1. OLI-2 on Landsat-9 will have up to 25% higher Signal-to-Noise than Landsat-8 OLI at typical radiances ($L_{typ}$) by virtue of retaining all 14 bits versus 12 for OLI.
2. The stray light correction for TIRS on Landsat-8 has successfully reduced the calibration error to near the performance of previous Landsat thermal bands. Stray light correction for Landsat-9 TIRS-2 has been modeled, designed and implemented.
3. In preparation for full spectral testing of the Landsat-9 OLI-2 with Goddard Laser for Absolute Measurement of Radiance (GLAMR), a OLI focal plane module was tested with GLAMR at GSFC.
References:

Technical Description of Images:
Figure 1. Predictions of the Landsat-9 OLI-2 Signal to Noise Ratio performance versus Landsat-8 OLI; Inherently the two instruments have comparable performance; transmitting two additional bits to the ground on Landsat-9 increases performance significantly in many bands at low radiance levels. (Ball Aerospace graph from Mission Preliminary Design Review)

Figure 2. The Landsat-8 TIRS Vicarious Calibration Results after stray light correction (collection-1 processing). After stray light correction as implemented in the operational Landsat Product Generation System, comparison of production data to ground measurements indicated some small biases still remaining (should be correctable) and RMSE error comparable to previous Landsat thermal bands, a significant improvement over the pre stray light correction results. Initial results and predictions indicate that the Landsat-9 TIRS-2 will have significantly improved stray light performance.

Figure 3. The GLAMR integrating sphere fed by lasers provides monochromatic light for the spectral testing of an OLI Focal Plane Module at GSFC. GLAMR will be used for instrument level testing of the OLI-2 spectral bands (all bands, all detectors) compared to the ~10% of detectors tested with a monochromator-based system for the OLI on Landsat-8.

Scientific significance, societal relevance and relationship to Decadal Survey:
The radiometric performance of the Landsat-8 OLI instrument has opened up new applications, particularly in water quality due to its improved signal-to-noise performance; Landsat-9 OLI-2 will enhance this performance at low signal levels typical for water bodies. The Landsat-8 TIRS performance was significantly limited for surface temperature retrieval due to its stray light; the implemented algorithm now provides data comparable data to Landsat-7 and earlier sensors. The improved spectral characterization of OLI-2 will also assist in retrievals of water parameters, accounting for the spectral variation across the focal plane.