Air Quality 2008 Baseline

Sources and Assumptions

The Utah Division of Air Quality (DAQ) monitors air pollution and implements regulatory measures to protect public health. If health standards are violated, the state must develop a formal plan to meet the standards. This is known as the State Implementation Plan (SIP). Air quality is projected for five major pollutants. They are:

- Carbon Monoxide (CO)
- Nitrogen Oxides (NOx)
- Sulfur Oxides (SOx)
- Ozone
- Particulate Matter (PM10, PM2.5)

Some pollutants are emitted directly from stacks and tailpipes (CO, NOx, SOx, and some PM10); others (ozone, some PM10, and PM2.5) are formed by chemical reactions in the air. For example, NOx and volatile organic compounds (VOC) are precursor chemicals in the formation of ozone. The chemical reaction of NOx and VOC in the presence of sunlight and high outdoor temperatures creates ground-level ozone in the atmosphere. Exceedances of the ozone standard usually occur during the late spring and summer months. Air quality models use emissions of NOx and VOC as a means to predict the future levels of ozone. Similarly, the fine particles less than 2.5 microns in size are formed by atmospheric reactions of NOx and SOx with ammonia. VOC are also known to play a part in the chemical reactions that form these secondary particulates. This problem primarily occurs along the Wasatch Front during winter inversion conditions (see Figure A).

To estimate the concentration of the five pollutants DAQ produces a triennial emissions inventory that is reported to the EPA and becomes a part of the national emissions database. For modeling purposes DAQ also projects the current-year inventory to future years and uses this estimation along with the model to test strategies for reducing pollution.

The triennial emissions inventory consists of point sources (approximately 300 individual stationary, commercial, or industrial sources); mobile sources (highway vehicles); and area sources (non-road mobile

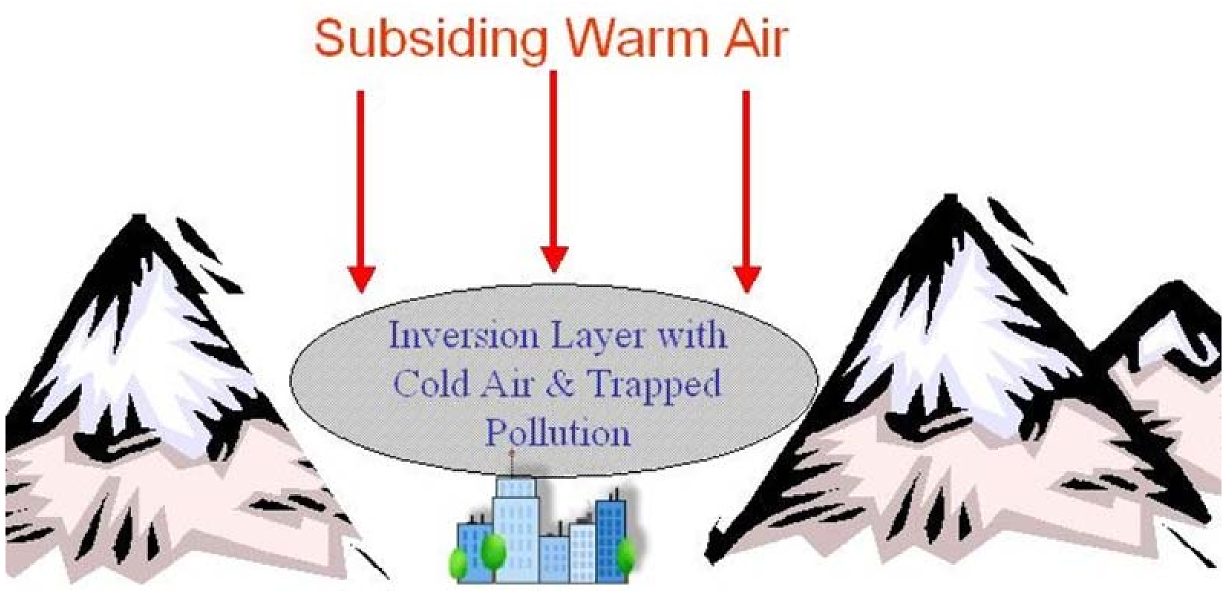

Figure A. The Impact of Temperature Inversions on Urban Air Pollution.

and stationary sources that are too small or numerous to be inventoried individually). The emission inventories quantify the amount of pollution emitted in each county. This type of inventory provides a coarse representation of the spatial and temporal distribution of the pollutants. Using population and economic projections a future-year forecast of emissions in the area can also be estimated.

