

## MYTHS and FACTS

8/30/02

### I. POLLUTANTS and IMPACTS

1. Myth: If I can't see or smell air pollution, the levels (concentrations) of the pollutants is health-acceptable.

Fact: Most air pollutant gasses are nearly invisible (e.g. carbon monoxide). Some pollutants can become visible but only if seen through miles of atmosphere e.g. a smog "haze" seen hovering over a distant city. Most pollutants also reach health-hazardous concentrations well before they can be detected with our noses (if this were not the case, early miners would not have had to take canaries into the mines with them).

2. Myth: Particulate matter (PM) emissions are not a problem if the emitted amounts are reasonable.

Fact: Particulates occur in the atmosphere due to both direct emissions (e.g. soot from a jet engine) and "secondary" chemical reactions. Gasses can combine with other gasses, often under solar energy driven conditions, to form new products that exist as particles. This is particularly true for reactions involving VOC's (volatile organic compounds) and oxides of nitrogen or NO<sub>x</sub> (produced burning fuels in the presence of atmospheric nitrogen).

3. Myth: The human body has protective functions that "filter out" particulate matter, preventing it from harming us.

Fact: Particulate matter is characterized by its particle diameter, amongst other aspects. Dusty conditions in nature have caused humans to evolve with protection systems such as nasal hairs and mucus (to flush away dust). But these dusts are comprised of relatively large particles, typically greater than 10 microns in diameter. Particulate matter emitted directly from combustion engines or secondarily formed are typically much finer, in the area of 0.1-2.5 microns diameter. These particles can penetrate the body's defense systems and enter the blood stream or lymph systems (e.g. via deep penetration into the lung wall structure).

4. Myth: I live along the shoreline where the air is pure and clean!

Fact: Shoreline areas can experience some of the highest pollutant concentrations! This is due to the fact that diurnal temperature differences between the land and the water tend to create local wind patterns, often known as sea or lake breeze effects, that can trap and recirculate pollutants rather than allowing them to be carried away by unidirectional winds. Trapping effects can extend for miles inland but are generally always worse or more persistent right near the shore. These trapped high concentrations can in turn lead to high ozone levels when the sun shines intensely for long periods (sun + pollutants = ozone).

5. Myth: Cancer is so prevalent, with so many different facets and variants, that airport pollution cannot be singled out as a major cause.

Fact: The chemicals and particulate matter emitted from airports and their associated aircraft have been linked to various cancers many years ago, with more linkages being formed each year. These carcinogenic linkages are of course dose dependant i.e. generally the more exposure the higher the risk. What is often purposely distorted by special interests, using statements like "we don't know yet", is the continual scientific search (for instance by the USEPA) for establishment of accurate exposure/dose relationships, especially for chronic cancer developments which may take decades to be seen. [Like sunburn, there are some indications that early exposures to children can create DNA damage that only

shows itself later in adulthood.] The EPA rightfully often establishes conservatively stringent requirements in these “needing better definition” areas, hoping that future investigation results might allow relaxation of the requirements. These stringent requirements usually affect the major polluters, like airports (and power plants and refineries and...) first, so it is not unexpected that they will be the ones to be seen fighting such conservatism. [One hopes these business representatives can adequately answer their own children’s’ questions about pollution and disease and their companies role.]

## II. AIRPORTS and AIRCRAFT EMISSIONS (noise and pollutants).

1. Myth: Analysis of “total airport” emissions includes all emissions from the airport campus and aircraft using the airport.

Fact: Emissions are often excluded from airport leased facilities, such as cargo operations, airline facilities, military operations, etc., as well as aircraft emissions associated with approach, takeoff and climb out operations.

2. Myth: Regulatory policy for environmental protection dictates erring on the high side (over predicting pollution concentration levels) rather than under predicting.

Fact: Political and economic interests (e.g. airport owners, airlines, FAA, etc.) tend to counter any such policy directions. Official airport impact predictions, including control of the input data, are made by these interests and are only reviewed by the EPA. Also, a recent change in official prediction models has reduced over-prediction conservatism by greater than a factor of ten (see IV.3).

3. Myth: The USEPA regulates airport emissions, as part of its government mandated responsibility and authority to “protect the environment”.

Fact: The USEPA is perceived to be very good at meeting its governmental charter, with a reputation for often going too far towards over-protection. [This tendency is often driven by difficulty in establishing degrees of protective conservatism related to long exposures (chronic, over a lifetime)]. But the USEPA does NOT have regulatory authority over airports...the FAA does, and the FAA’s clients are airline/airport interests, not citizens/residents living in the areas of airports.

