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2004 WIPP Compliance Recertification Application - Main Volume

DOE/WIPP 04-3231
March 2004

CRA Main

Fluid pressure above hydrostatic is a hydrologic characteristic of the Salado (and the Castile) that plays a potentially important role in the repository behavior It is difficult to ~~accurately~~ measure natural pressures in these formations ***accurately*** because the boreholes or repository excavations required to access the rocks decrease the stress in the region measured Stress released instantaneously decreases fluid pressure in the pores of the rock so measured pressures must be considered as a lower bound of the natural pressures Stress effects related to test location and the difficulty of making long duration tests in lower permeability rocks result in higher pore pressures observed to date in anhydrites The highest observed pore pressures in halite rich units near Room Q ***are*** ~~is~~ on the order of 9 ***MPa*** whereas the highest pore pressures observed in anhydrite are ***approximately*** 12 ~~5~~ ***MPa*** (~~Beauheim et al 1993 139~~ ***Beauheim and Roberts 2002, p 82***) Far field pore pressures in halite rich and anhydrite beds in the Salado at the repository level are expected to be similar because the anhydrites are too thin and of too low permeabilities to have liquid pressures much different than those of the surrounding salt For comparison the hydrostatic pressure for a column of brine at the depth of the repository is about 7 ***MPa*** and the lithostatic pressure calculated from density measurements in ERDA 9 is about 15 ***MPa***

Fluid pressures in sedimentary basins that are much higher or much lower than hydrostatic are referred to as abnormal pressures by the petroleum industry where they have received considerable attention In the case of the Delaware Basin evaporites the high pressures are almost certainly maintained because of the large compressibility and plastic nature of the halite and to a lesser extent the anhydrite The lithostatic pressure at a particular horizon must be supported by a combination of the stress felt by both the rock matrix and the pore fluid In highly deformable rocks the portion of the stress that must be borne by the fluid exceeds hydrostatic pressure but cannot exceed lithostatic pressure

Brine content within the Salado is estimated at 1 to 2 percent by weight although the thin clay seams have been ***inferred*** ~~observed~~ by Deal et al (1993 ***pp*** 4 3) to contain up to 25 percent brine by volume Where sufficient permeability exists this brine will move towards areas of lower hydraulic potential such as a borehole or mined section of the Salado

Observation of the response of pore fluids in the Salado to changes in pressure boundary conditions at walls in the repository in boreholes without packers in packer sealed boreholes or in laboratory experiments is complicated by low permeability and low porosity Qualitative data on brine flow to underground workings and exploratory boreholes ~~have been~~ ***were*** collected routinely ***between*** ~~since~~ 1985 ***and 1993*** under the Brine Sampling and Evaluation Program (BSEP) and have been documented in a series of reports (Deal and Case 1987 Deal et al 1987 1989 1991a 1991b ~~and~~ 1993, ***and 1995***) ~~These and other investigations are discussed in Appendix SUM (Section 3 3 1 3)~~ A discussion of alternative conceptual models for Salado fluid flow is given in Appendix ***PA, Attachment*** MASS Section MASS 7 Additional data on brine inflow are available from the Large Scale Brine Inflow Test (Room Q) Flow has been observed to move to walls in the repository to boreholes without packers and to packer sealed boreholes These qualitative and relatively short term observations suggest that brine flow in the fractured DRZ is a complex process In some locations evidence for flow is no longer observed where it once was in others flow has begun where it once was not observed In many cases observations and experiments must last for months or years to obtain useful results