

LEGISLATIVE COUNCIL Question On Notice

Tuesday, 23 August 2016

4315. Hon Robin Chappie to the Minister for Planning representing the Minister for Environment

I refer to a question without notice No. 711, asked on 17 August 2016, and responses to parts (5) to (7), and I ask:

- (a) why are the ΔE colour changes of >2 perceptible to the human eye;
- (b) is it correct that some of the changes recorded in the table are greater than ten times the change that is perceptible to the eye;
- (c) do these results suggest that the integrity of the rock art has changed rapidly since 2004;
- (d) have the L^* , a^* and b^* results been analysed statistically to show whether the changes from 2004 are significant and whether the trend is in the same direction;
- (e) what has been the colour change from 2004 to 2014 at each engraving and each background spot measured;
- (f) are there significant differences in colour change from 2004 and 2014 between engravings and background rock;
- (g) if a comprehensive statistical analysis of the trends between 2004 to 2014 in L^* , a^* and b^* has not been conducted, why not; and
- (h) if the colour changes between 2004 and 2014 are significant, what will the Government do to reduce the impact and degradation of the rock art?

Answer

The Minister for Environment has provided the following response.

- (a) The CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014* report notes that the difference between two colours measured instrumentally is ΔE (delta E) and that a delta E value of zero represents an exact match.

CSIRO has advised that changes in delta E over two are 'just perceptible' to the naked eye. The value of a delta E of 2 is based on experimental tests mainly in the dentistry domain. The human eye is more sensitive to certain colours than others. The intensity of the solar light in real rather than controlled laboratory conditions can affect perception.

- (b) CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014 Report* (page 28) states that the change for Site 7 Spot 1 Engraving between 2004 and 2005 was 23.71.
- (c) The conclusion of CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014* report on page 92 is that a robust statistical analysis of the Analytical Spectral Device spectra was conducted for the second time and that none of the engravings or background showed systematic change through time.
- (d) CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014* report (page vii) includes analysis of variance between the control

(Northern Sites) and sample (Southern Sites) L*, a*, b* average measurements to determine whether there is a statistically significant difference between the groups.

Neither the control or sample sites show a consistent trend in an increasing or decreasing direction. There is a stable degree of colour difference between engravings and background.

- (e) Figures 16 to 25 inclusive of CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014* report (pages 42-49) show the colour differences from 2004 to 2014 between engraving and background for each spot examined. Monitoring of the Yara-Pilbara sites, shown on Figures 23 to 25, commenced in 2013.

[See Tabled Paper No. #].

- (f) Page 62 of CSIRO's *Burrup Peninsula Aboriginal Petroglyphs: Colour Change and Spectral Mineralogy 2004-2014* report states that site averaged colour change values at the southern sample sites were not consistently different to those at the northern control sites, with most sites displaying relatively stable colour differences, and any slight changes being comparable between the Southern and Northern sites.
- (g) CSIRO advises that the colour and mineralogical long term rock art monitoring program is the first of its kind, and the methodology and technology are constantly being reviewed and improved. CSIRO has advised that the 2004 to 2015 report will include a statistical analysis of the trends between 2004 to 2015 in L*, a* and b*.
- (h) Not applicable.

