Stack-height Recommendations

Feb. 19, 2008

Stack Height Committee proposed Recommendations

- Stack-heights for new & future Munter's oxidizer units should be 38 meters (15 meters more than existing Durr's stacks)
- Intel should use sound, approved engineering practices to continue reducing emissions at the source, improve abatement, and increase dispersion

Stack Height Committee proposed Recommendations (Cont.)

- **Continued Modeling:** The CEWG should continue to use and refine modeling to further reduce ground level concentrations of emission, not only from Munters oxidizers, but also cooling towers, scrubbers, and Durr units.
- **Public Relations:** The regular CEWG advertisement should include a statement about the CEWG recommendation. The wording of this statement should be clear, accurate, and approved by the CEWG. It should make clear the limited scope of the change

Background

- Intel plans to install two Durr replacement Munters pollution abatement oxidizers in 2008 and three additional units in 2013 at the earliest. These will be located together and, when set in operation, will act in unison to treat plant emissions. When complete, the suite of five thermal oxidizers will have 10 stacks. Intel has asked the CEWG to make a recommendation on the height of these stacks.

Background (cont.)

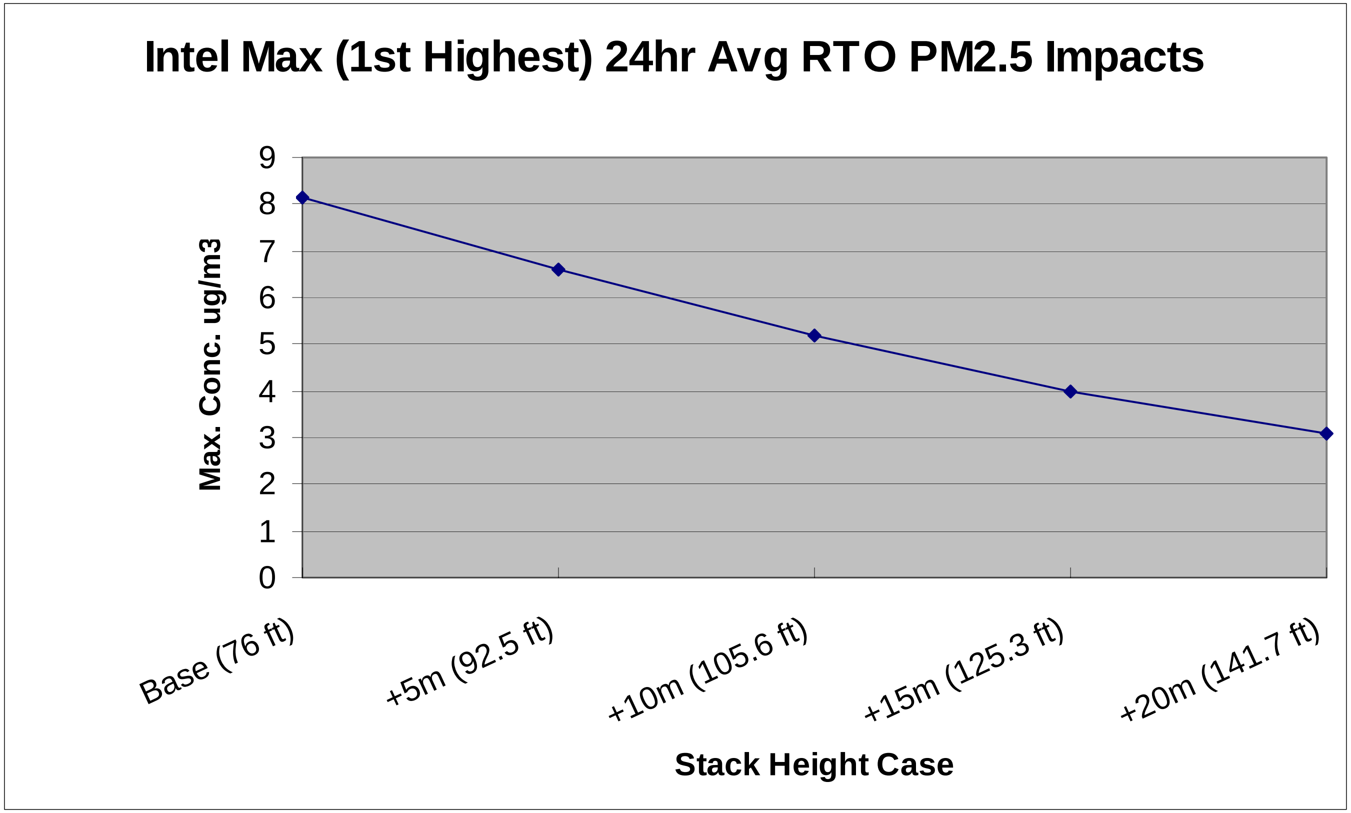
- The new Munters oxidizers will be designed so that they will have the capability to treat all the emissions even if one unit is down as long as there is at least one unit running
- The emissions from current Durr oxidizers, cooling towers, and scrubbers are not affected by the proposed changes