The future-year inventory combined with air quality modeling is used to predict the amount of pollution in the future. The models, developed by the Environmental Protection Agency (EPA), consider population and industrial growth, vehicle emissions, and the effects of weather and terrain on air quality. They also incorporate known technological advances that will be required in the marketplace and will reduce emissions. These advances include new industrial standards, cleaner vehicle engines and fuels, and other technologies. When concentrations of certain pollutants are projected to violate the state and federal air quality health standards, the Utah Air Quality Board takes actions to achieve and maintain the standards.

Characteristics and Trends

Air monitoring began in the late 1970s. Since that time, parts of the Greater Wasatch have violated the health standards for SO2, fine particulates, CO, and ozone. The highest measurements of these pollutants occurred during the 1980s. During the 1990s and early 2000s, however, pollution levels have steadily declined. Recently, however, new more stringent health standards were promulgated by the EPA for PM2.5 and ozone and as a consequence, new non-attainment areas are being identified based on current monitoring in the State.

The concentrations of the five major air pollutants, as monitored at the DAQ monitoring network sites, are projected to decline from the year 2000 to 2030, continuing the trend from the 1990s. Figures B and C show trends in PM2.5 and ozone at several monitoring locations along with the revised and tightened Ambient Air Quality Standards (NAAQS) during the last ten years. Figures D and E show that ambient concentrations of CO and SO2 have been largely under control for many years and this is expected to be the case into the future. Figure D includes the corresponding number of inversion days to show that the downward trend in CO concentration is not the result of improved meteorology.

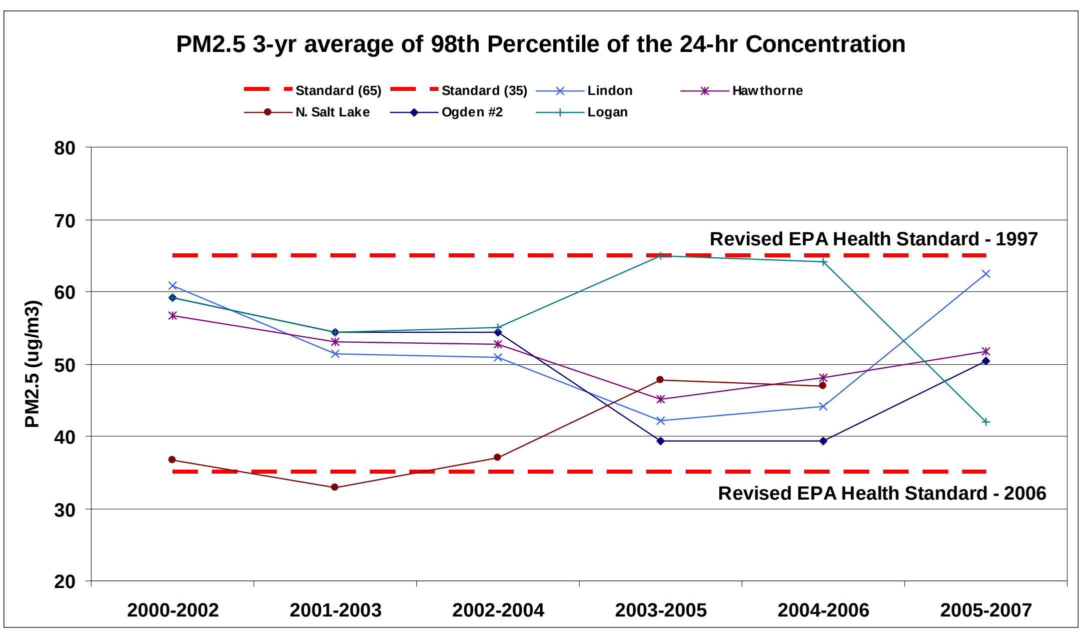

Figure B. Monitored PM2.5 With Revised Health Standard. Non-attainment Recommendation Submitted 12/18/2007.

