

Technical Note 04

Measuring phosphine concentrations

Why is it necessary to measure phosphine concentrations?

The effectiveness of fumigation depends on keeping an adequate concentration for the full exposure period. Until a fumigation method has been checked by gas measurement, it is impossible to be sure that the fumigation is being properly carried out. The accepted way of monitoring fumigation is by measurement of gas concentration over time and ensuring that a minimum concentration is maintained through the fumigation period at the weakest point in the system.

What concentration is being measured?

The concentration of phosphine is expressed as weight of phosphine per volume of space (g/m^3) or as the ratio of gas volume to air volume in ppm. The ratio 1g/m^3 is approximately equal to 710 ppm. The dose is calculated in g/m^3 but measured in ppm.

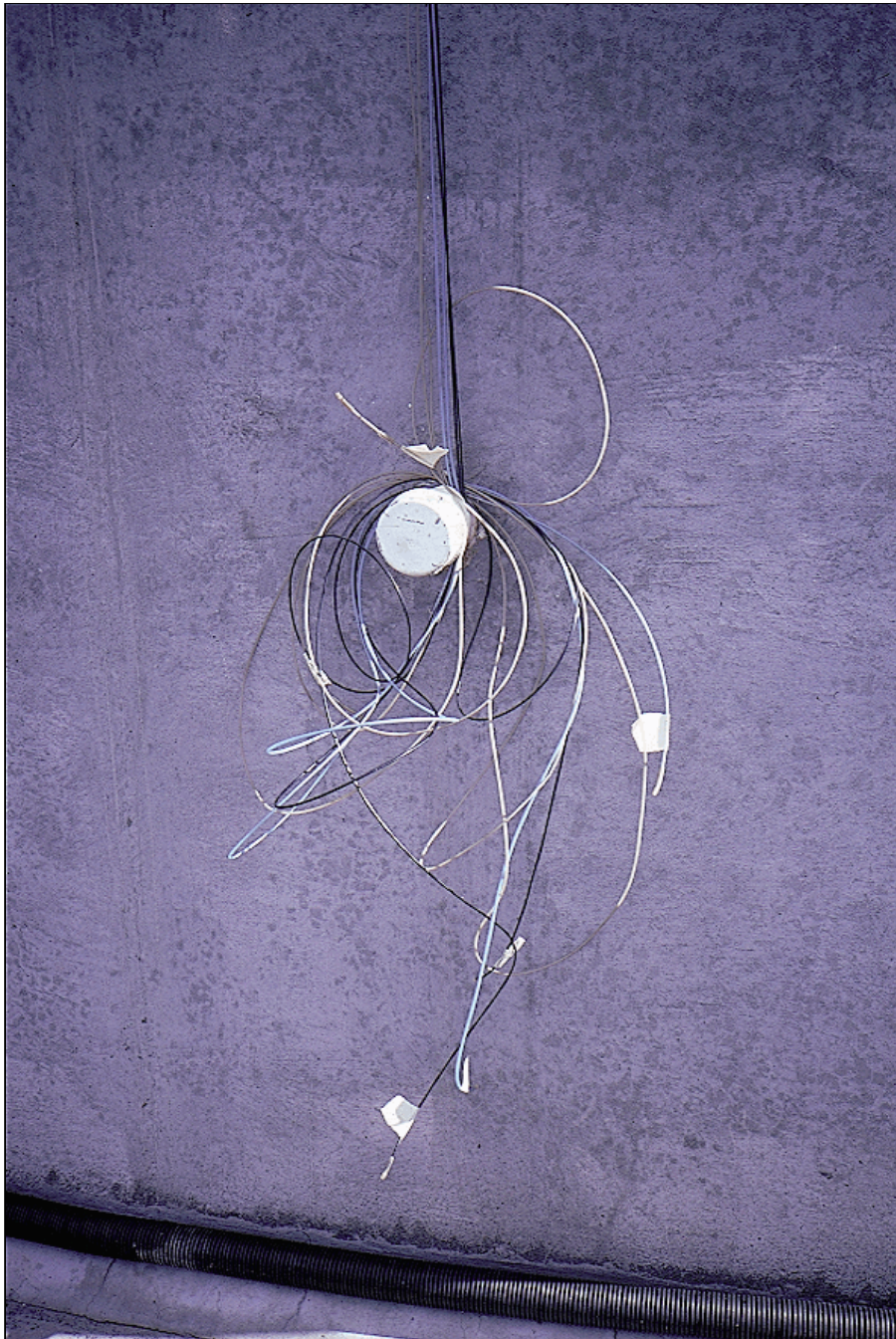
For standard phosphine fumigations, the minimum concentration which must be reached in all parts of the silo is 100 ppm. For SIROFLO it is 40–70 ppm X 15–28 days. A change in the application rate and in the duration of phosphine fumigation may be necessary due to increasing insect resistance to the fumigant.

How can the concentration be measured?

Phosphine can be measured by chemical detector tubes or by meters. The meters are easier to use and allow for repeated readings, whereas each tube is only used once. At about \$1500 upwards, meters are relatively expensive but they should be seen as an essential part of the use of phosphine, especially when installing SIROFLO or SIROCIRC systems.

The equipment required consists of a meter, gas sampling line (2mm i.d. hard nylon tubing) and hand pump (to pump out gas line). Gas lines are set up to sample the atmosphere in the fumigated space. All gas lines are led to a safe location where concentrations are measured.

Photograph: Gas lines attached to a silo



Photograph courtesy of David Webley

What are the instruments available?

Instruments for measuring operating concentrations of phosphine are:

- Silo-Chek phosphine fumigant monitor
- Bedfont EC80 phosphine monitor

The Bedfont meter measures both phosphine and carbon monoxide. It needs a CO interference filter kit.

Details of suppliers and costs are listed in Updates on the bottom menu bar.

Is it necessary to check working space concentrations for personal safety reasons?

It may be useful to check working space concentrations if working with phosphine in cylinders.

Suppliers of instruments for checking workspace concentration are given in the Updates section.

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