Analysis Approach

- Select goal of at least 40% reduction in modeled concentrations from the Munters stacks
- Use EPA-approved, AERMOD model to estimate concentrations using readily available meteorological data
- Perform analyses for both controlled & uncontrolled emissions (performed by Ralph Williams)

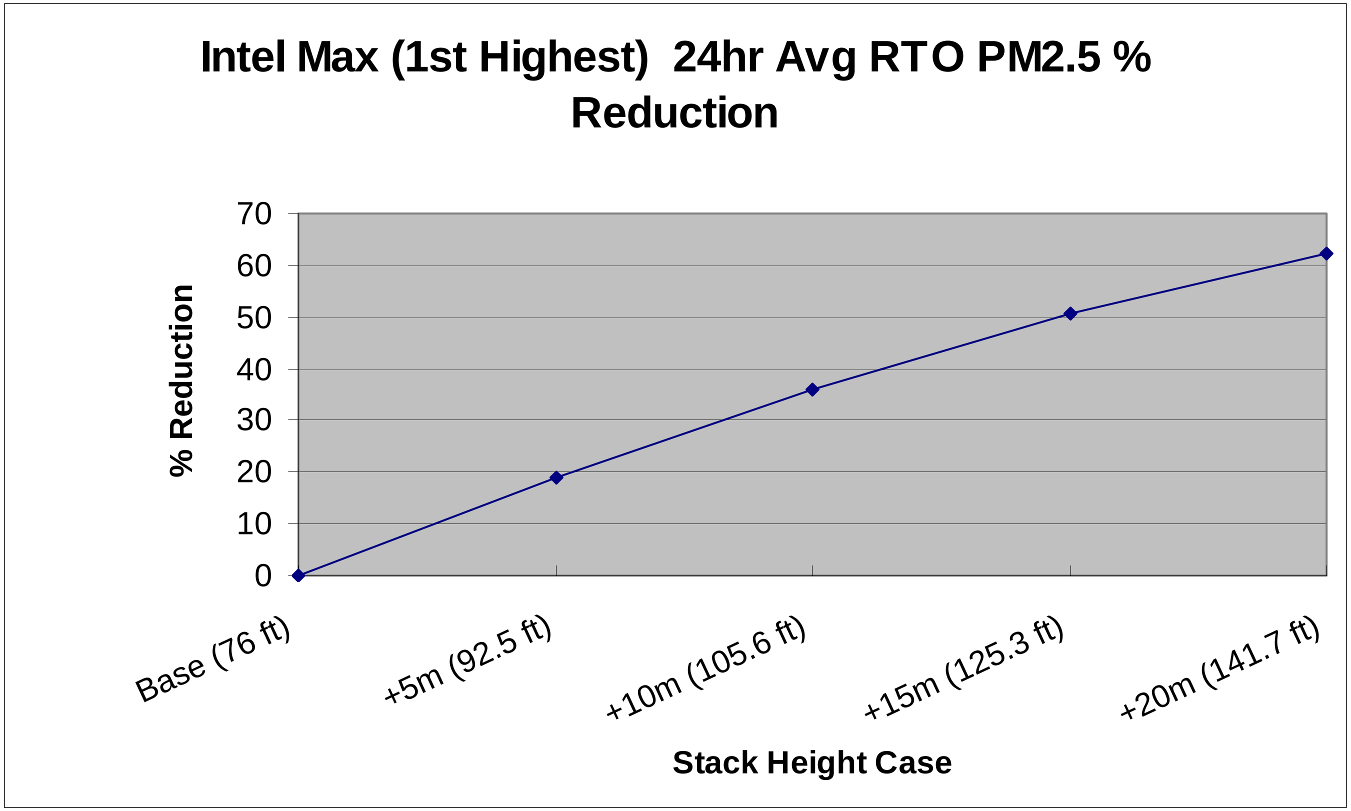
Modeling Results – controlled emissions

- Highest 24hr avg., fine particles



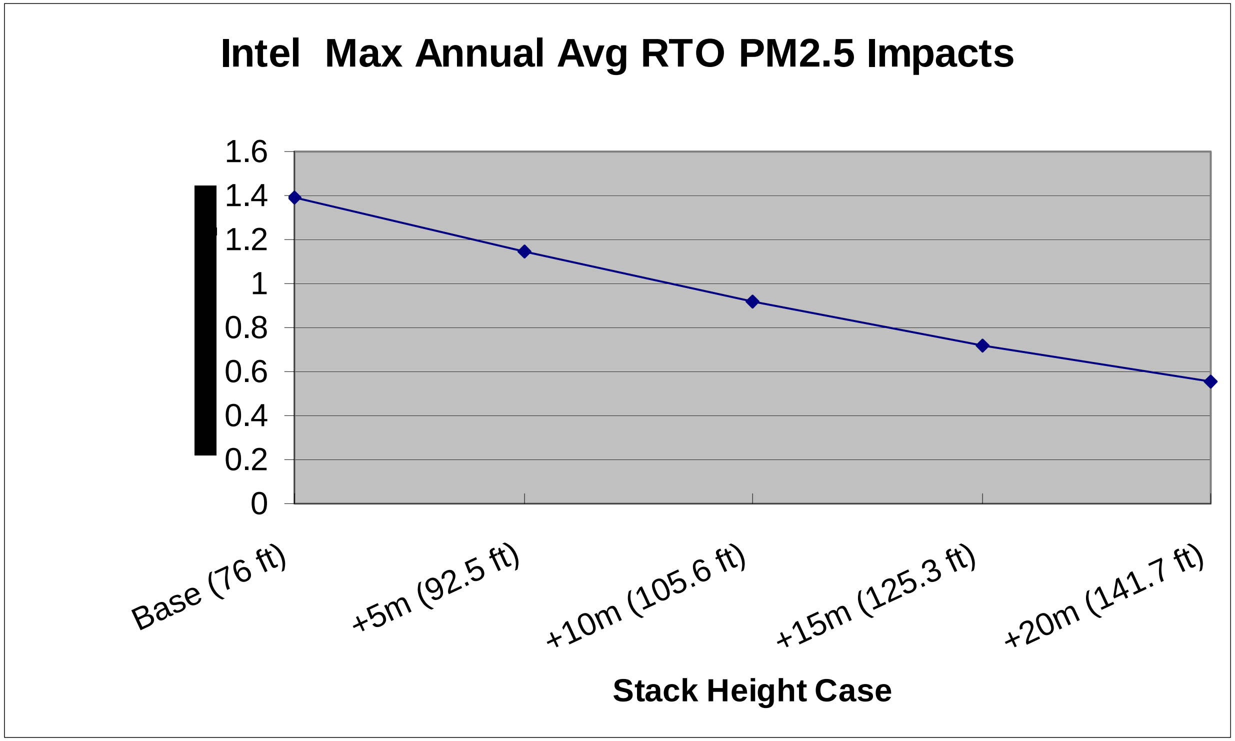
Modeling Results – controlled emissions (cont.)

