



CASE STUDY

Electronic Board Recycling with ICP-MS and ICP-OES: Smart, Sustainable – and Successful

By almost any measure, Camston Wrather is much more than a waste disposal company. In fact, the company has created what it calls the “the world’s most carbon-friendly and advanced engineering process for the recycling and recovery of sustainable resources,” mainly from printed circuit boards. By doing so, Camston Wrather not only contributes to environmental sustainability, but also supplies valuable metals for future electronics products.

Camston Wrather has partnered with PerkinElmer for the ICP-MS and ICP-OES analysis of electronic boards, which has been instrumental in helping the company overcome their lab challenges and advancing their mission of sustainable electronic-board recycling. Through collaboration and state-of-the-art technology, they’re working toward a more environmentally friendly and circular future for the electronics industry.

“At Camston Wrather, our mission in the recycling of electronic waste-containing printed circuit boards encompasses multiple objectives to address environmental concerns and foster sustainable practices,” says Danny Kwok, Camston Wrather’s director of metallurgy. *“Our commitment lies in keeping electronic waste out of landfills, mitigating the harmful impact on the environment. And we aim to provide a more environmentally friendly process for liberating precious metals and minerals from PCBs.”* This sustainable approach contributes to resource conservation and reduces the environmental footprint associated with traditional incineration methods.

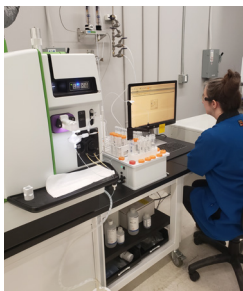
Utilizing their domestic processing facility, Camston Wrather strives to keep reclaimed precious metals and minerals within the United States, too, fostering economic sustainability and reducing reliance on international sources. In line with their commitment to environmental stewardship, the company offers an alternative to traditional extraction methods. And through their advanced particle separation technique, Camston Wrather achieves their sustainability goals without the need for heat, pressure, or chemicals.

This proprietary process is remarkably efficient: their processes have been checked by Verra, a nonprofit manager of the world’s leading voluntary carbon markets program, and proven to be less carbon intensive compared to conventional alternatives. *“Our multifaceted mission revolves around responsible electronic waste management, resource conservation, economic sustainability, and environmentally conscious practices,”* Kwok says, *“This ultimately contributes to a greener and more sustainable future.”*

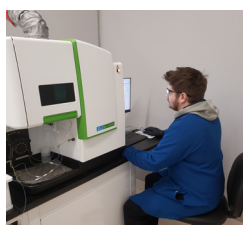
The Power of Partnership

That ambitious agenda presents some real challenges for frontline scientists in the lab, including sample heterogeneity, complex matrices, highly concentrated samples (primarily aluminum, copper, and iron), and variable concentrations of analytes of interest in these and other samples.

And for help with meeting those challenges and more, they're turning to PerkinElmer.



"PerkinElmer is providing fantastic support by assisting with method development employing the NexION 1000 ICP-MS and Avio 220 Max ICP-OES," says geochemist Sarah Van Deventer. *"The NexION 1000 ICP-MS has been optimized with help from our FAS for precious metals analysis, in particular for gold. We work closely with PerkinElmer to adjust the AMS gas flow, helium KED, and RPa values to achieve high-quality data while minimizing concentrated samples from overloading the cones and detector. The NexION 1000 requires minimal maintenance beyond routine weekly cleaning, which allows us to preserve high throughput."*



Senior lab technician Brandon Jonas agrees, adding that the Avio® 220 Max ICP-OES supplements the NexION® 1000 ICP-MS system by providing robust analysis of weight-percent-level analytes, high throughput, and minimal maintenance beyond the routine introduction-system cleanings. *"The Avio 220 Max has also served as a backup for the NexION ICP-MS and provides excellent quantification of our PGMs, down to ppb levels. Another plus is its physical size – the small footprint is perfect for our limited lab space."*

The Proof Is in the PPBs

The introduction of the Avio 220 Max ICP-OES system to Camston Wrather's processes has increased the NexION 1000 ICP-MS throughput by 28%. According to lab technician Andy Nguyen, *"The utilization of both instruments facilitates fast turnaround times – from 12 to 24 hours for high-priority samples – while for routine samples it's three business days. Plus, the Syngistix instrumentation software also cooperates well with our LIMS database, and that reduces reporting time by about 20% versus using Excel workbooks alone."*

So what's Camston Wrather's long-term goals? And how does PerkinElmer fit in?



"We're hoping to expand our operations on a global scale and produce metals in house to put directly back into the supply chain, creating a truly circular solution," says Danny Kwok. *"We've been using PerkinElmer instrumentation for over eight years and have always been satisfied with the ease of use of the instruments and their high quality, plus the top-of-the-line support provided by their technical support help line and field staff. I see this partnership as instrumental to reaching our goals."*

Danny Kwok



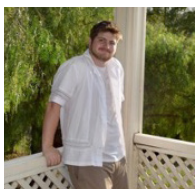
Danny Kwok has a BA/BSc in mining and mineral processing engineering from the University of British Columbia and has more than 18 years of professional experience in operating and managing commercial mineral processing, hydrometallurgical, and analytical laboratories. He was a key member in the commissioning of two laboratories, where he provided technical services to various PEA, prefeasibility, and feasibility studies for international mining companies. Danny's experience extends beyond the laboratory environment, having conducted numerous mill audits for mining operations in Canada, USA, Peru, Brazil, and Burkina Faso.

Sarah Van Deventer



Sarah Van Deventer graduated in 2015 with a BSc in geology with an emphasis in geochemistry, from the University of Oklahoma. She has more than eight years' experience in the environmental and oil and gas industries, focusing on inorganic chemistry and method development. As a chemist at Camston Wrather, she supports the laboratory team with robust analyses and a focus on throughput.

Brandon Jonas



Brandon Jonas is a senior lab technician at Camston Wrather. He attended San Diego Miramar College to receive associate degrees in chemistry and biology before transferring to UC Santa Barbara and receiving a BS in chemistry. Since graduating, he has worked in PCB production and the semiconductor industry, focusing on inorganic metal analysis.

Andy Nguyen



Andy Nguyen is a lab technician at Camston Wrather. He graduated from UC San Diego with a BS in chemical engineering.