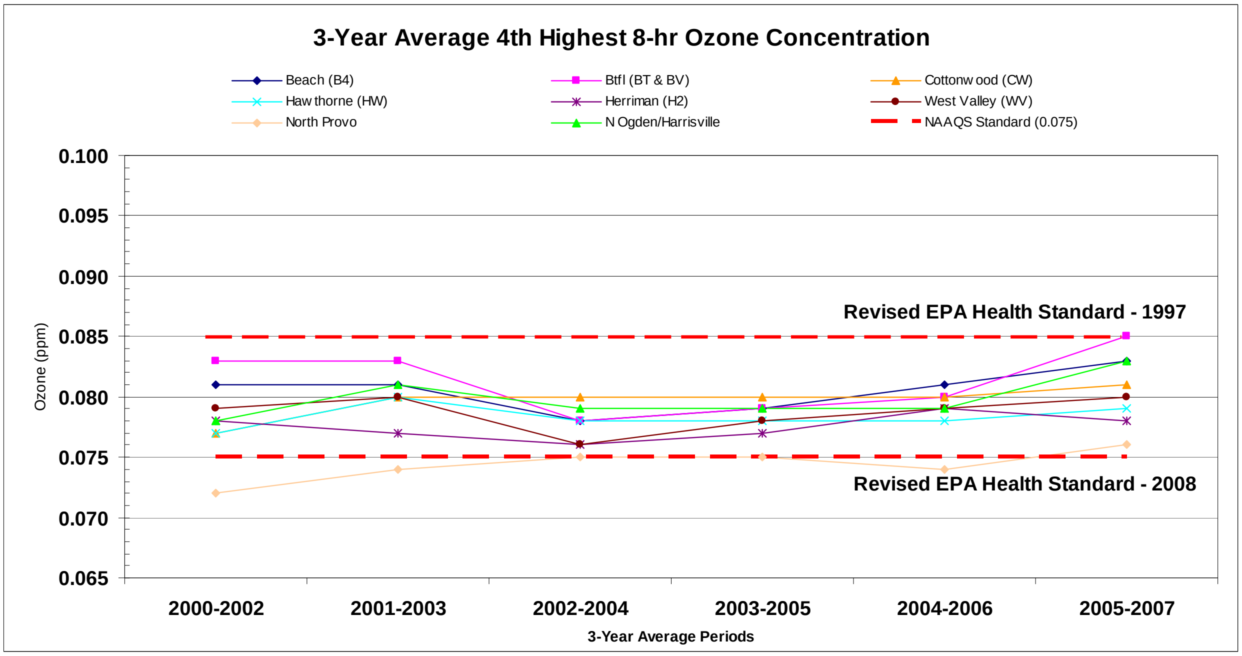

Figure C. Monitored Ozone With Revised Health Standard. Formal Non-attainment Recommendation Pending 3/12/2009.

