

FIELDNOTES West Side industrial district, Chicago



Picking up a stink

Sniffing out a stench

Chemical plants, landfills, oil refineries... foul odours are everywhere. Now we can keep them in check

Christopher Weber

WITH its two waste water treatment plants, a chemical company and a garbage truck depot, Chicago's West Side industrial district is one of the worst smelling places in the city. But foul odours are exactly why I am here; I have come to witness the Nasal Ranger – the instrument of choice for measuring bad smells – in action.

My guide is Lynn Smith of Professional Service Industries, an environmental consultancy firm based in Oakbrook Terrace, Illinois. She relies on the Nasal Ranger to find out whether smells are potent enough to trigger huge fines.

Smith's trusty Nasal Ranger looks a bit like a handheld ray gun, with a twist (see photo). On the

front is a black dial pierced by six holes ranging in size from the width of a pencil lead to a mere pinprick. At the rear is a mask that you place over your nose. The two are connected by a barrel of Teflon, which resists residual odours. Two carbon-based filters are mounted on either side.

A nose for what's nice

Electronic noses, which unlike the Nasal Ranger don't rely on the human nose to detect an odour (see main story), are also able to tell a foul smell from a pleasant scent.

A team led by Rafi Haddad at the Weizmann Institute of Science in Rehovot, Israel, found that an e-nose correctly classified bad odours 90 per cent of the time – even

The Nasal Ranger allows Smith to precisely mix two streams of air before they hit her nose. Pungent ambient air enters through the holes at the front and mingles with odour-free air that enters via the filters. Twisting the dial changes the ratio of foul to filtered air, diluting the stench

when encountering them for the first time. This accuracy persisted when comparing the e-nose to the opinion of people from Israel and Ethiopia, suggesting that it is chemical structure and biological hard-wiring, not cultural preference, which sets the molecules people find offensive (*PLoS Computational Biology*, DOI: 10.1371/journal.pcbi.1000740).

to the edge of detection. The idea is to find out the level you can no longer detect the smell, which is measured in the number of dilutions needed to get there.

We stand across the street from an oil terminal that smells strongly of rot, probably due to a sulphur compound used during

"Some states in the US regulate smell, with hefty fines for companies that emit strong odours"

oil processing. Smith buries her nose in the nasal mask and inhales, drawing a little harder than normal.

The oil terminal registers as a level-30 dilution. Those states in the US that regulate odour allow a dilution level of 7. Any smell measuring higher is considered a "nuisance" and can lead to hefty fines. The Nasal Ranger measures smells up to 60 dilutions – enough to send you reeling if sampled undiluted – and by fitting it with a spare dial it can measure odours detectable at 500 dilutions.

Some companies use the device to collect smell information in a pre-emptive strike before the introduction of regulations, says the Nasal Ranger's inventor, Charles McGinley of St. Croix Sensory, based in Lake Elmo, Minnesota. "They believe that they do not smell that much and want to collect data to show that."

"In the past, to understand the impact of an environmental odour, you would capture the odour in a container, bring it to the laboratory, dilute it successively, present those dilutions to panellists, and have them tell at what point they could detect the odour," says Pamela Dalton of the Monell Chemical Senses Center in Philadelphia, who uses the Nasal Ranger to monitor the smells emitted by hog farms. "The Nasal Ranger allows you to do that in real time in the field." ■