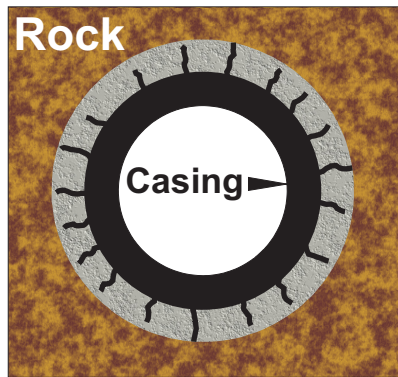
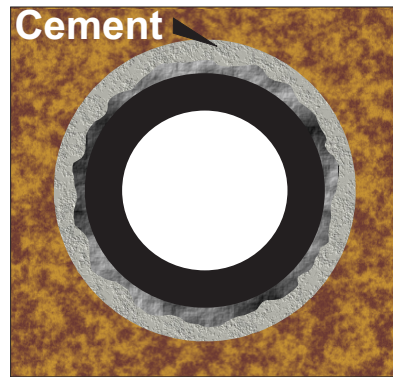


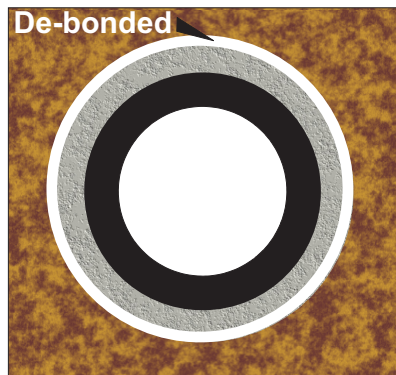
Types of cement channels in annular spaces that may permit upward methane migration. From Newhall (2006).



Cracks in cement sheath.



Plastic deformation in cement sheath.



Debonding at rock/cement interface.



Debonding at cement/casing interface.

Figure 5. Well operations may lead to loss of zonal isolation resulting from failure of the cement sheath. Some failure mechanisms are depicted. From Ravi et al. (2002). HydroQuest
Graphic