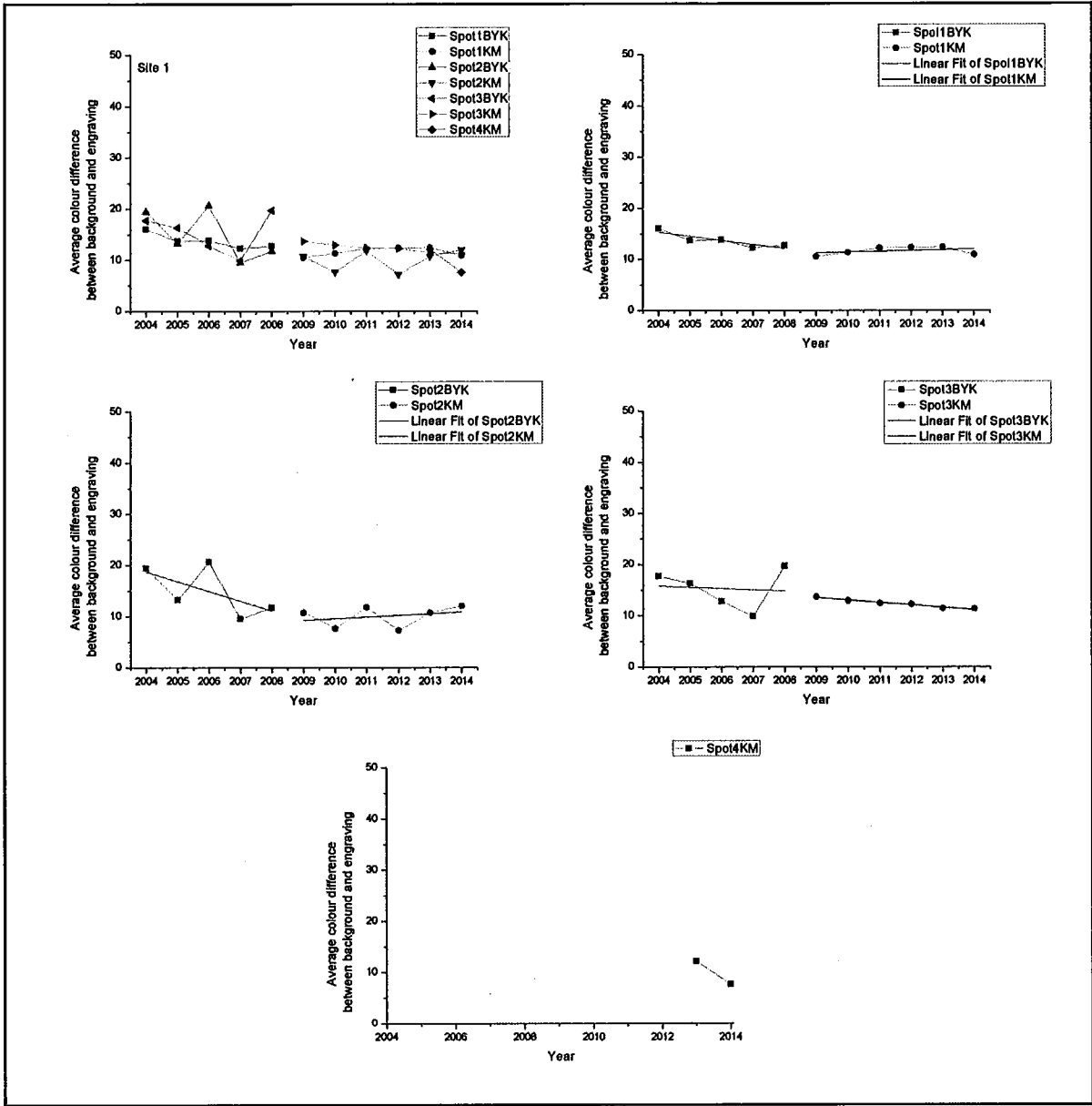


Figure 16: Colour differences between engraving and background for each spot examined at Site 1 – Dolphin Island.

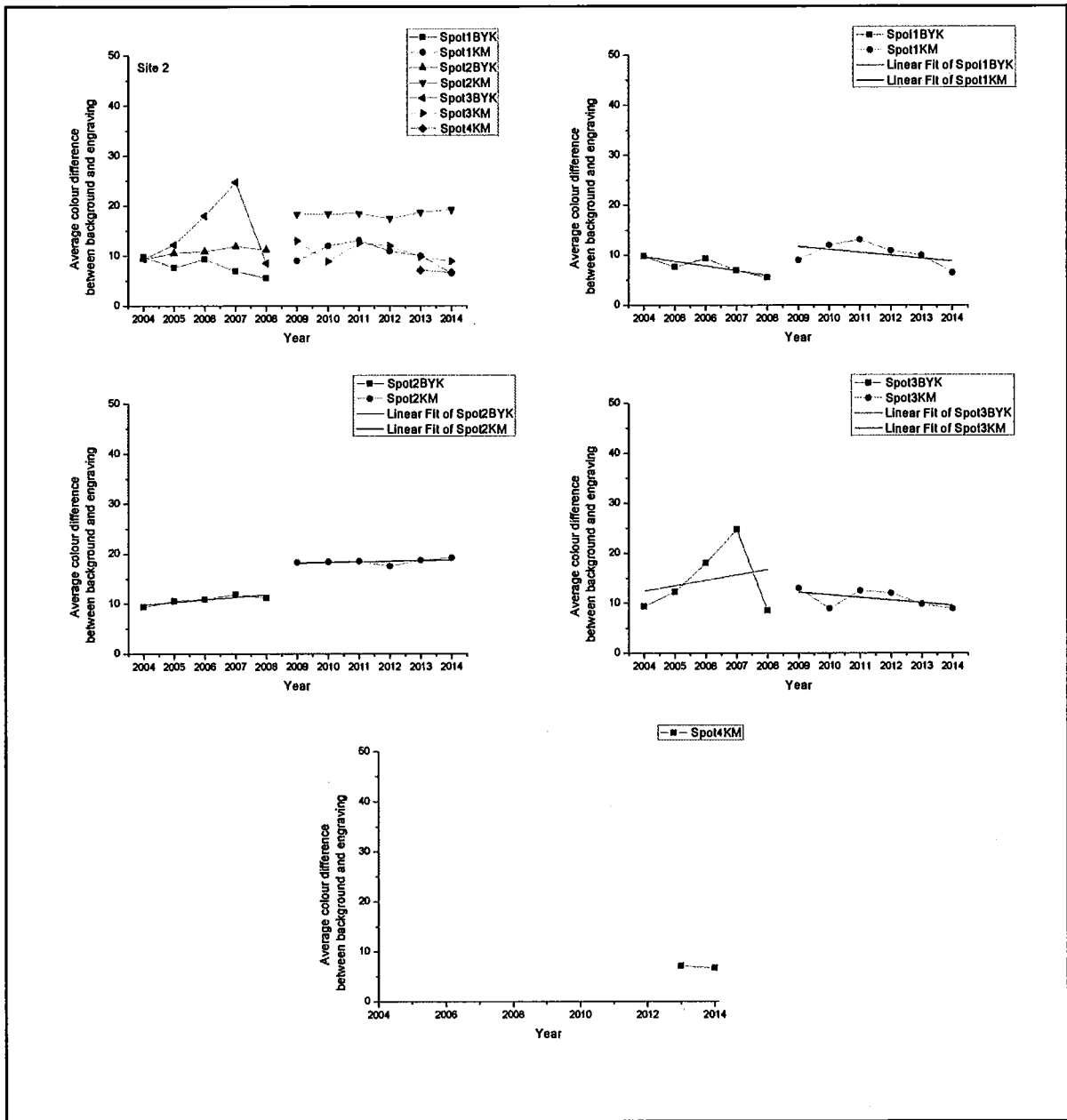


Figure 17: Colour differences between engraving and background for each spot examined at Site 2 – Gidley Island.