- Percent reductions for 24hr max



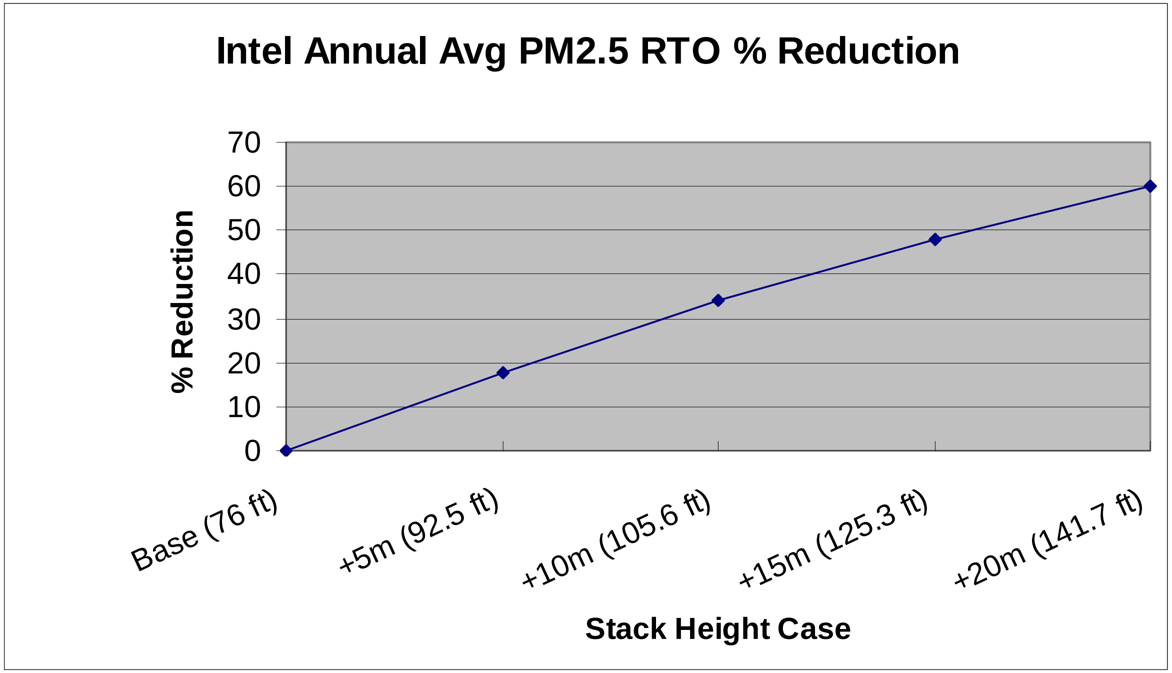
Modeling Results – controlled emissions (cont.)

- Controlled, annual-average, fine particles



Modeling Results – controlled emissions (cont.)

