The Salí River Basin in north-west Argentina (7,000 km2) is composed of a sequence of Tertiary and Quaternary loess deposits, which have been substantially reworked by fluvial and aeolian processes. As with other areas of the Chaco-Pampean Plain, groundwater in the basin suffers a range of chemical quality problems, including arsenic (concentrations in the range of 12.2–1,660 μg L−1), fluoride (50–8,740 μg L−1), boron (34.0–9,550 μg L−1), vanadium (30.7–300 μg L−1) and uranium (0.03–125 μg L−1). Shallow groundwater (depths up to 15 m) has particularly high concentrations of these elements. Exceedances above WHO (2011) guideline values are 100% for As, 35% for B, 21% for U and 17% for F. Concentrations in deep (>200 m) and artesian groundwater in the basin are also often high, though less extreme than at shallow depths. The waters are oxidizing, with often high bicarbonate concentrations (50.0–1,260 mg L−1) and pH (6.28–9.24). The ultimate sources of these trace elements are the volcanic components of the loess deposits, although sorption reactions involving secondary Al and Fe oxides also regulate the distribution and mobility of trace elements in the aquifers. In addition, concentrations of chromium lie in range of 79.4–232 μg L−1 in shallow groundwater, 129–250 μg L−1 in deep groundwater and 110–218 μg L−1 in artesian groundwater. All exceed the WHO guideline value of 50 μg L−1. Their origin is likely to be predominantly geogenic, present as chromate in the ambient oxic and alkaline aquifer conditions.