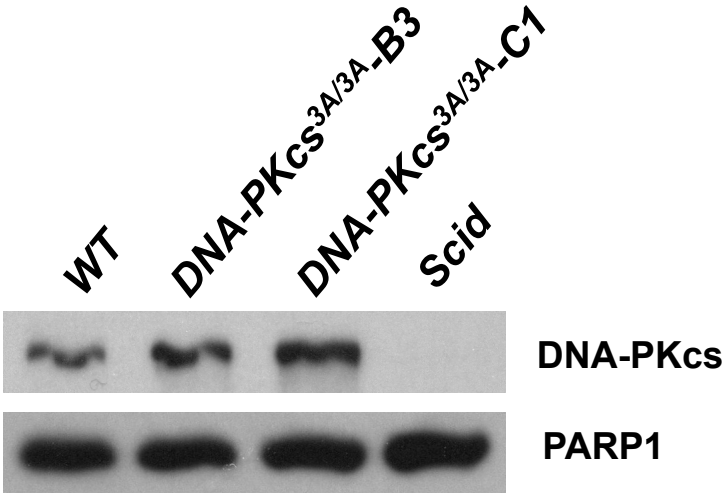


**Figure S1:** Western blot analysis of DNA-PKcs in one *WT,* two *DNA-PKcs*$^{3A/3A}$, and one *Sci*d abl pre-B cells. PARP1 is shown as a loading control.