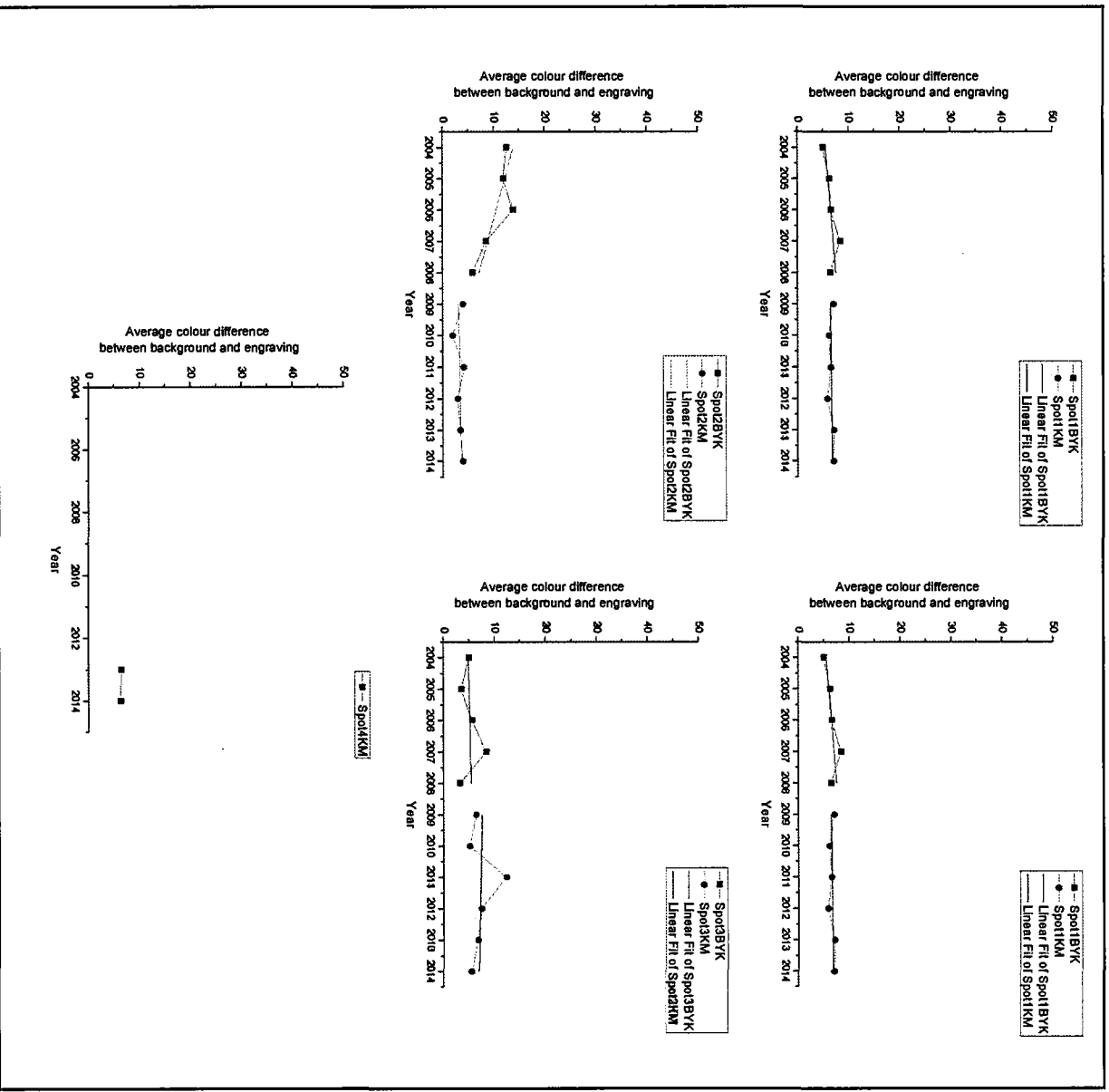


Figure 18: Colour differences between engraving and background for each spot examined at Site 4 – Woodside.

