A background of deep red, vertically pleated theater curtains with a scalloped valance at the top. The lighting is dramatic, with the center being brighter and the edges darker.

PRESENTING
A
MASTERPIECE
Classic



AMBIENT ODOUR ASSESSMENT



A Drama in Four Episodes



**AMBIENT ODOUR
ASSESSMENT**



Presented by

Michael Rix

ZORIX Environmental



**AMBIENT ODOUR
ASSESSMENT**



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**York Region
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GREAT EXPECTATIONS



“Blessed is he who expects nothing, for he shall never be disappointed.”

Alexander Pope



Duffin Creek Water Pollution Control Plant



Pickering

Ajax

WPCP

2 km radius

Lake Ontario

Why an ambient odour assessment?

What were the requirements and expectations from stakeholders?

What were our expectations as odour assessment specialists?

2007 Pre-Expansion Ambient Odour Assessment

Part A

Short-term intensive program

- 3 sessions per day at 8-hour intervals over 3 days, including one weekend day
- purpose - to gather baseline data with respect to diurnal and geographic variations in odour
- Identify other methodological concerns before commencing Part B

Part B

Long-term program

- 16 weeks, one session per week
- The parameters were based on the general approach developed in conjunction with the MOE, and refined based on the results of the short-term ambient study

2007 Ambient Monitoring Parameters Measured/Recorded

- Date
- Time
- Coordinates
- Receptor Group No.

Location Details

- Temperature
- Precipitation
- Cloud cover
- Wind speed and direction (from plant)
- Observed wind speed and direction

Weather Information

- Wastewater flow
- Biosolids dewatering throughput
- Maintenance or abnormal operations

Plant Conditions

- Strength
- Permanence
- Hedonic tone
- Description
- Nasal Ranger

Observed Odour

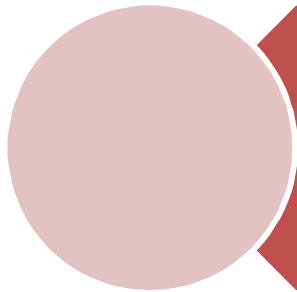
- If odours detected
- From "control" location
- Field "blanks"
- H₂S "spiked" samples

Odour Sample Collection

- H₂S (Jerome analyser)

Other Measurements

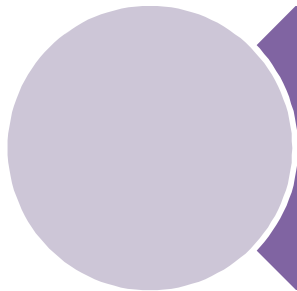
2007 Ambient Odour Sample Collection



Sample (Tedlar bag) to be collected when odour was detected



Odour panel to evaluate odour unit value, hedonic tone, character



Additional samples

- At "control" location
- Activated carbon filtered air "blank"
- AC filtered plus H₂S spike

2007 Ambient Monitoring Results

Collected Odour Samples

| Sample Location | Minimum (OU/m ³) | Geometric Mean (OU/m ³) | Maximum (OU/m ³) |
|-----------------------------------|------------------------------|-------------------------------------|------------------------------|
| Downwind of WPCP | < 11 | 19.8 | 53 |
| Upwind of WPCP & Control Location | < 11 | 21.4 | 86 |

Difference between upwind and downwind was not statistically significant

Many samples had significant odour levels, though no odour was apparent in the field; QA/QC samples were OK

Subjective field observations indicated presence of WPCP odours downwind, particularly close to plant fenceline

2010 Ambient Odour Assessment

Number, Frequency and Scheduling of Sessions

- 2 surveys per week for 14 weeks (mornings)
- July to September
- Reflect summer conditions (20°C +)

Receptor Groups

- 3 additional receptors added at MOE request
- Each receptor group sampled at least twice during program

Additional Changes from 2007

- 2 observers in the field
- Sample upwind, and downwind, even if no odour apparent

2010 Ambient Monitoring Parameters Measured/Recorded

- Date
- Time
- Coordinates
- Receptor Group No.
- Receptor ID

Location Details

- Temperature
- Precipitation
- Cloud cover
- Wind speed and direction
(from plant)
- Observed wind speed and
direction

Weather Information

- Wastewater flow
- Biosolids dewatering
throughput
- Maintenance or abnormal
operations

Plant Conditions

- Strength
- Permanence
- Hedonic tone
- Description
- Nasal Ranger

Observed Odour

- Whether odours detected
or not
- Upwind and downwind of
WPCP
- From "control" location
- Field "blanks"
- H₂S "spiked" samples

Odour Sample Collection

- H₂S (Jerome analyser)

Other Measurements



HARD TIMES



“It was the best of times, it was the worst of times... it was the epoch of belief, it was the epoch of incredulity...”