- Percentage-reductions, controlled emissions, annual average

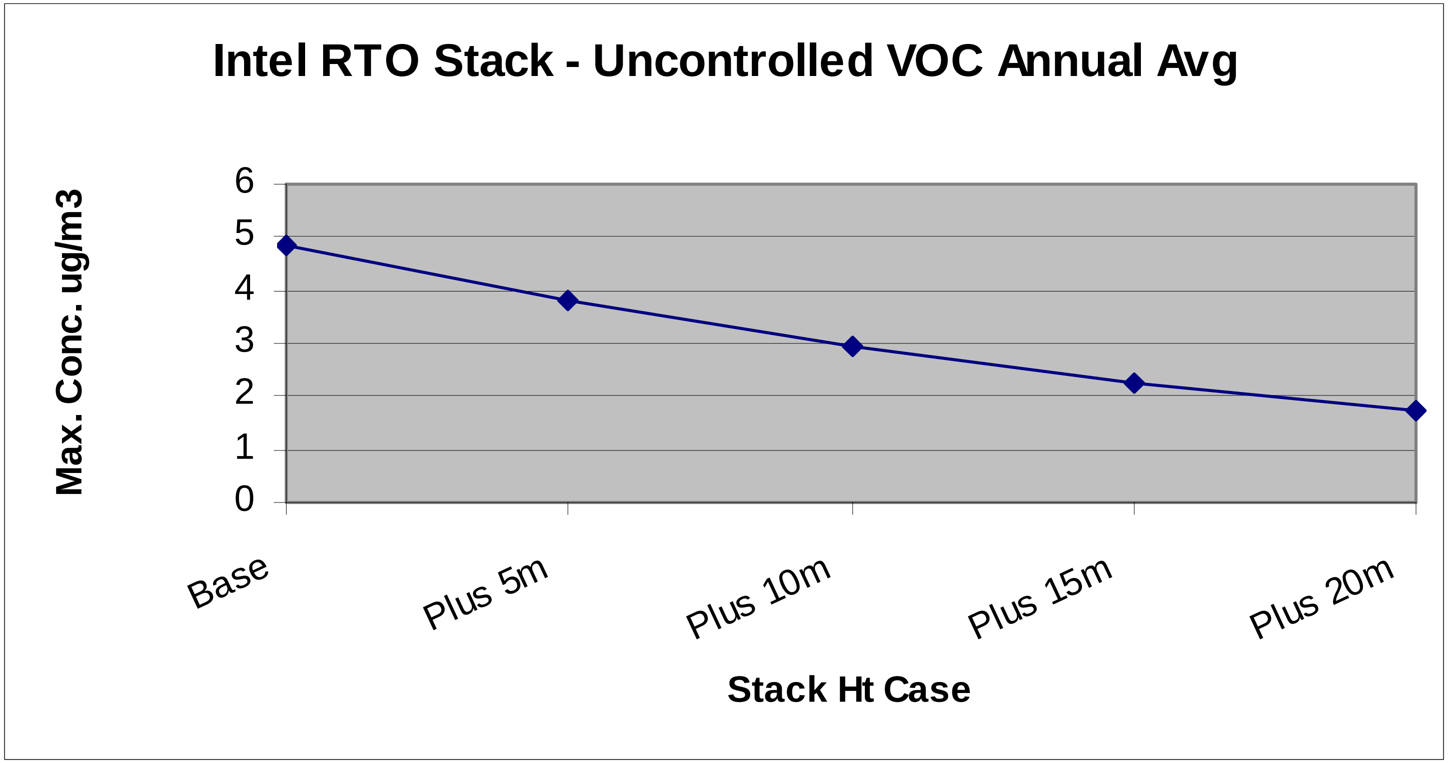


Context for Uncontrolled Emissions

- Occurs when no other units are running or a second unit is down for maintenance or repairs
- Duration is limited by the time required to get a backup up to temperature
- Estimated frequency of upset conditions while production is going and unit is entirely down – about once in 1.7 years based on Oregon Munters experience compared to once in about 5 months for Durrs

