July 14, 2020, Rev. 2

NTSB Questions DR 130:

- Explanation for all outliers identified during the above unity plot review of the 2011 hard spot ILI run data (my guess is that this is already included along with the unity plots, as it's standard to analyze outliers immediately after comparing data sets in a unity plot).

Response:

- Excavation hardness tests were performed with a Microdur Ultrasonic Contact Impedance (UCI) portable hardness tester and a Telebrineller portable hardness tester for confirmation of selected readings. A grid pattern was established, centered at each ILI reported hard spot feature. The surface was prepared, and hardness tests were conducted within the grid for hard spot confirmation. The reported readings represent the maximum hardness detected at each hard spot location. Hard spots associated with the Lincoln County Incident site have been added, and metallurgical laboratory hardness values reported.

- WC 244877.9 (2011 Reported ILI 355 HB, Excavation 160 HB) – This appeared to be a false positive and is in the conservative area outside of the vendor tolerance (+/- 50 HB) band. The pipeline was excavated, coating removed, and feature location examined for the hard spot. Hardness testing detected a maximum hardness of 160 HB. Region and field personnel verified that the correct joint was assessed by correlation of ILI data with above ground marker (AGM) and physical reference points.

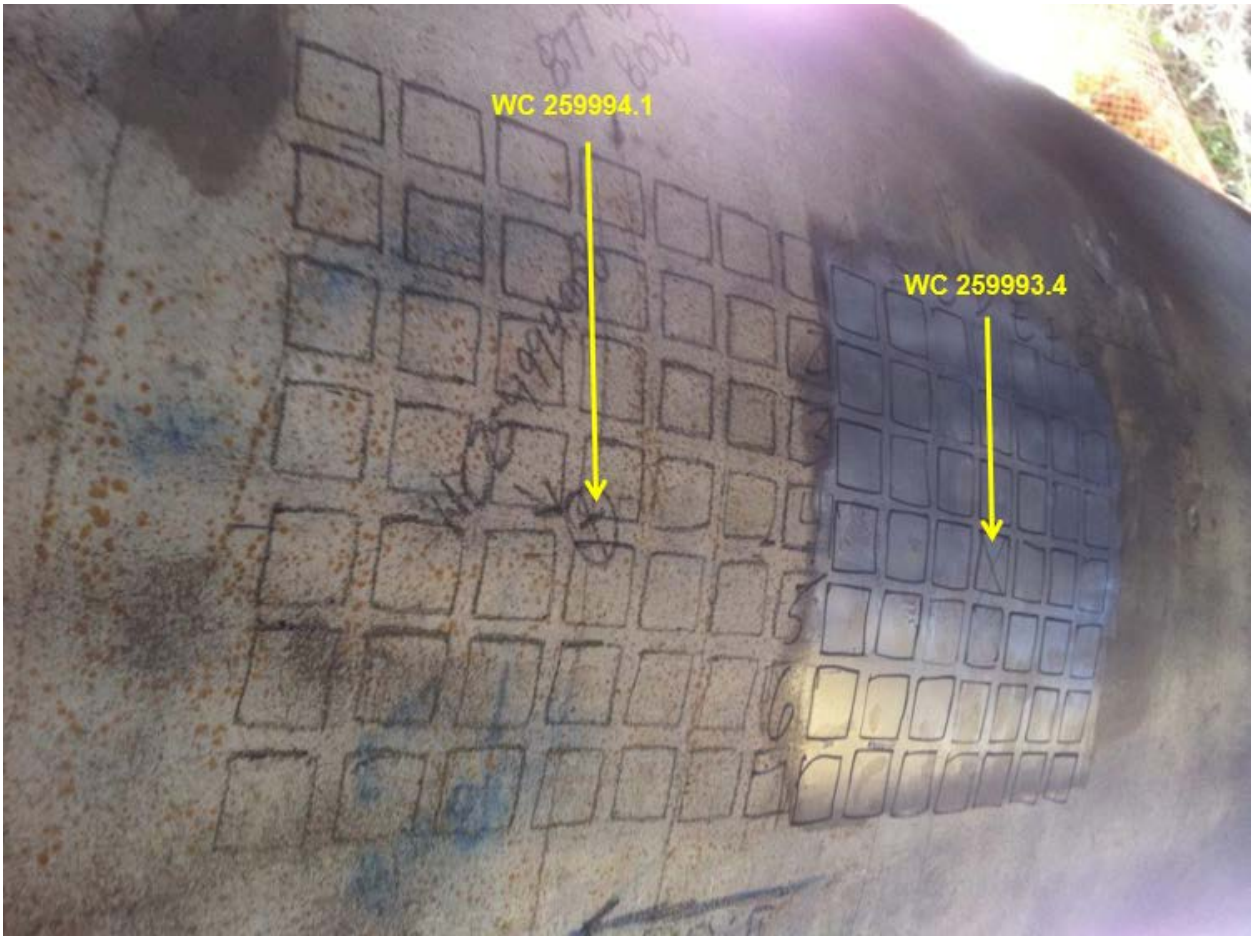
- WC 259994.1 (2011 Reported ILI 261 HB, Excavation 306 HB) – The hard spot at WC 259994.1 was approximately 7" from the ILI reported hard spot at WC 259993.4. See image below. The maximum hardness measured at the excavation for WC 259994.1 was 306 HB, and the maximum hardness for WC 259993.4 was 277 HB as shown in the Table below. The excavation measured hardness at WC 259994.1 (277 HB) was in the non-conservative region, but within the tolerance (+/- 50 HB) of the ILI tool. The field hardness for WC 259994.1 closely matched the estimated hardness for WC 259993.4. Similarly, the excavation measured hardness at WC 259993.4 (277 HB) closely aligned with the ILI estimated hardness (261 HB) for WC 259994.1. Both hard spots were repaired with a Type-B sleeve with welded ends.

  WC 376895.508 and WC 376895.842 (ILI Data Re-Assessment Reported in 2019 after the incident - ILI 245 and 241 Brinell respectively, NTSB Metallurgical Testing – 381 HB) – The two ILI reported hard spots were physically near each other and within one hard spot. The maximum hardness measured at the lab was 381 HB.

Line Segment	Wheel Count	ILI Data (Brinell)	Excavation Data Hardness (Brinell)
TOMP-DANV LN 15	210039.700	293	240
TOMP-DANV LN 15	244877.893	355	200
TOMP-DANV LN 15	259993.442	311	277
TOMP-DANV LN 15	259994.080	261	306
TOMP-DANV LN 15	376895.508	245	381

Line Segment	Wheel Count	ILI Data (Brinell)	Excavation Data Hardness (Brinell)
TOMP-DANV LN 15	376895.842	241	381
TOMP-DANV LN 15	376895.967	236	0

* Data from NTSB metallurgical lab testing of incident samples.



Hard spot test grid for ILI excavation at WC 259994.1 (pre-polish) and WC 259993.4 (post-polish).