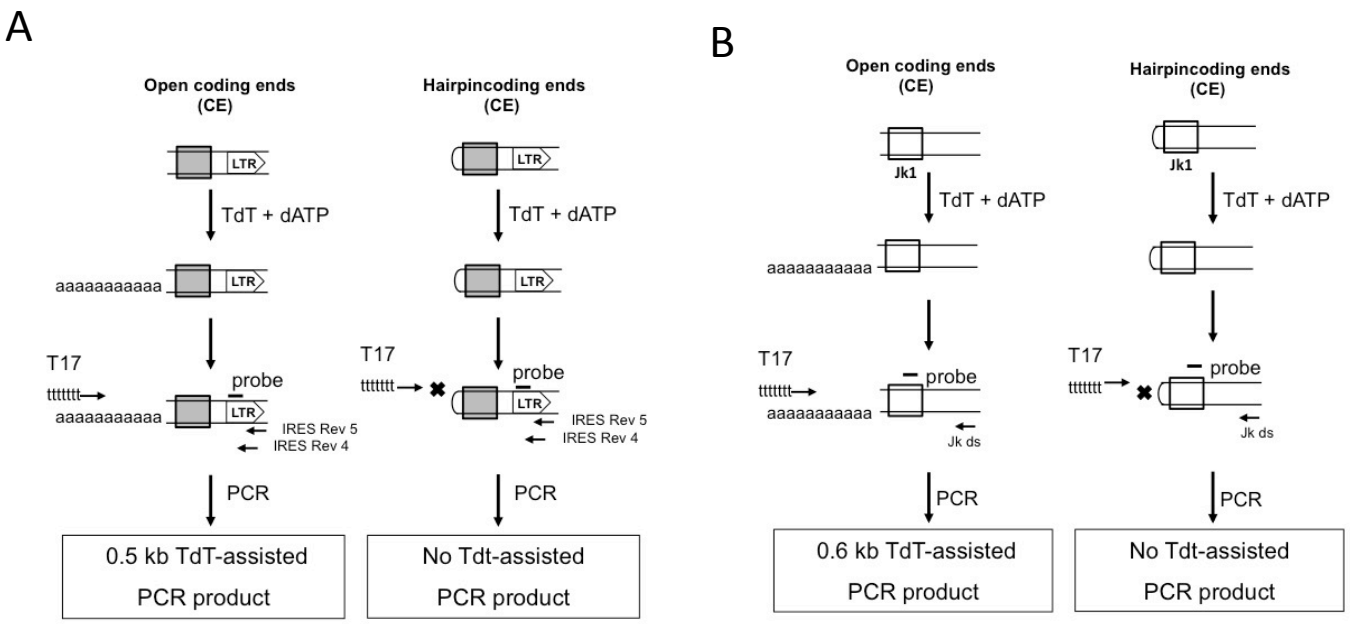


**Figure S2:** Schematic of TdT-assisted PCR for pMX-DEL$^{CJ}$ (A) and Jk1 (B) coding ends. Shown are schematics of pMX-DEL$^{CJ}$ and Jk1 coding ends with open and hairpin sealed coding ends. Incubation with TdT and dATP will add several adenosines to the end of open but not hairpin sealed coding ends. Open coding ends are then amplified using a oligo-dT primer (T17) and primers complementary to regions of pMX-DEL$^{CJ}$ (IRES REV5 and IRES Rev 4) or Jk1 (Jk ds) just downstream of the coding end. The expected size PCR product from amplification of the open pMX-DEL$^{CJ}$ and Jk1 coding ends are indicated.