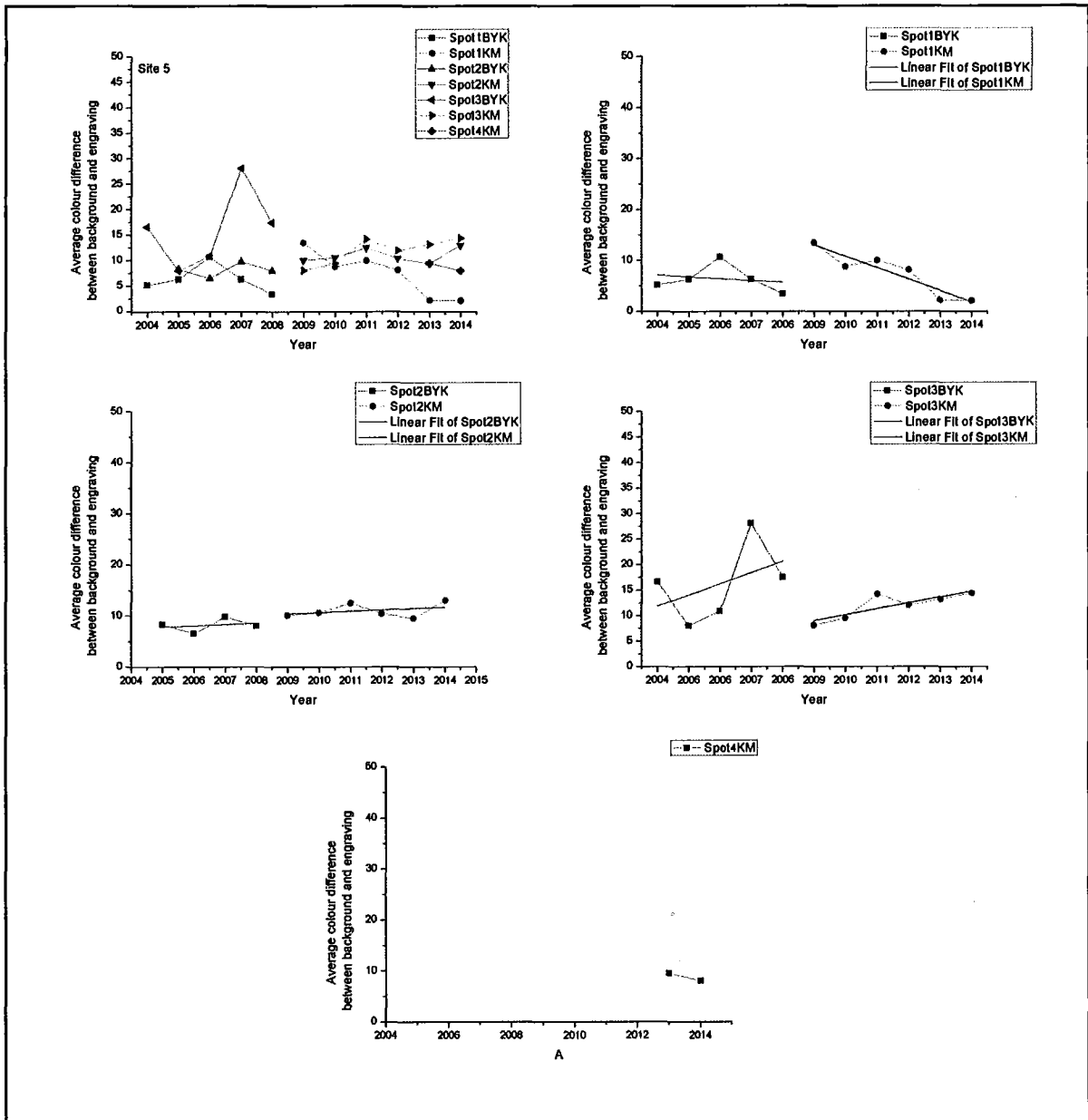


Figure 19: Colour differences between engraving and background for each spot examined at Site 5 – Burrup Road.
 Note: Site 5 spot 3 is believed to exhibit high variance in single years due to irregular measurements.