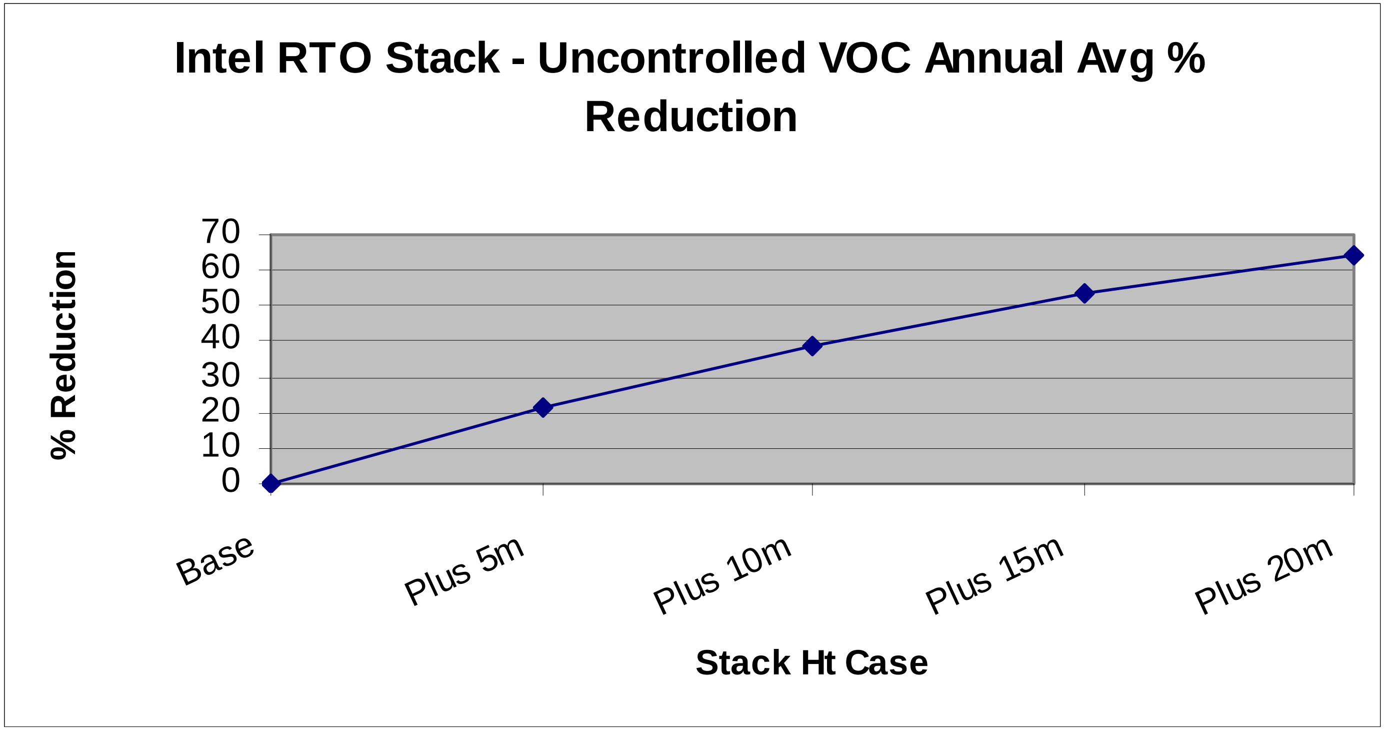
Modeling results for uncontrolled emissions