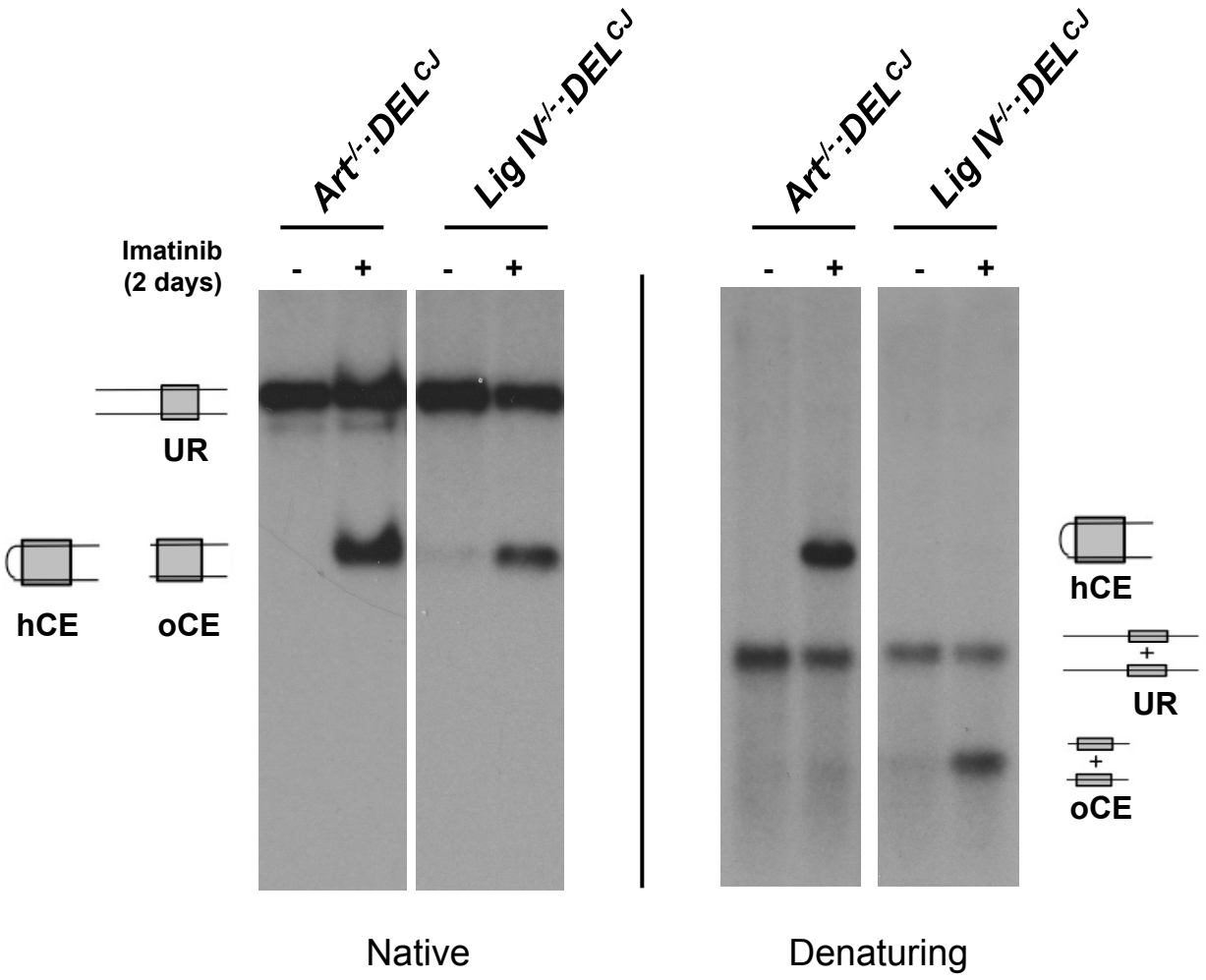


**Figure S3:** Native and denaturing Southern blot analysis of pMX-DEL$^{CJ}$ coding ends that are either open in DNA LigaseIV-deficient abl pre-B cells (*LigIV$^{-/-}$:DEL$^{CJ}$*) or hairpin sealed in Artemis-deficient abl pre-B cells (*Art$^{-/-}$:DEL$^{CJ}$*). The genomic DNA from abl pre-B cells treated with Imatinib (+) or vehicle alone (-) was digested with *EcoRV* and probed with the C4b probe (Fig. 1a) after fractionating under native or denaturing gel conditions. The expected size bands for the un-rearranged pMX-DEL$^{CJ}$ substrate and hairpin sealed pMX-DEL$^{CJ}$ coding ends that are either open (oCE) or hairpin sealed (hCE) are shown. Note that the hairpin sealed coding ends migrate at the same molecular weight under native and denaturing conditions whereas the open coding ends migrate at a lighter molecular weight under denaturing conditions due to dissociation of the two DNA strands forming single DNA strands.

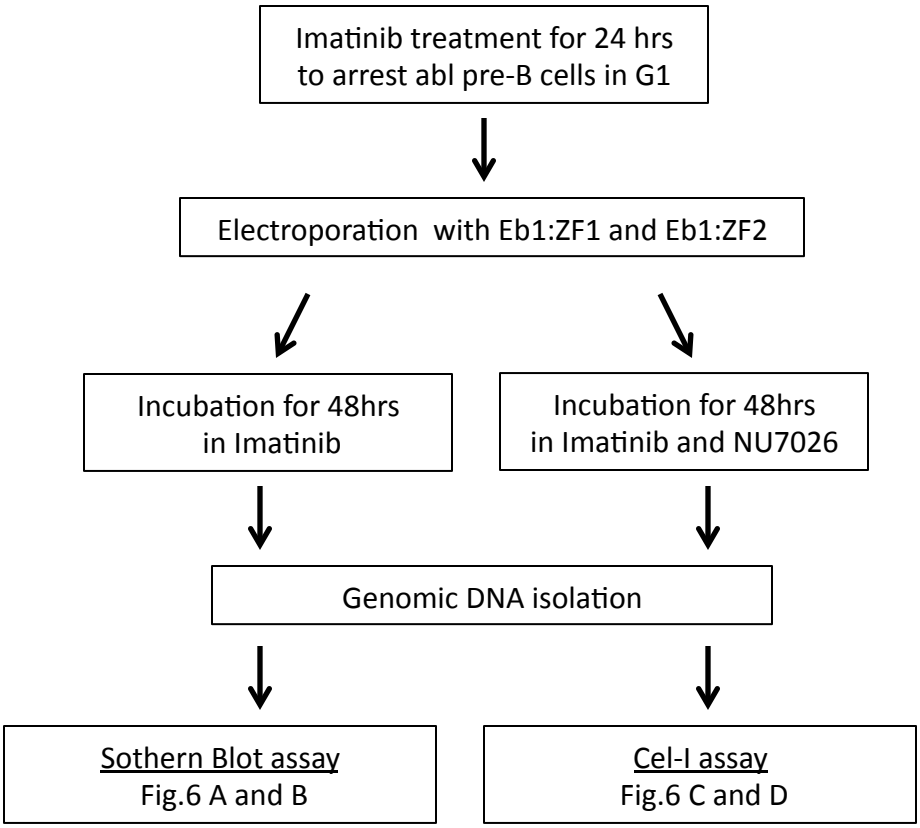


**Figure S4:** Schematic of approach to generate and analyze DNA DSBs generated by the ZFN at the Tcrb locus.