A sensitive high flow sampling system for measuring methane emission rates.

We have developed a highly-accurate sampling system to measure methane leaks from oil and gas equipment over many orders of magnitude. Quantification of known leaks (emissions sources) from oil and gas infrastructure are useful for many reasons, including a more accurate emissions inventory for air quality impacts and tightening up losses to increase revenues.   High flow samplers have been in use for decades and are an approved method by EPA (CFR Title 40, part 98, Subpart W (98.233).  Commercial high flow systems do not distinguish between organics and methane and may be biased (Howard et al., 2015). For our system, we first detect a leak with an infrared camera.  Next, we seal conductive ducting around the leak and pull leaking gas with some ambient air through a 4.25” diameter stainless steel pipe containing a Fox Model FT3 mass flow meter, which measures total sample flow.  We use a Los Gatos Research Greenhouse Gas Analyzer to measure the methane concentration in the sample flow and calculate emission rates as the methane concentration (subtracting ambient methane) multiplied by the flow rate.  We have used our custom high flow system to measure more than 500 leaking components at compressor stations and natural gas wells, and have measured methane emission rates from 6g/sec (1200 scfh) down to  8e-7 g/sec (0.00016 scfh).   We collected these measurements across a variety of equipment components including compressor engines, pneumatics, flanges, large well valves, as well as smaller components that are often leak points.