- Annual average – representative of average conditions



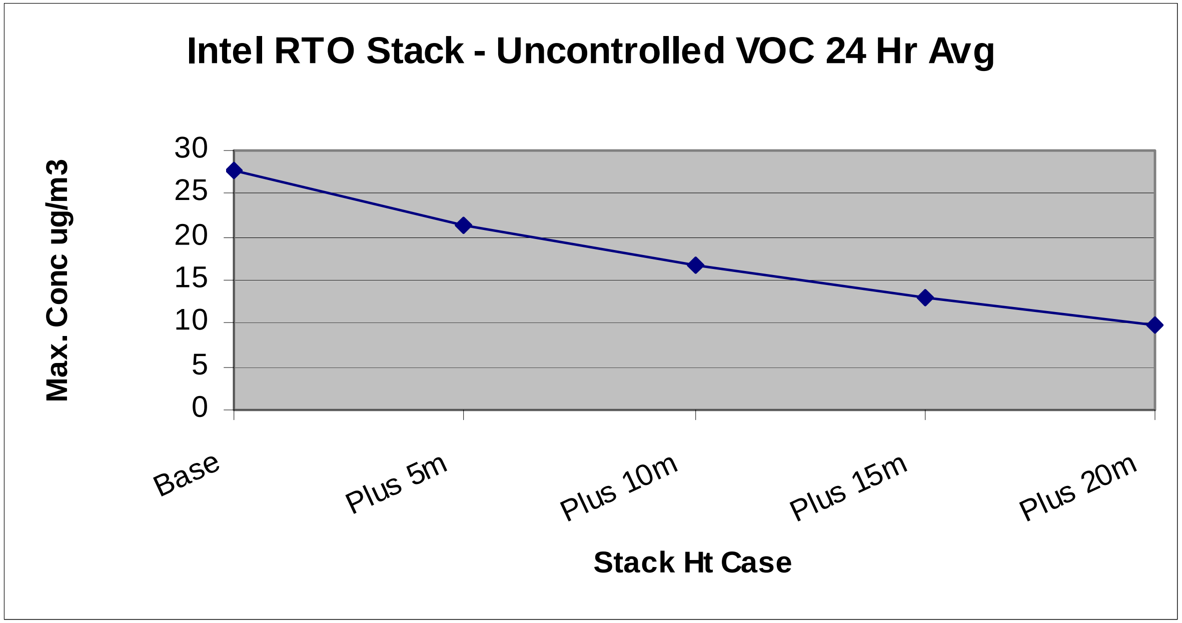
Modeling results for uncontrolled emissions (cont.)

- Average conditions, percentage reductions



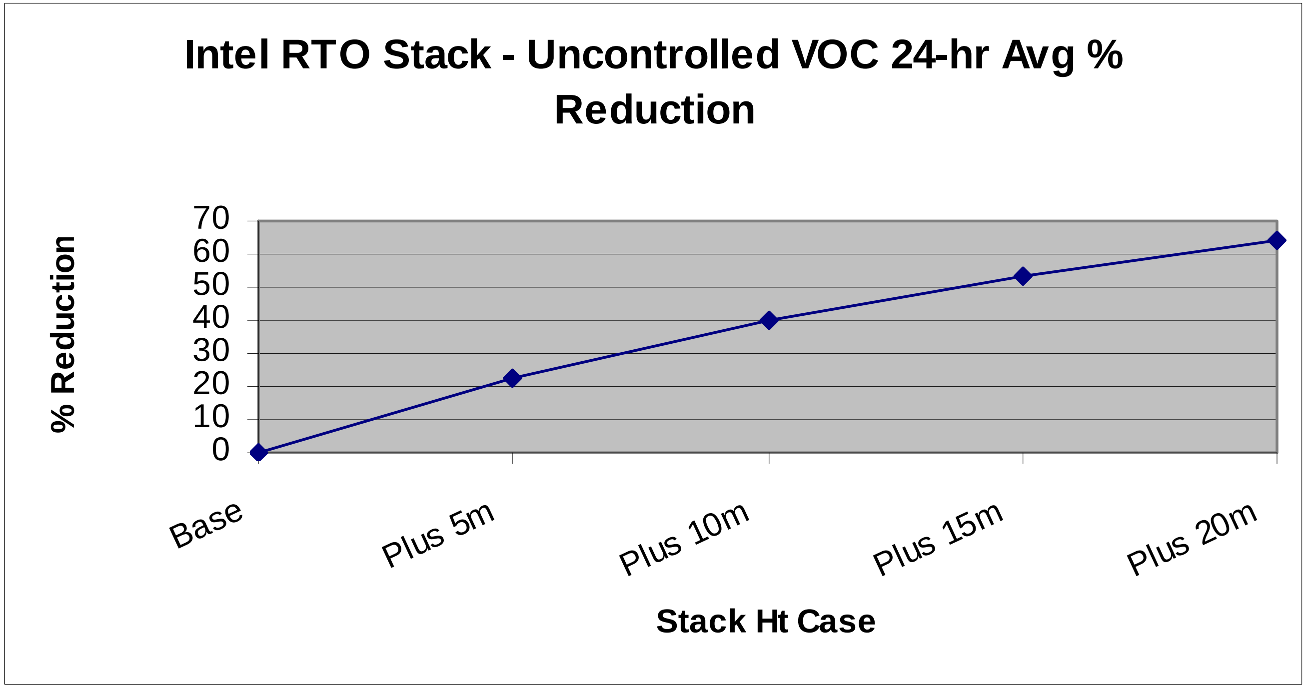
Modeling results for uncontrolled emissions