Charles Dickens

2010 Ambient Monitoring Results

Collected Odour Samples

| Sample Location | Minimum (OU/m ³) | Geometric Mean (OU/m ³) | Maximum (OU/m ³) |
|-----------------------------------|------------------------------|-------------------------------------|------------------------------|
| Downwind of WPCP | < 11 | 28.3 | 91 |
| Upwind of WPCP & Control Location | < 11 | 29.1 | 181 |

Difference between upwind and downwind was not statistically significant

Many samples had significant odour levels, though no odour was apparent in the field; QA/QC samples were OK

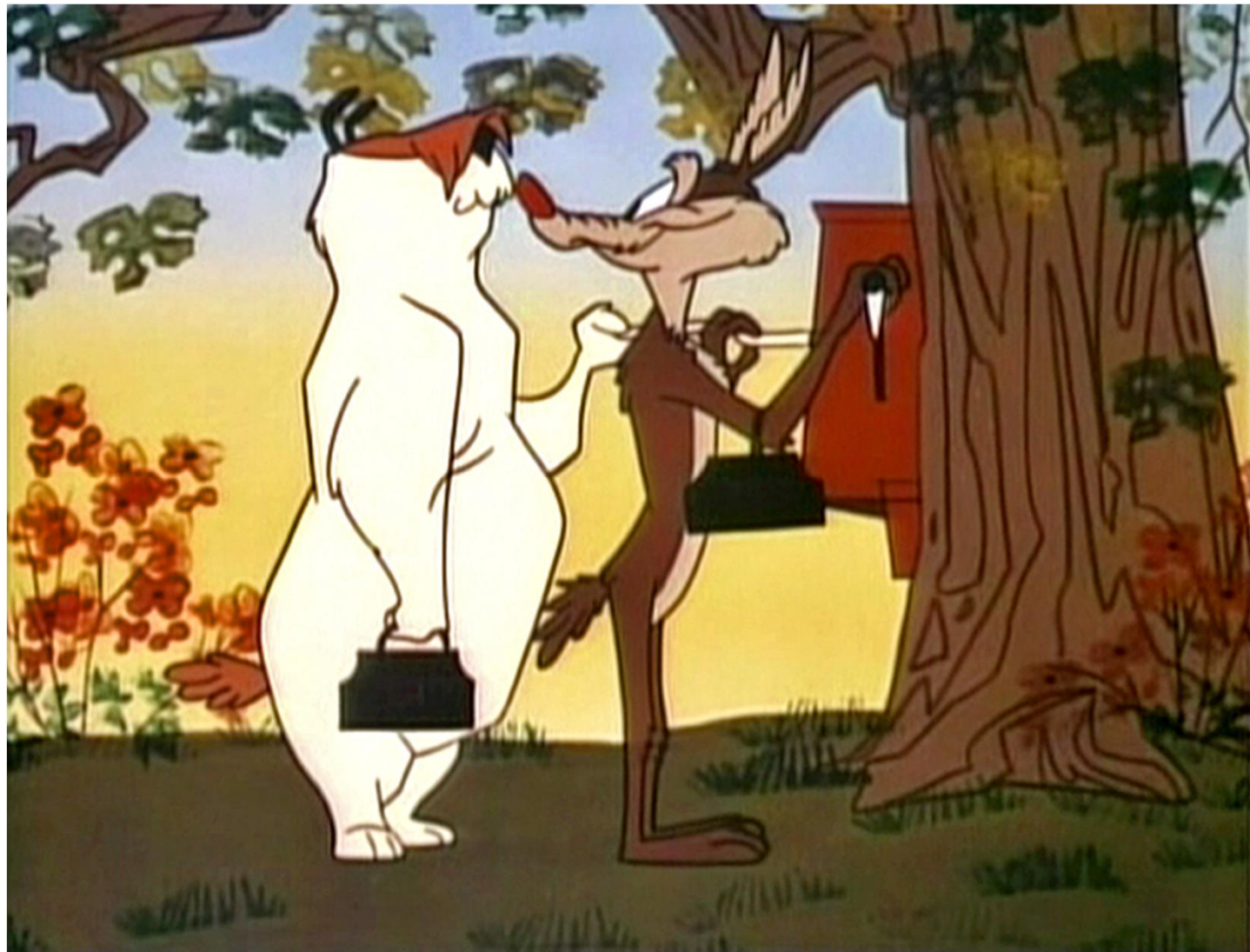
Subjective field observations indicated presence of WPCP odours downwind, particularly close to plant fenceline