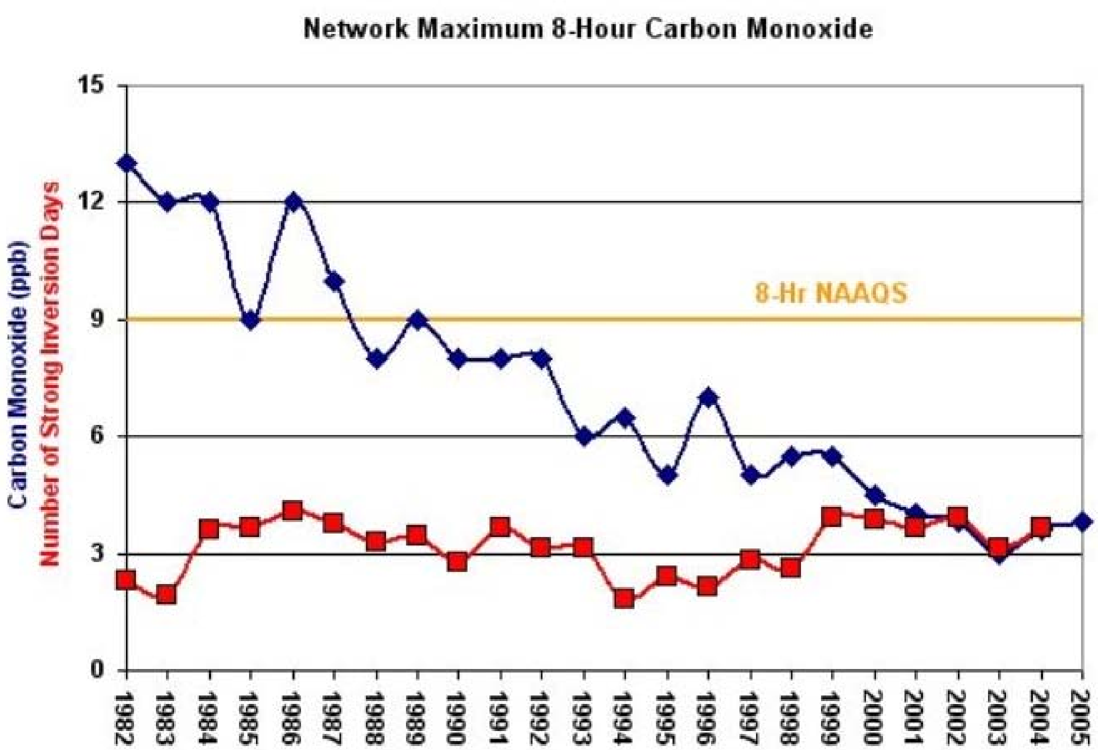

Figure D. Long-term Carbon Monoxide Trend Along the Wasatch Front.

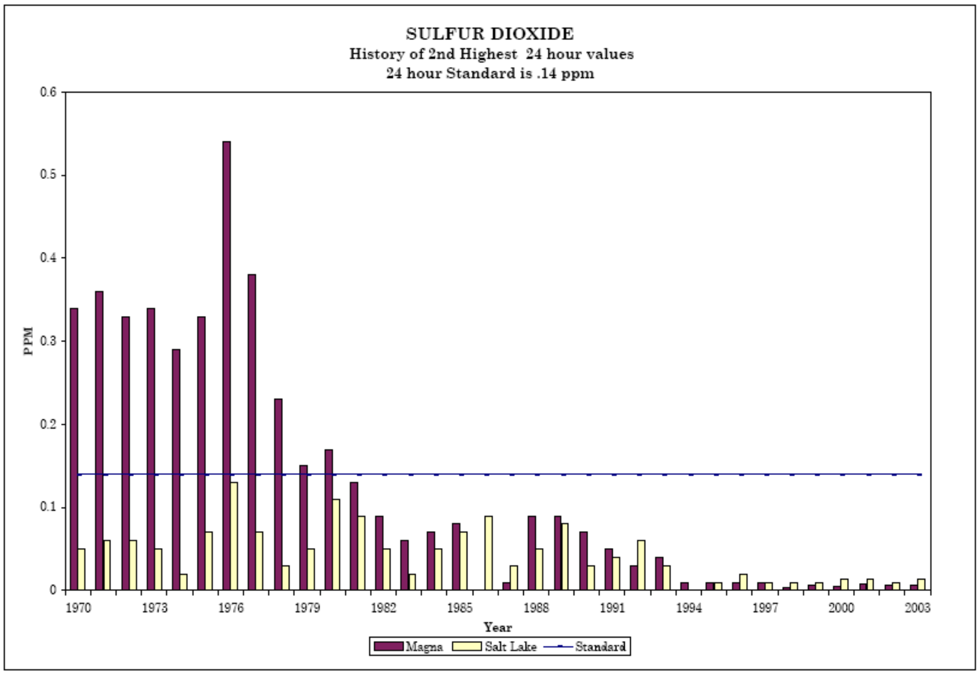

Figure E. Thirty Year Trend in Monitored SO2.

Annual Emissions Inventory

One method used by DAQ to assess the amount of pollution going into the air is the statewide inventory. The inventory is created to estimate pollution coming from four major categories. These include large industries, automobiles, a combination of small commercial sources and household activities, and natural sources. Table A shows inventory projections for the ten-county area of northern Utah projected to the year 2030. The table also compares these same projections created for the 1997 Baseline Scenario and the 2003 Baseline Scenario.

One of the difficulties in comparing emission projections over time is that emission estimation methods and emission factors are continually changing and improving. This may cause emissions to appear higher or lower from one year to the next without any actual emission change. One further difference in the reporting of the 2008 baseline estimate compared to the previous two is the reporting of anthropogenic, or human-caused, emissions only. This leaves out the emissions from wild fires and from a category known as biogenics which are emissions from vegetation such as trees, plants, and crops.

Table A shows four of the five emission categories projected to decline or stay relatively constant over the next twenty five years. The one category that shows a very modest growth in emissions is coarse particulate matter or PM10. This category does include the fine fraction as well, which is PM2.5. However, it is important to distinguish between the *primary* fine particulate, which is what this category in the inventory represents, and *secondary* fine particulates. Primary particulates consist mainly of dust in the air from dirt roads, construction sites and even desert dust storms. Dense smoke from forest fires is also made up of a lot of primary particulates.