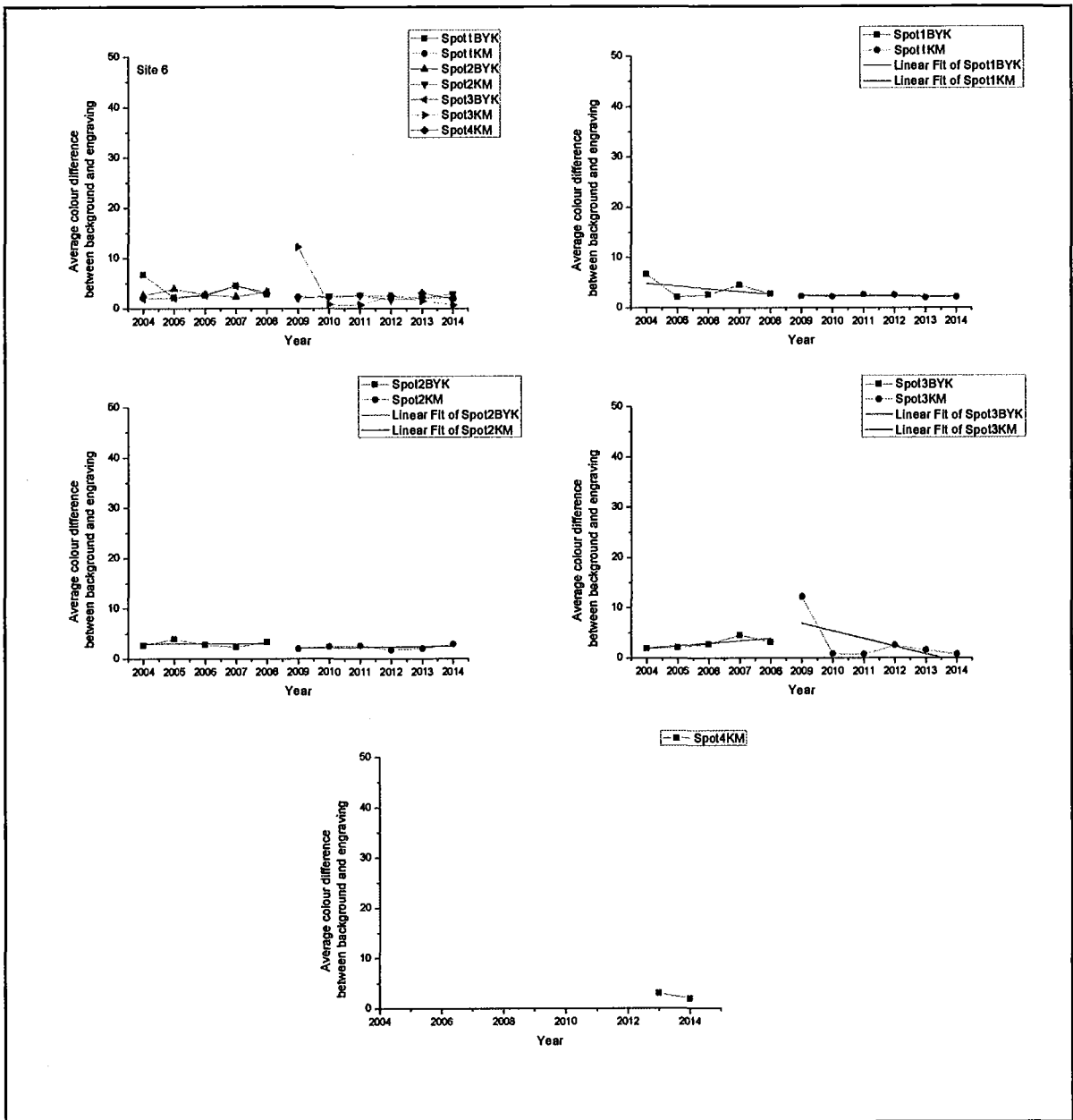


Figure 20: Colour differences between engraving and background for each spot examined at Site 6 – Water Tanks.

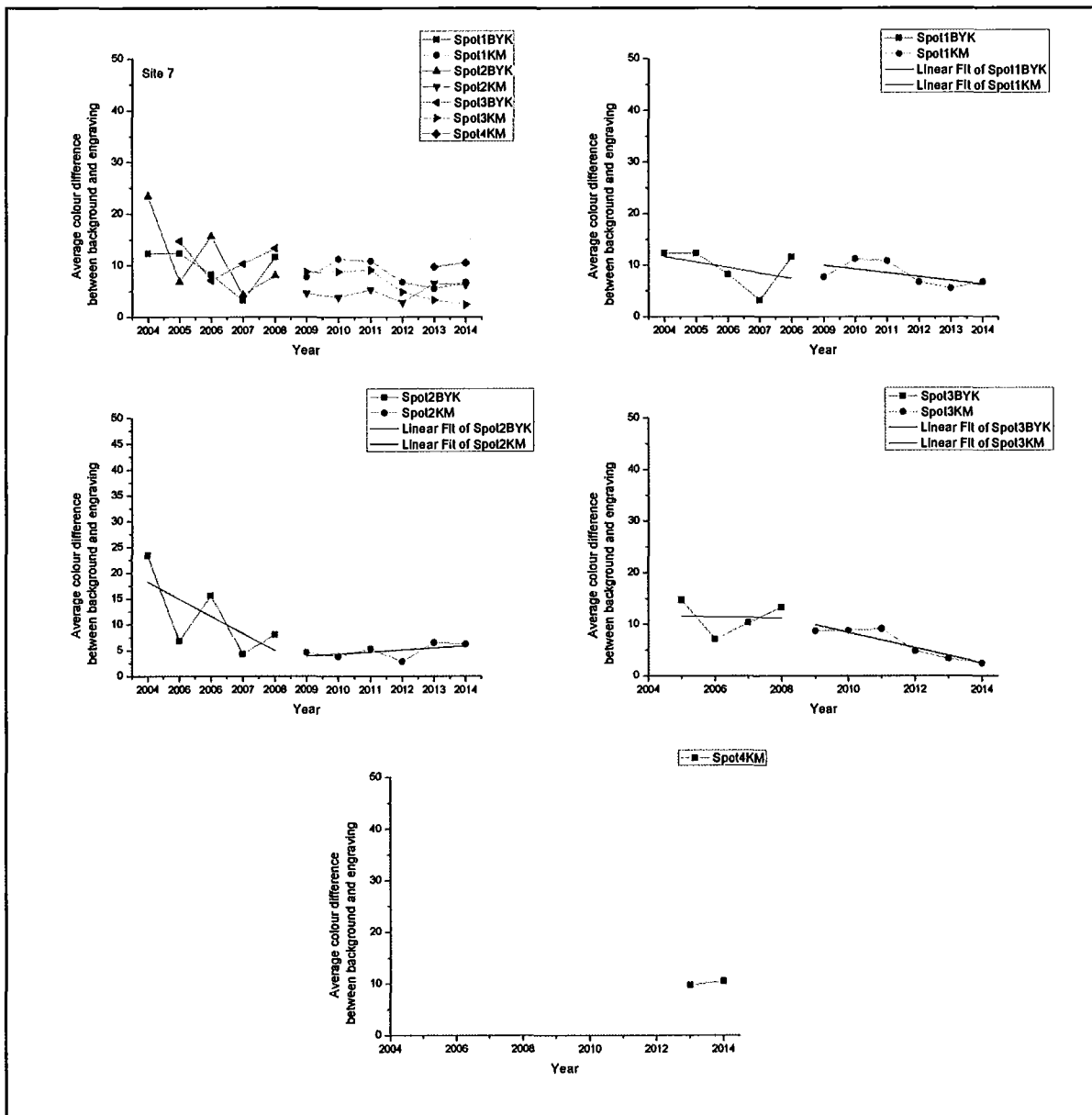


Figure 21: Colour differences between engraving and background for each spot examined at Site 7 – Deep Gorge.
 Note: Site 7 spot 2 is believed to exhibit high variance in single years due to irregular measurements.