4. Myth: The USEPA regulates aircraft engine emissions, just as they do for automobile engines.

Fact: The USEPA does not regulate aircraft engine emissions; the ICAO (International Civil Aviation Organization) does, by setting emissions “certification” standards for all aircraft. ICAO operates as a UN organization, forcing governments such as the U.S., to accept the standards into law (FAA regulations) because of “treaty considerations.” Historically, the airline dominated ICAO works to ensure that >90% of all existing and future aircraft can meet their standards. [USEPA attempts to influence those standards by influencing the FAA to influence ICAO].

5. Myth: Well, at least we have jet engine standards for all the critical pollutant emissions.

Fact: There is no particulate matter specification standard for jet engines. There is only a “smoke number” standard. Years ago, citizens could “see aircraft emissions” because of the smoke they emitted from inefficient burning of the kerosene-like jet fuel. The aircraft manufacturers, under pressure, modified engine designs to minimize “smoke”, thus the ICAO certification “smoke test”, which is basically to pass an exhaust sample through a filter paper for a given time and to measure the density of the soot deposits. As one might conclude, this test does not characterize the deposited matter into categories used today by the USEPA, such as PM10 or PM2.5 (PM of diameter less than 10

or 2.5 microns). Furthermore, it does not characterize any PM resulting from engine exhausts subsequently reacting chemically in the atmosphere, under solar or other influences (e.g. humidity, ammonia presence, etc.).

6. Myth: The airport needs to acquire land for noise abatement.

Fact: The noise is not “abated”. To abate means to reduce in amount, degree or intensity. In fact, the noise is probably increasing. The airport actually needs to relocate residents and business’ out of their planned (or already existent) high level noise space in order to prevent harm or negative health impacts to them.

7. Myth: Airports operate and fund “noise abatement” programs that provide improved noise insulation for homes, schools, etc.

Fact: Again, assuming one keeps ones windows closed all the time, improved noise isolation often only maintains the internal noise status quo if the airport increases or otherwise changes operations such that the outdoor noise levels increase (unabates?).

### III. POLLUTION SIMULATORS

1. Myth: Airport pollution impact simulators accurately predict future air quality impacts (pollution concentrations) in the region.

Fact: Achieving prediction accuracy under a wide variety of environmental and meteorological conditions is extremely difficult. “Acceptable” accuracy here is generally defined as “within a factor of 2:1” (predicted vs. measured).

2. Myth: Models and simulators used for pollution impact studies are designed conservatively to always over-predict rather than under-predict impacts.

Fact: “Dispersion models” built into the simulators can substantially under-predict impacts because the theoretical and physics assumptions they are based on don’t match a particular environmental, meteorological situation. Equally important, even if the dispersion model was perfect, the meteorological (weather) inputs provided may be too few or too limited to allow the model to function properly.

3. Myth: The FAA’s “required” simulator, EDMS (Emissions Dispersion Modeling System) is accurate and errs on the side of over-predicting pollution concentrations in surrounding areas.

Fact: EDMS historically used the Industrial Source Complex Short Term (ISC3ST), hereafter ISC3, dispersion model to predict pollution concentrations. This model tended to generally over-predict concentrations, often by factors of 6:1. EDMS was “improved” in 1998 by replacing the ISC3 modeler with the EPA’s AERMOD modeler which, though generally conceded to be more “accurate” (less variation around a true value) has been shown to often under-predict by a factor of around 2:1. In effect, prediction conservatism has been reduced by a factor of about 12:1.

4. Myth: Pollution concentration simulations for an entire area around an airport, say 25 miles radius, including variations in terrain, weather (meteorology), chemical emission factors, emissions source characterizations, etc. probably require Cray “super-computers” in order to get accurate results in reasonable study times.

Fact: The FAA’s EDMS simulator was designed to run on PC’s in order to allow wider use by government agencies and consultants. EDMS Version 3.0 is a Windows™ 3.1 application but also runs in the Windows™95 environment.

Minimum hardware requirements for Version 3.0 are a 486DX 66MHz processor, 8 MB RAM, 3.5 inch 1.44 Mb floppy disk drive, and a 300 MB hard disk drive. The FAA recommends 16 MB RAM for larger studies (e.g., detailed dispersion analysis).

5. Myth: Full meteorological weather data for an entire area and an entire “average” year is inputted to drive the predicted results.

Fact: Typically only the NWS (National Weather Service) data gathered at the airport under study is used (or closest NWS source if not at the airport). This data is normally just a few measurements, such as hourly wind speed and direction, temperature and wind/temperature conditions aloft (balloon “sounding”) once a day. In EDMS, all of the other conditions over the rest of the entire area are estimated based on that data. If you live 20 miles from the airport, wind conditions at your house and all points in-between are estimated, based on a simple algorithm (i.e. the wind is the same everywhere!).

