

**Analox & Safety Gear Store** have partnered up to promote gas safety for CO<sub>2</sub> (carbon dioxide) users.



**CO<sub>2</sub> is heavier than air** and cannot be detected by human senses, but in high concentrations, it can prove fatal. It is used in numerous applications from putting the fizz into drinks as well as creating dry ice...



**The Birmingham Royal Ballet theatre** production of **Swan Lake** has recently purchased some **Analox Ax60+ CO<sub>2</sub>** analyzers from **Safety Gear Store**, helping to protect dancers from the effects of dry ice during the show. The team have been monitoring CO<sub>2</sub> levels to ensure their dancers are safe and shared their findings with us.



## CO<sub>2</sub> data from the misty depths of Swan Lake

The **Ax60+ monitor** (shown above) was used in two regular positions in consultation with our dancers, orchestra and stage management as well as senior management and health and safety manager.

### These were:

- 1. At 'knee' height,** (1m above the stage floor) on stage to represent a Dancer's head level. This is while the Swans are ducked under the layer of dry ice we create and is shown in the photo below. This is the part of the show when we use the highest levels of Cardice Pellets to create a blanket of dry ice to hide the Swans - usually the big 'oooh' moment in the show!
- 2. Down in the orchestra pit** under the stage level at the height of an orchestra member's head so 1.2m off the Pit floor. This was to see how the CO<sub>2</sub> sinks down into the sub stage area and affects orchestral players specifically.

A base level control reading was taken at each performance or rehearsal day and then an actual show level reading. We often pull back during rehearsals for two reasons:

1. So that new dancers become accustomed to the affect as per our resident advisor.
2. To save money once a cast is familiar with the effect.

We took upwards of 50,000ppm (5%) as our red light level of respiratory danger and around 800ppm to 1000ppm as the normal base level.

We found breathing directly onto the sensor could show levels of upwards of 28,000ppm as another handy benchmark. To be clear we advised all Swans before commencing that



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they were to always take a deep breath before ducking under the ice and if they felt at all uneasy to simply stand up to be clear of it. This was not necessary at any point and we had no incidents at all over 5 weeks and nearly 40 shows.

Over the course of the shows we found typical levels as follows:

**Orchestra pit:**

1. Normal pre effect in Pit 725ppm to 850ppm.
2. During effect in Pit 10800ppm to 19500ppm.

This indicated to us that the Pit was receiving fairly low levels of concentrate despite the CO<sub>2</sub> ‘sinking’ towards the Pit during the effect period we presumed it dispersed quite rapidly.

### Stage at dancer head level:

1. Normal pre effect on stage again around 750ppm to 850ppm.
2. During effect at knee level on stage 8650ppm to 32200ppm.

As a control and purely out of interest we took a couple of readings at floor level directly in the flow of CO<sub>2</sub> - no dancers or staff lie down with their head at this level so it was only to check what the readings could potentially get to and we saw 42400ppm and one 67500ppm at this zero level. This again proved to us that atmospheric dispersion was considerable during the effect running.



**Analox are honoured** to have supplied their equipment to such an amazing theatre, ensuring the dancers and staff of the world-renowned show, Swan Lake were kept safe.

Analox will continue to work alongside **Safety Gear Store**, reinforcing the message of the dangers of CO<sub>2</sub> and supplying the equipment to keep you safe.

To discuss your CO<sub>2</sub> monitoring requirements **contact the Analox team** or visit our **CO<sub>2</sub> application page** to check out all our CO<sub>2</sub> related products.

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