# THE DAY EDMONTON WENT DARK

On August 17, 2018 Edmonton had the worst air quality in the world. You read it right, among thousands of urban areas in 85 countries around the world with a population of more than 250,000 people, Edmonton had the worst air quality.

*Hazy conditions cast a strange hue over downtown Edmonton Wednesday morning. (Terry Reith/CBC).*
*Original article: https://www.cbc.ca/news/canada/edmonton/edmonton-air-quality-smoke-1.4792507*

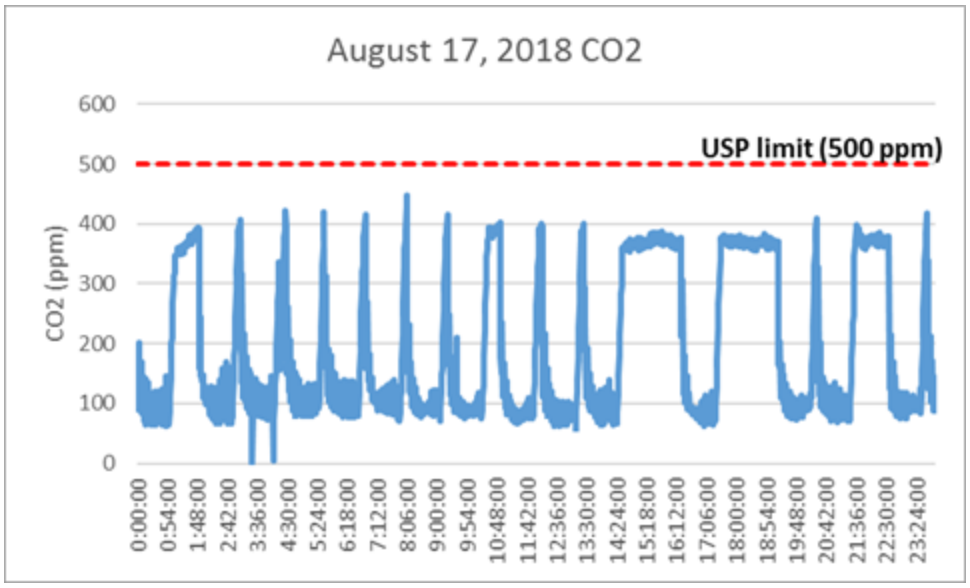
The poor outdoor air quality was not limited with just one day or one city. That day crowned weeks of smoky air in Edmonton due to the forest fires in BC and the USA. Prince George had even worse air quality than Edmonton but it was excluded from the rating as its population is below 250,000 people.

When the outdoor air is bad, Health Authorities recommend limiting your exposure to it, especially if you suffer from a respiratory disease. Fine particulate matter (PM 2.5) gets most attention followed by gaseous pollutants. Most Canadian hospitals make the medical air they treat patients with, and although a CSA compliant and well maintained medical air system will do a great job filtering fine particles, it does little to remove or even monitor gaseous chemical contaminants associated with smoke, namely carbon monoxide (CO) and carbon dioxide($CO_2$).

So what happened with CO and $CO_2$ in medical air during the week long stretch of bad quality air in Edmonton? At least one hospital reported multiple CO alarms (ie CO level greater than the USP limit of

10 ppm). After reaching CO levels of 16 ppm the facility decided to suspend production of medical air and used Medical Oxygen as an alternative in order to protect patients.

At another site - the only hospital in Edmonton equipped with Air Liquide Healthcare's revolutionary P3C (Patient Protect Purge Control) dryer - the dryer worked overtime and purged virtually every hour to prevent excessive levels of $CO_2$ from being delivered to patients. Here is how it looked on that day:




The P3C dryer was developed in Canada by Air Liquide Healthcare specifically to address the $CO_2$ catch and release effect common to all desiccant air dryers. In addition to forcing a tower purge on measured humidity, the P3C dryer also measures $CO_2$ and forces a purge before it surpasses the USP formula limit of 500 ppm.

This $CO_2$ catch and release by desiccant dryer effect is well documented and more information can be found in these articles and video:

https://www.airliquidehealthcare.ca/onsite-production-medical-air-purity-problem

https://www.cjrt.ca/wp-content/uploads/CJRT_2018_5402.pdf

https://youtu.be/LLQv0DQvShU

Information on various adverse health effects of elevated $CO_2$ levels are available from many sources, for example:

https://www.eiga.eu/index.php?eID=dumpFile&t=f&f=3282&token=fe8e3399018ad935dd2c8600f03a43e1e587dab3

But what about the main active ingredient in medical air - oxygen? Could the sudden releases of $CO_2$ impact oxygen content at bedside by displacing it from the air? Theoretically, this is quite possible. Typical desiccants used in medical air dryers could potentially capture and release up to 28.5 liters of $CO_2$ per kg. So a dryer containing 8 kg of desiccant (typical for a large hospital), could produce a $CO_2$ bolus that lasts 45.6 seconds at 5 lpm patient flow.

What does this all mean for Facility Managers? Here are some best practices:

1. Air Liquide Healthcare recommends including onsite production of medical air within every facility's Code Grey (Air Exclusion code for hospitals in Alberta) preparedness plan.
2. To ensure accuracy calibrate your Medical Air system chemical sensors (such as CO) after every alarm or prolonged exposure to the element they measure. The CO sensors at both hospitals mentioned above exhibited minor exposure drift and were calibrated by Air Liquide Healthcare technical services.
3. Have a procedure to restart the medical air system after a quality related shut down. The procedure should include means to ensure that quality (ie off spec) condition has normalized.
4. Consider installing/calibrating oxygen monitors on equipment that uses wall Medical Air such as NICU isolettes.
5. Complete a Medical Air Quality Risk Analysis as required by CSA Z7396.1-2017 and decide on what, if any, additional Quality Control measures, such as aerALin™ real time Medical Air Quality Control system or P3C dryer, is required.

The Medical Air Risk Analysis template is available from our website at: www.aeralin.com

And here is our contact information if this article or any of our solutions peaked your curiosity: https://www.airliquidehealthcare.ca/about/find-a-rep

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During his time with Air Liquide Healthcare, Alex oversaw high-profile medical gas projects such as the Surrey Memorial Hospital Critical Care Tower, Penticton Regional Hospital Patient Care Tower, and the Lions Gate Hospital Acute Care Facility.

His background in physics and role regularly involves him in launches of new innovations such as the Monnal T60 medical ventilator and our exclusive Kinox gas.

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Sheldon has been in the medical gas industry since 1991, specializing in medical and lab gas source and piping systems for the past 17 years.
He has sold, serviced and assisted consultants with medical and lab gas systems design for countless projects throughout western Canada.
Reach out to Sheldon and he will be happy to help you with your medical and lab gas system requirements.