It is the secondary particulates which account for the majority of what we measure in the air at our monitoring stations during the winter time. The amount of secondary fine particulates are influenced more by the emissions of NOx and VOC than by the primary emissions. Table A shows that emissions from sources that produce NOx and VOC are either declining or remaining flat into the future. It is also important to keep in mind that NOx and VOC are the main pollutants in the formation of ozone. Consequently the reduction in these emissions is helpful in our ability to maintain the public health for both ozone and PM2.5.

Air Pollution Emissions for the Greater Wasatch Area, 2005 to 2030
Davis, Salt Lake, Utah, Weber, Box Elder, Juab, Morgan, Summit, Tooele and Wasatch Counties

	2008 Baseline Emissions by Pollutant **					Total Emissions by Pollutant		
Year	Particulate Matter PM10	Sulfur Dioxide SO2	Nitrogen Oxides NOX	Volatile Organic Compounds VOC	Carbon Monoxide CO	1997 Baseline	2003 Baseline	2008 Baseline
2005	129	34	243	230	1,653	3,295	2,439	2,289
2006	130	35	240	224	1,601	3,366	2,466	2,230
2007	135	34	236	221	1,551	3,444	2,347	2,178
2008	137	34	228	218	1,517	3,525	2,277	2,134
2009	138	34	220	213	1,481	3,607	2,262	2,087
2010	139	32	207	210	1,446	3,695	2,244	2,034
2011	140	32	199	206	1,412	3,770	2,236	1,989
2012	141	31	190	203	1,378	3,849	2,227	1,943
2013	142	31	181	199	1,343	3,933	2,222	1,896
2014	143	31	178	200	1,352	4,018	2,223	1,903
2015	145	31	176	201	1,360	4,104	2,228	1,913
2016	147	32	174	202	1,370	4,183	2,232	1,925
2017	148	32	172	203	1,379	4,263	2,239	1,934
2018	150	33	170	204	1,387	4,344	2,245	1,943
2019	152	33	167	205	1,395	4,427	2,254	1,952
2020	153	33	165	206	1,403	4,511	2,265	1,961
2021	155	34	163	206	1,412		2,283	1,969
2022	157	34	160	207	1,420		2,303	1,978
2023	158	34	158	208	1,428		2,324	1,987
2024	160	35	155	209	1,436		2,347	1,995
2025	162	35	153	210	1,444		2,371	2,004
2026	163	35	151	211	1,453		2,396	2,013
2027	165	36	148	212	1,461		2,422	2,022
2028	167	36	146	213	1,469		2,446	2,031
2029	169	36	144	214	1,478		2,473	2,040
2030	170	36	141	215	1,486		2,499	2,049
AARC	1.13%	0.29%	-2.15%	-0.28%	-0.42%	1.99%	0.10%	-0.44%

AARC - Average Annual Rate of Change, 2005 to 2030
Note: Data reflects an annual average tons per day
Source: Utah Division of Air Quality

**** Anthropongenic (human-caused) emissions only**
This inventory does not include natrural emissions such as those caused by wild fires and vegetation and trees

Table A. 2008 Baseline Air Emissions Inventory.

Major Issues and Findings

There has clearly been a reduction in pollutant levels along the Wasatch Front since the early 1990s. These reductions have come from all major sectors of the economy by reducing process emissions from large industrial sources, cleaner and more efficient automotive technology, and more efficient commercial and residential products which simply require less energy for their use. However, growth in population, the economy and vehicle miles traveled has been robust during this same period and future projections foresee growth continuing. So, while pollution per capita may be on a downward trend, the fact of more people making demands on natural resources, including the capacity of the local airshed, is a challenge that will take creativity and perseverance to solve.

In addition to the opposing forces of less per capita pollution offset by growing population and economic activity, a second and more immediate challenge faces northern Utah in the attainment of air quality health standards. The EPA-mandated air quality standards for ozone and PM2.5 have become more stringent since the last baseline scenario was published in 2003. The more stringent standards have put counties that had either returned to compliance with those standards or had never been out of compliance, into the non-compliance category.

As Utah and other states assess their impact on and options for mitigating climate change, federal legislation is likely to add to the air quality regulatory environment. Consequently, there are very real challenges that the state of Utah, especially the Wasatch Front and rapidly growing parts of the State, will be dealing with in the years to come.

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