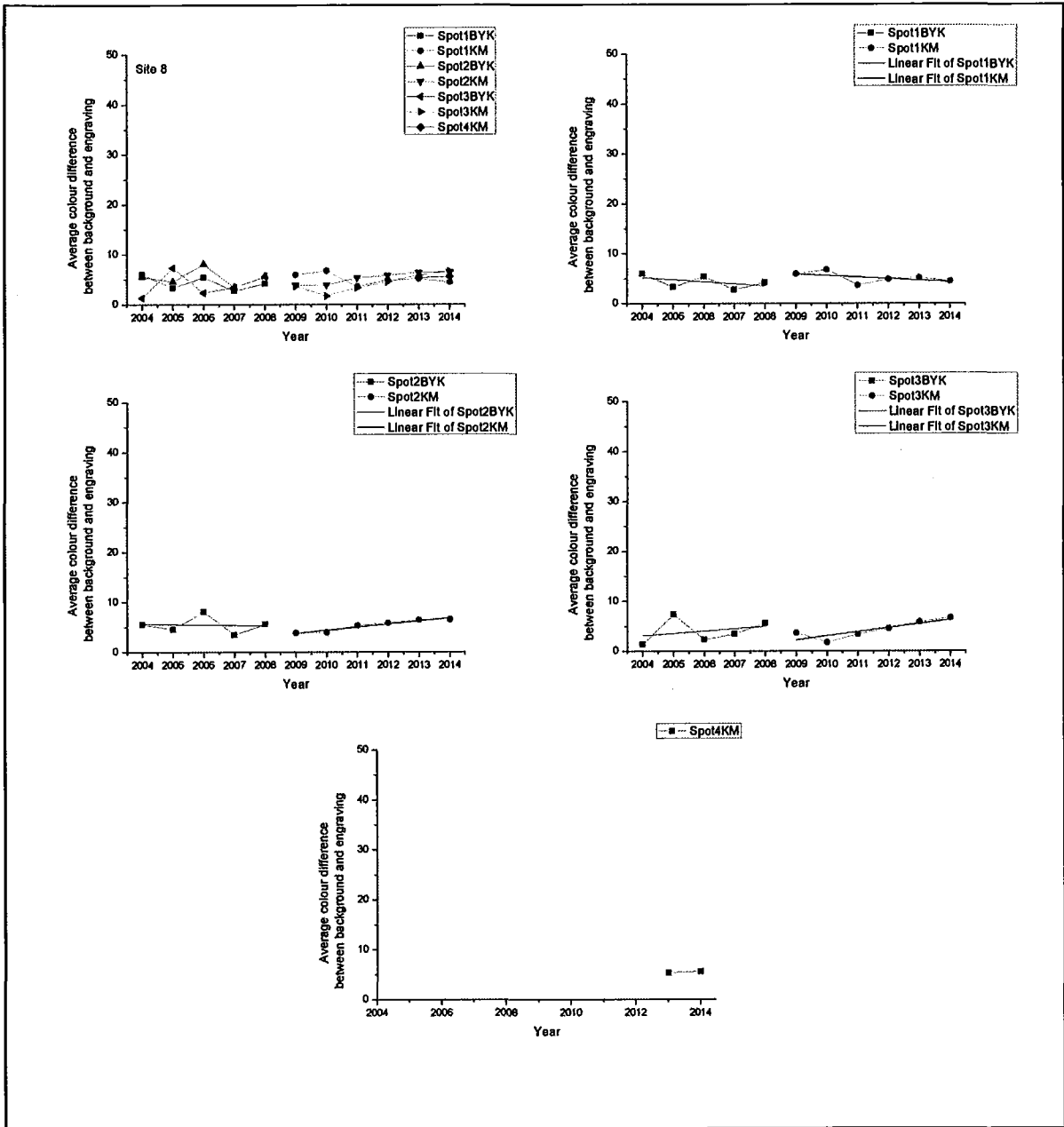


Figure 22: Colour differences between engraving and background for each spot examined at Site 8 – King Bay South.

