

MESSEL PIT-FOSSIL SITE

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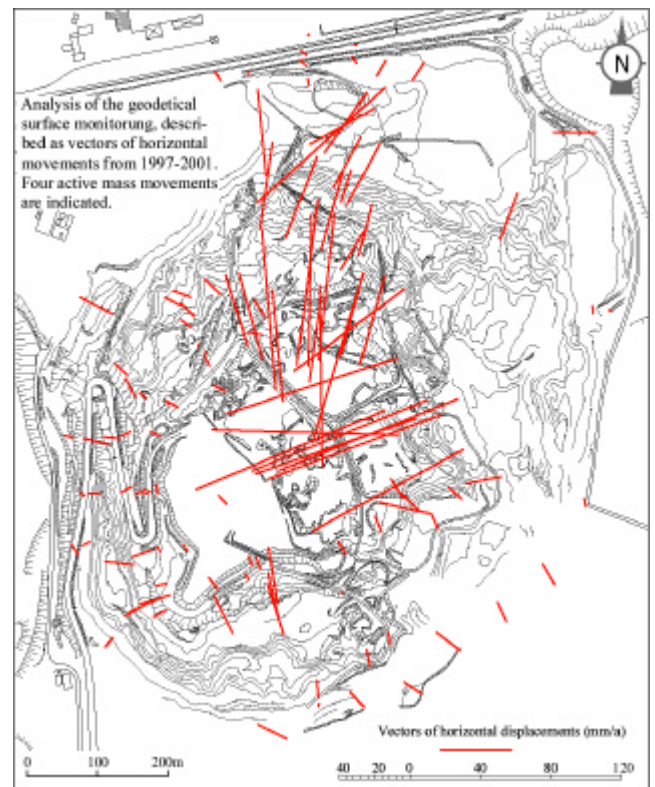
Engineering geological conditions and problem:

Messel is situated in the south of Hesse (Germany) between the cities of Darmstadt, Dieburg and Langen, about 20 km from Frankfurt a. Main. The oilshale deposits of the Messel pit are famous especially because of the finds of superbly preserved vertebrate fossils of Eocene age. Messel became a member of the UNESCO list of World Heritage in 1995. Since 1990/1991 the government has taken over the responsibility for the site, which includes possible health and safety issues arising i.a. by mass movements of the artificial slopes. Particular attention has to be directed to a railway line, situated on the northern, and the observation platform, situated on the southern rim of the pit.

The sediments of the Eocene Messel Formation have accumulated in a Tertiary volcanic lake, which was formed in Carboniferous igneous rocks and sediments from the Upper Permian. Lithostratigraphically the Messel Formation is subdivided into three units (from bottom to top):

- Lower Messel Formation (pyroclastic debrites),
- Middle Messel Formation (Messel oil shale),
- Upper Messel Formation (light coloured clays and sands).

The beds are dipping gently to the centre of the pit. Shear planes occur especially in the transition-zone of Lower Messel Formation to the Middle Messel Formation and use the beds as existing zones of weakness. The landslides are generally restricted by nearly vertical zones of crushed or ground-up rock (detachment planes) at the transition to surrounding Paleozoic rocks.



Protective measures:

For a long time survey of the mass movements a geotechnical monitoring program was established, including inclinometer devices, ground water devices and geodetical surface monitoring. 134 measuring points were arranged in cross-sections from the surrounding Paleozoic rocks to the bottom of the pit.

References on studies already performed:

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