- Maximum 24hr average as indicative of worst-case dispersion – does not address duration



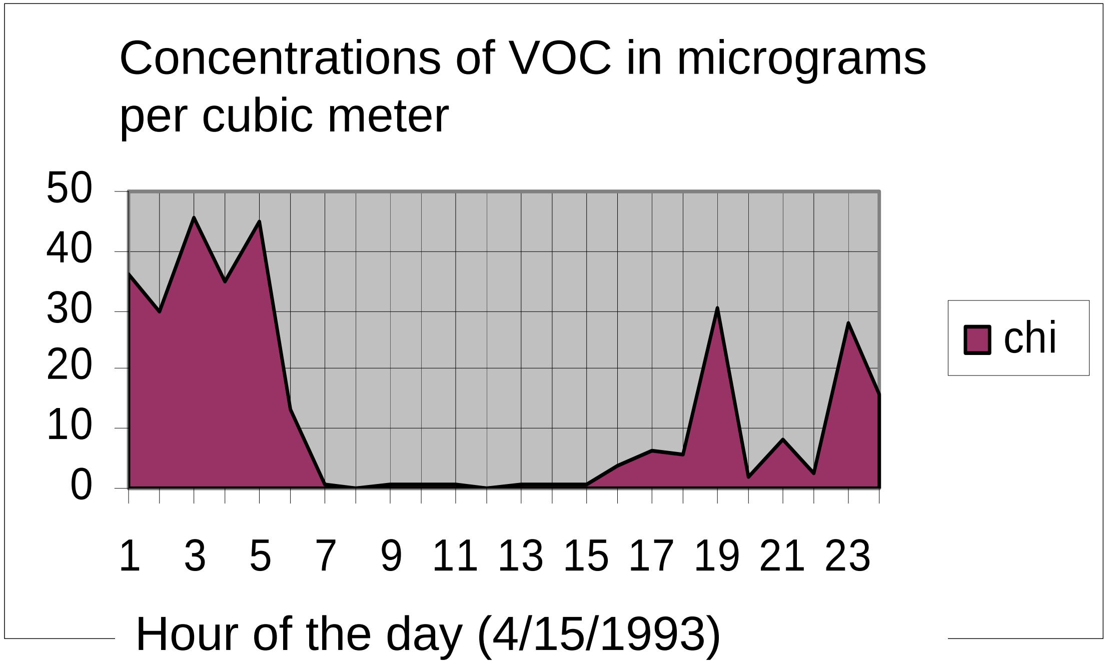
Modeling results for uncontrolled emissions (cont.)

- Percentage reductions for maximum 24hr averages



Role of limited duration

- If the outage lasted 24 hours; the average would be about 12.5
- For a 3 hour duration average is about 5 for worst case



Additional considerations

- Building height less than stack height
- Dense-gas (gas concentrations are too low)
- Dense-gas because room air is colder than ambient air during uncontrolled releases but velocity induced mixing will reduce density differences to small levels
- Limited meteorological data doesn’t change percentage reductions

Dense-gas by room temperature vs ambient temperature

- At ambient temperature of 105F and room temperature of 70F; density ratio is 565/530=1.066
- Initial upward velocity is about 60fps based on 25,000 cfm and 3 foot stack diameter
- Normally air mixes with the rising stack gases and reduces velocities to near ambient levels. This process would normally dilute the stack gases until their density was close to that of the surrounding air.
- Not properly modeled with AERMOD, need improved technique