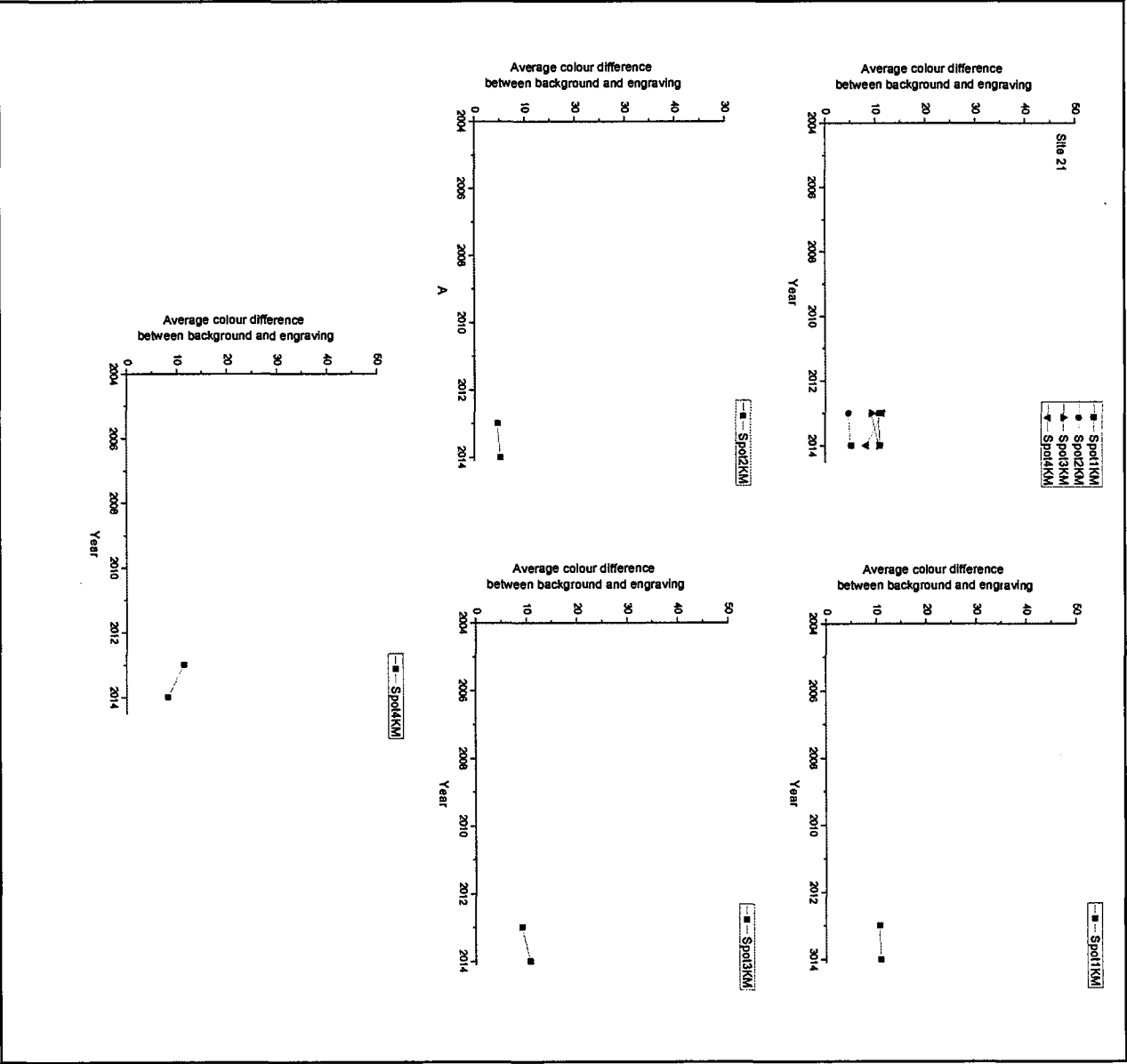


Figure 23: Colour differences between engraving and background for each spot examined at Site 21 – Yara West.