UPSTAIRS, DOWNSTAIRS



On roles, responsibilities - and consensus?



2011 Ambient Odour Assessment

Enhanced program resulting from meetings with stakeholders.

Number, Frequency and Scheduling of Sessions

- 2 surveys per week for 13 weeks
- July to September again

Receptor Groups

- Remove "control" location, other receptors the same as 2010

Additional Requirements for 2011

- Triplicate, simultaneous upwind and downwind samples
- No H₂S spiked samples

Other Improvements

- Wind speed and direction monitoring with real-time field access
- Tablet based data recording
- More rigorous Nasal Ranger use

2011 Ambient Monitoring Parameters Measured/Recorded

- Date
- Time
- Coordinates
- Receptor Group No.
- Receptor ID

Location Details

- Temperature
- Precipitation
- Cloud cover
- Wind speed and direction (real time)
- Observed wind speed and direction

Weather Information

- Wastewater flow
- Biosolids dewatering throughput
- Maintenance or abnormal operations

Plant Conditions

- Strength
- Permanence
- Hedonic tone
- Description
- Nasal Ranger (whether odour detected initially or not)

Observed Odour

- Whether odours detected or not
- Triplicate, simultaneous upwind and downwind of WPCP
- Field "blanks"

Odour Sample Collection

- H₂S (Jerome analyser)

Other Measurements

Ultrasonic Anemometer

Centrally located on site

Located away from obstructions as per MOE ambient monitoring guidance

Real-time data accessible on iPads by trained observers in the field



Ambient Sample Collection





**ALL'S WELL THAT
ENDS WELL**



2011 Ambient Monitoring Results

Collected Odour Samples

| Sample Location | Minimum (OU/m ³) | Geometric Mean (OU/m ³) | Maximum (OU/m ³) |
|------------------|------------------------------|-------------------------------------|------------------------------|
| Downwind of WPCP | < 11 | 23.1 | 86 |
| Upwind of WPCP | < 11 | 18.6 | 63 |

Difference between upwind and downwind was statistically significant

Many samples had significant odour levels, though no odour was apparent in the field, and QC/QC data was OK

Subjective field observations indicated presence of WPCP odours downwind, particularly close to plant fenceline

Lessons Learned

Ambient odour assessments (even more than source odour assessments) are not just about technical issues. Different stakeholders may have very different imperatives or expectations from an ambient odour assessment which need to be considered.

Lessons Learned

The “whole odour” (determined by an odour panel in the lab) of background air in the natural environment may be much greater than the odour typically contributed by industrial or municipal odour sources. Large sample sizes may be needed to see differences between upwind and downwind samples.

Lessons Learned

A variety of odour assessment methodologies and ancillary tools will strengthen and ambient odour assessment program and enhance its credibility.

Lessons Learned

Involvement by odour assessment experts is important in the planning of ambient odour assessments – not only because of what they can contribute technically, but because they need to hear and understand the expectations and requirements of stakeholders.

A close-up view of a stage curtain. The curtain is a deep red color with vertical pleats. The top edge has a scalloped, ruffled border. The lighting is dramatic, with the center of the curtain being brighter than the edges, creating a sense of depth. The text 'THE END' is centered on the curtain in a white, serif font.

THE END