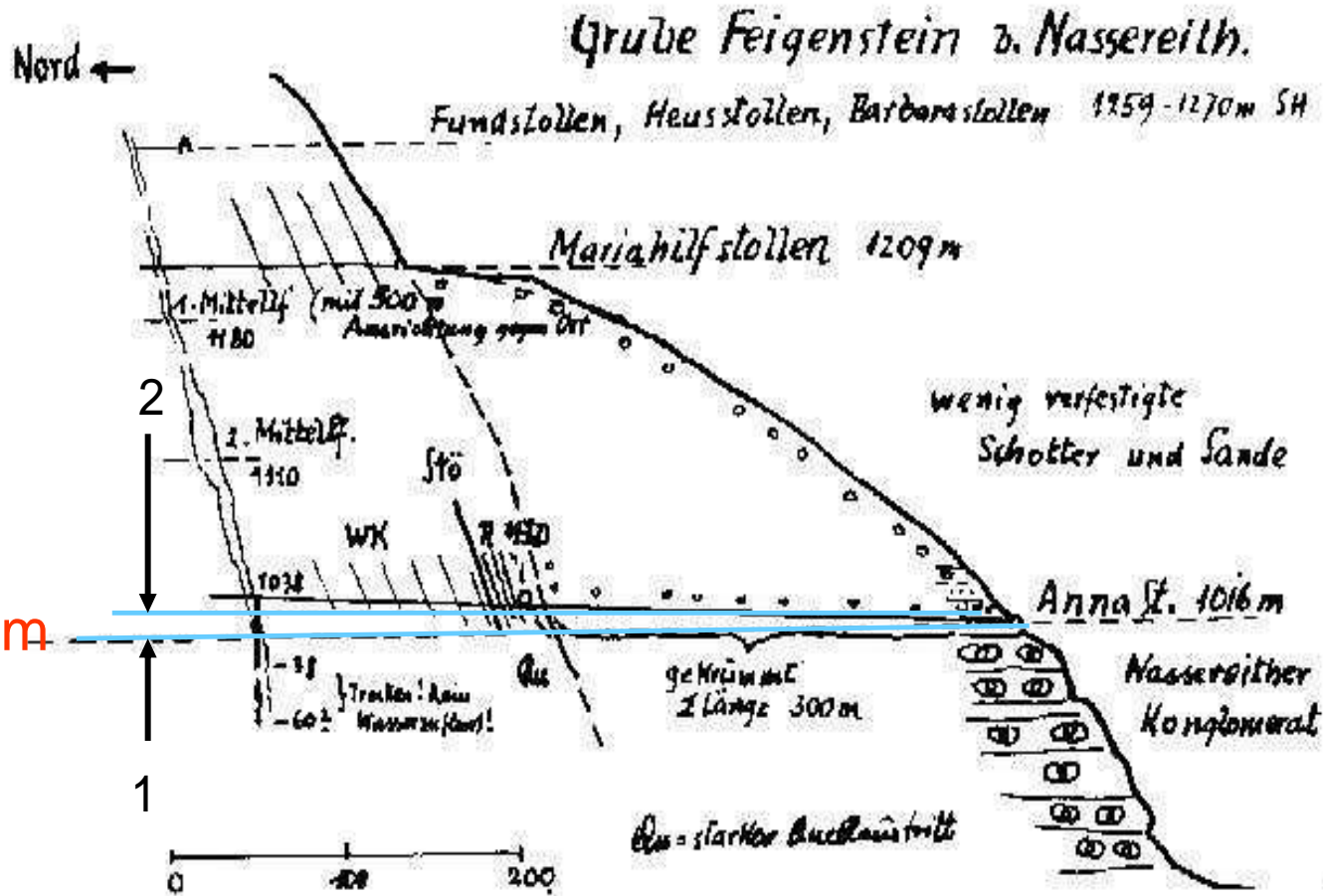


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The Nassereith Minewater explosion...



Mine water explosion was primarily 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...

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



Lessons learnt...

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

but



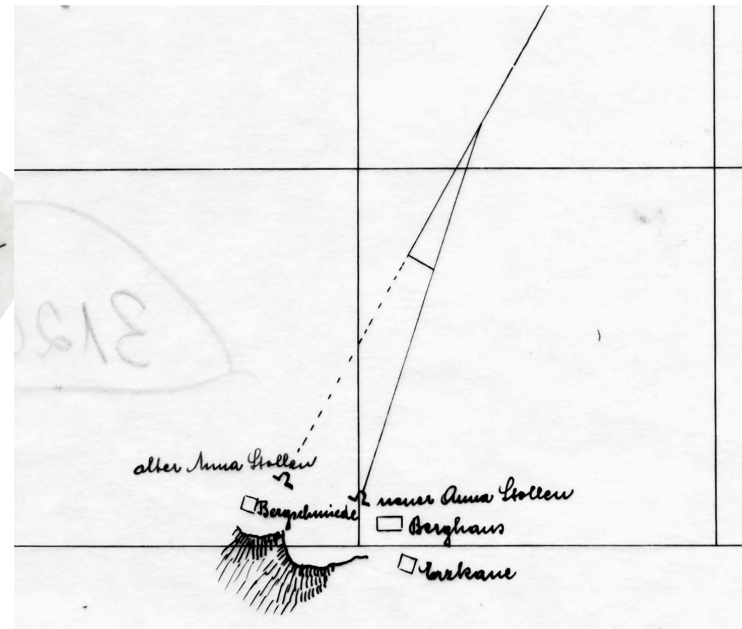
Lessons learnt...

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



Lessons learnt...

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



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...

Lessons learnt...

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Closing of mines is expensive...

Unproper closing of mines is
much more expensive...

