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NUCLEAR REGULATORY COMMISSION
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U.S.A.

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WM Project: WM-

PDR no

(Return to WM, 623-55)

WM Record File: 412

LPDR no

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21.09.1987

Betreff

Dear Mr. Nataraja,

thank you for your letter August, 26, 1987. We give you information about the accident in shaft No. 1 of the Gorleben Exploratory Mine on May 12, 1987. At this day, at 9.45 a.m. a steel reinforcement ring (diameter 10 m) dropped from a height of 5 m into the base of the shaft under construction, which was at a depth of 239 m below surface. At that moment, 7 miners worked on this level. 3 of them were heavily and 3 others slightly injured. One of them died some days later.

Technical and geological situation:

Shaft 1 of the exploration mine Gorleben was sunk to a depth of 239 m through a cylindrical set of frozen strata into the interface between the overlying strata and the caprock of the salt dome.

The geological formation of the Quarternary (0 - 162 m below surface) including a 3.5 m thick layer of "Lauenburger" clay was passed by shaft sinking without problems. The underlying Tertiary formation (162 to 237 m) consists in principle of 3 layers: an upper clay layer (162 to 210 m), an intermediate layer of sand and sandstone (210 to 229.5 m) and the lower clay layer (from 229.5 m) which overlies the caprock at a depth of 237 m. Due to the proximity of the salt dome, the water content of the lower clay layer is

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highly saline. The clay formation shows abundant joints and slickensides. In this critical zone sinking was done more carefully. While sinking thru the tertiary clay, routine survey measurements did observe significant convergencies of shaftwalls and installed concrete blocks in the lower clay layer. Therefore, the concrete blocks forming the outer shaft reinforcement were supported by 34 pre-stressed, welded and screwed steel rings. One of these steel rings fell down after a welding had broken.

Among the first security actions taken was the emplacement of steel cables to secure the remaining steel rings. During the following days, measurements and visual inspections of these rings showed general deformations due to rock pressure. This meant, that the reinforcement rings were too weak to withstand the unexpectedly high rock movement. However, this outer wall is normally not designed to resist to external pressure but so serve as a protection during shaft sinking. Pressure resistance will finally be guaranteed by the inner shaft wall consisting of a steel liner and reinforced concrete, both being based on a foundation in the rock salt.

On May 17, it was decided to fill up the shaft in this critical zone of 14 m with low grade concrete in order to stabilize the actual situation and to avoid the failure of freezing tubes due to rock displacement. 1.290 m³ concrete was brought in from May 18 to May 20, 1987.

During March/April 1987 an other observation was made. In one of the outward (outside of frost wall) temperature control hole the temperature had risen from -17°C to -7°C.

The reason for both the excessive convergency and the rise in temperature in one of the temperature control hole is presently under investigation. The question still remains open if there is a causal connection between both incidents.

The sinking has been stopped for the time being until the investigations for

- a) failure of one of the U-beams
- b) excessive convergence
- c) temperature rise in one of the outward control holes have been completed.

Meanwhile, consultants are checking (un)equal ground pressure in order to come up with a conceptual design of perhaps a new preliminary lining in this particular horizon.

It is anticipated to resume shaft sinking at the beginning of 1988.

Conclusions:

Due to these facts, critics claim again to stop all work at Gorleben. However, it is common understanding within the Government and the companies in charge that this event is only a mining problem and does not effect the suitability of the shaft after its completion and the salt dome as a whole for a radioactive waste repository.

Yours sincerely

Deutsche Gesellschaft zum Bau und Betrieb
von Endlagern für Abfallstoffe mbH (DBE)

ppa. Grübler

i.v. Engelmann

cc: Dr. Don Clark

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