with any tank car, the risk of puncture to a DOT-113 tank car increases with speed and the conditions in the derailment environment.

If in a rail accident only the outer tank is breached, the history of how these cars behave indicates that the outer tank breach will result in the loss of insulating vacuum between the inner and outer tank. This will cause a higher rate of heat transfer to the inner tank from the ambient air and result in LNG vaporization causing a buildup of pressure. The resulting pressure build could eventually lead to the activation of the pressure relief systems on the car and the controlled venting of LNG vapor. While this scenario is concerning, the controlled venting of LNG vapor is minor in comparison to the uncontrolled release of an entire LNG lading as liquid, if the inner tank is punctured below the liquid-vapor interface level. Additionally, in the event the inner tank was damaged and releasing LNG, it is highly unlikely that the derailment would result in an explosion. This is because, if the liquid is released into the annular space between the inner and outer tanks (assuming the outer tank is punctured but not torn apart entirely), the rapid evaporation of the liquid coming in contact with the warm outer tank results in very large volume vapor production; this vapor whose concentration is nearly 100% will occupy the entire annular space and spill over to the outside. Because of its high concentration it will not burn inside the annular confined space, even if there was an ignition source nearby. Therefore, there is no explosion possibility in this type of release. In the case the liquid is released directly to the outside of the outer tank and spills on the ground and evaporates producing a vapor cloud, as we have described before any ignition of this vapor cloud in the open results in only a flash fire and possibly a pool fie, if liquid still pooled on the ground. In this scenario also, there is no likelihood of an explosion.

A boiling liquid expanding vapor explosion (BLEVE)[10] is unlikely to occur from a LNG tank car after derailment, when the inner tank is not punctured and it is exposed to an external pool fire, and the following conditions exist:

(1) The outer tank is intact or has suffered a puncture hole, the pressure relief valves (RPVs) are not damaged and perform as designed.
(2) The insulation on the inner tank is substantially undamaged (at least, in the vapor wetted wall area), the PRVs work as designed but the outer tank is damaged substantially.

No test data or mathematical models exist to predict whether and when a LNG tank car exposed to an external fire would undergo a BLEVE.

The BLEVE event is also highly unlikely due to the mandated requirements for redundant pressure relief systems (valves and safety vents) that are built into each car. In addition, this proposed special permit would require a 15 psig maximum loading pressure when LNG is offered

[10] A BLEVE is not caused by a combustion explosion of a flammable material. As the name implies, it is the explosion caused by rapidly evolving vapor in relatively small space which leads to significant increase in pressure which may violently damage/destroy a damaged or weakened container. When a damaged or weakened container with a liquid in it is exposed to a fire or other heat sources and insufficient pressure relief, the liquid within it can be heated and cause an increase in the tank's internal pressure. If this increase in pressure causes the tank to fail (due to, say, wall metal failure), the rapid depressurization that results leads to an extremely rapid boiling of the liquid, and release of a significant mass of vapor, in microseconds to milliseconds, into the container. This results in very high pressures inside the container leading to its burst, causing an "explosion" (an explosion is the release of energy in an extremely short duration of time).