6. Myth: EDMS contains accurate source emission data files that are used for simulations.

Fact: It is true that EDMS contains extensive data files on emissions sources, primarily those of a variety of aircraft engines. Emissions information from non-engine sources must often be obtained from other sources, such as automobile emissions from the EPA’s MOBILE5 simulation files. Manual inputs are also sometimes required for less common sources e.g. fuel fires set at airports for fire-fighting training purposes.

Finally, emissions factors themselves may be in error by significant degrees, either because they are estimates or because they are outdated or other reasons.

See for instance (July 2001) at:

<http://www.ci.manhattan-beach.ca.us/agenda/2001/Ag-Min20010717/20010717-20.pdf>

Excerpt:

*An example of the magnitude of the emissions underestimation can be derived by comparing emission factors across the alternative methods. The Draft EIS/EIR relies on the use of EDMS to generate GSE emission estimates. However, EDMS includes significantly outdated GSE emissions data. A quick comparison indicates that CARB OFFROAD model and EPA NONROAD model GSE (average) emission rates (for the same equipment activity distribution assumed in the EIS/EIR) are, for diesel equipment, from 7 to 13 times greater for VOC, 5 to 10 times greater for PM, 5 to 9 times greater for CO, 4 to 5 times greater for Nox, and 4 to 5 times greater for So2. For gasoline GSE, the models produce average emission rates 10 to 20 times greater for VOC, 1 to 6 times greater for PM, 15 to 16 times greater for CO, 6 to 9 times greater for Nox, and 2 to 4 times greater for So2. The impact of using outdated emission rates is clearly significant and should be reevaluated if realistic air quality impacts are to be derived.*

See also: [www.air-dispersion.com/feature.html](http://www.air-dispersion.com/feature.html)

#### IV. OTHER

1. Myth: Government continuously tightens regulatory levels of allowable pollutants.

Fact: This is true in some areas (radon, lead, etc.) but is not a universal truth, especially where powerful and moneyed business’ feel their interests (generally profits) are at risk. We’ve all seen these interests at work in the past (oil spills, nuclear dumps, toxic ground deposits, etc.) and expect them to continue in the future. In particular, air industry interests are attempting to pass federal legislation that will bypass states’ abilities to regulate airports within their boundaries and legislation that will bypass

or minimize existing airport environmental regulations. [Ref. HR 3479, S 2039, HR 4481, S 633 and others.]

2. Myth: “Cars pollute more than airports/aircraft.” “Even lawnmowers emit more.” “The xyz airport’s emissions are only a small portion of the area’s overall emissions.”

Fact: These statements are often used as population “desensitization” ploys. Though it may be true that all of the automobile traffic “in the area” emits a substantially greater amount than the airport, what is seldom explained is exactly what car population is being used for the comparison. A little digging usually reveals that the reference is to all the vehicles (and usually cars *and* trucks) in a large multi-county area (e.g. 9 counties in the Chicago “area”). Even just a little bit of science will easily demonstrate that the impact on the atmosphere surrounding an individual’s home (or workplace or school) is substantially more effected by an upwind airport several miles distant than by a neighborhood’s worth of lawnmowers 40 miles away; or a diesel truck 3 counties over; or a manufacturing plant 30 miles downwind. The statements grossly mislead by disregarding emission dispersion effects and speaking only to amounts.

3. Myth: Emissions from cars and trucks are increasing, due to increased travel, and are technologically about as low as they can get, what with all the pollution control devices already in place. So we should worry about those emissions quantities and not be concerned about the (smaller) amounts from airports/aircraft.

Fact: Net emissions from autos and trucks are expected to move down substantially in the near future, due to changes in fuel composition (reduced sulphur) and implementation of pollution control devices on all diesel trucks (which may experience almost a 90% emissions decrease). On the other hand, no changes in aviation fuel (which is basically the same as diesel fuel i.e. kerosene) or substantial technology shifts are currently planned for aircraft/airports, so the ratio of pollution contributions will greatly shift within the next decade or two.

3. Myth: “Environmentalists” want to shut down all airports and air transportation.

Fact: Though a very small minority of environmental activists might be considered supporters of such radical views, most believe that air transportation serves an important role in overall transportation requirements. The arguments between air industry protagonists and environmentalists centers more on the “how” rather than the what. For example, in Chicago, air-protagonists believe that the major O’Hare airport, located in the center of a heavily populated area, should be substantially expanded. Area environmentalists tend to believe that attempting such expansion in the bowels of the city will cause major destruction and environmental damage and that the cheaper, faster, better, more environmentally-friendly approach of building a new airport well out of the main city area provides a much better “How.”