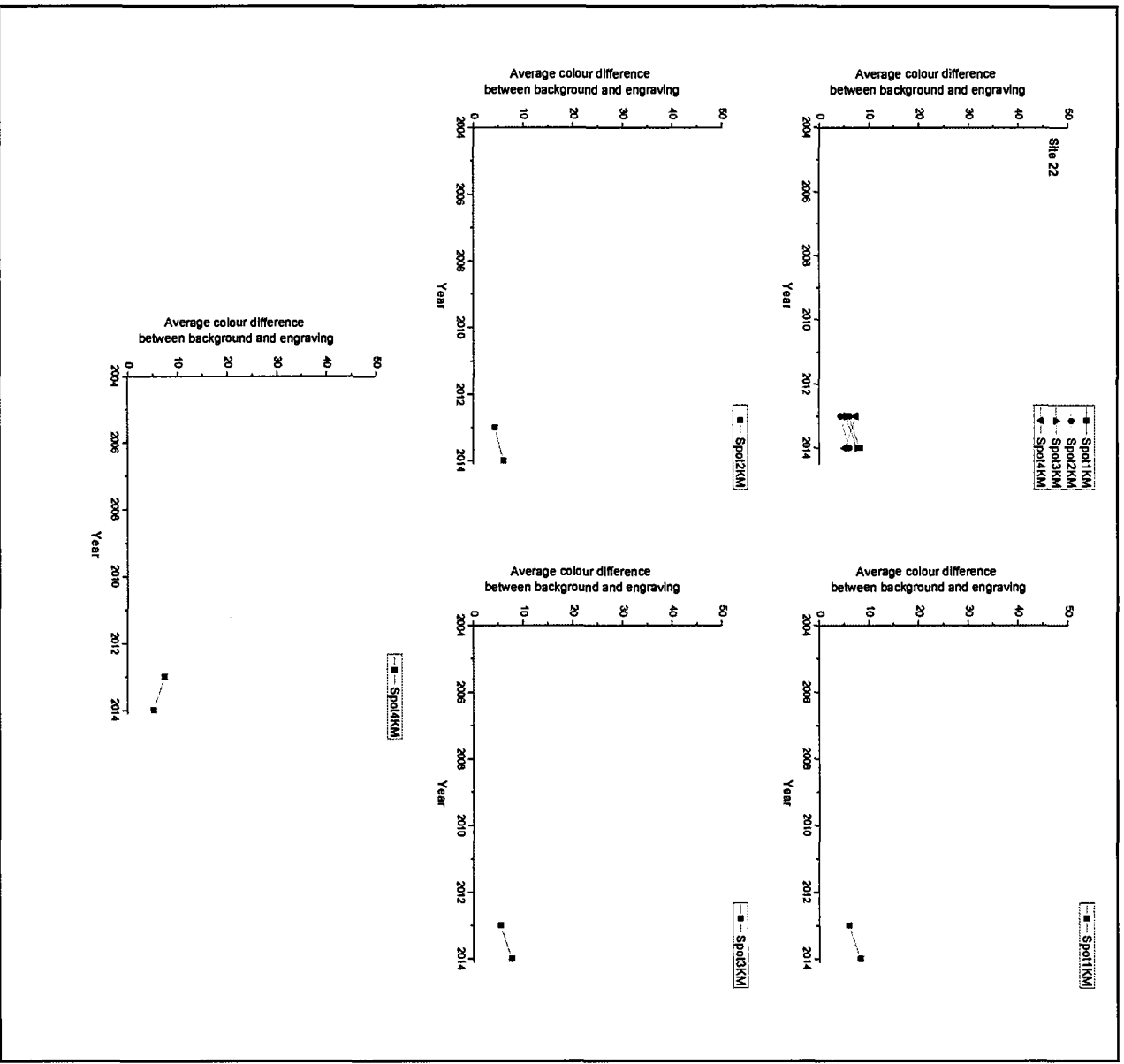


Figure 24: Colour differences between engraving and background for each spot examined at Site 22 – Yara North East.

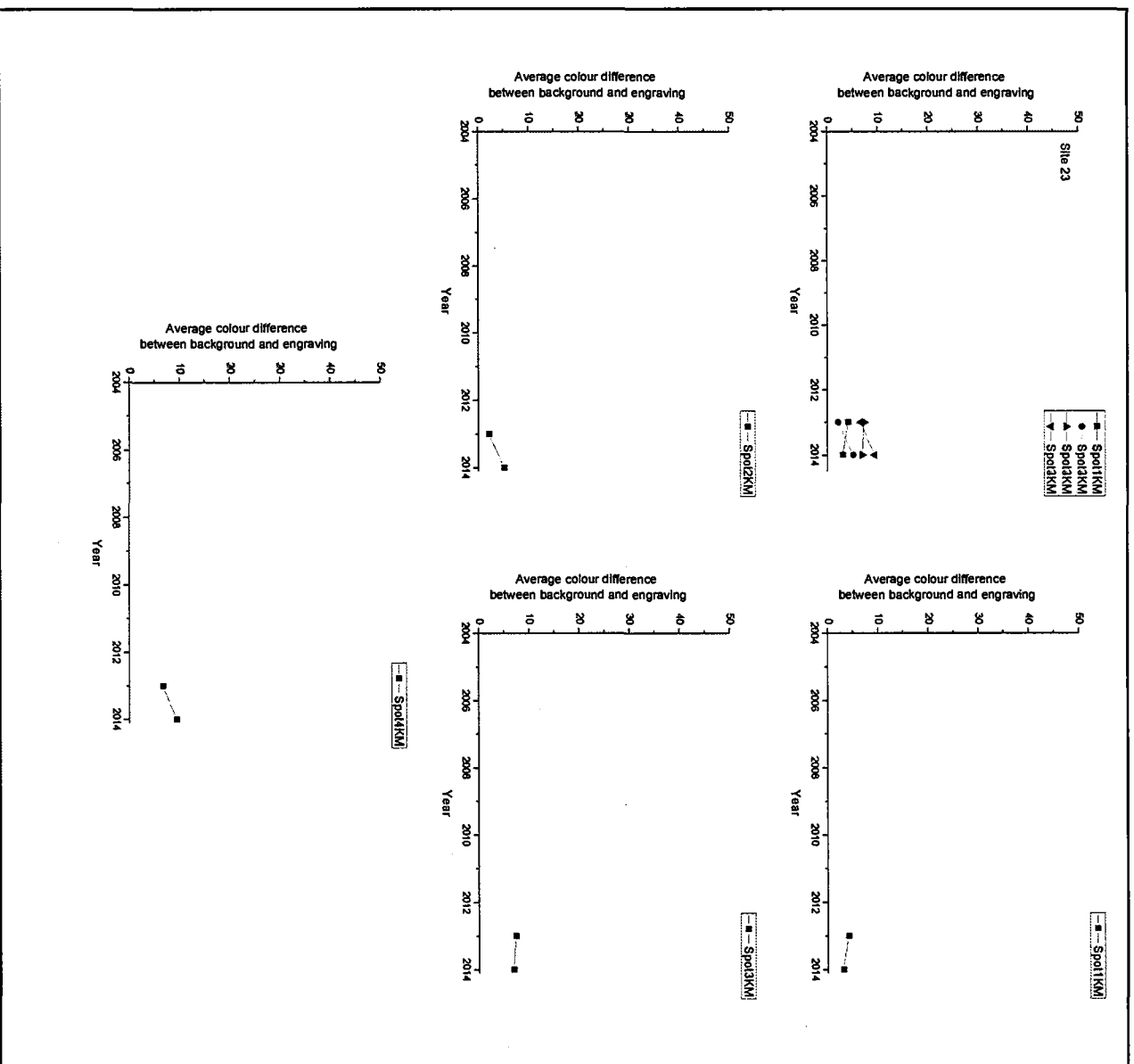


Figure 25: Colour differences between engraving and background for each spot examined at Site 23 – Vara East.