UTAH

Administrative Documentation

PM10 Exceptional Wind Event
Cottonwood, Hawthorne, Lindon, & North Salt Lake
Event Date – April 15, 2008

State of Utah
Department of Environmental Quality
Division of Air Quality
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July 12, 2010

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ADMINISTRATIVE DOCUMENTATION
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Proposed

Utah Division of Air Quality

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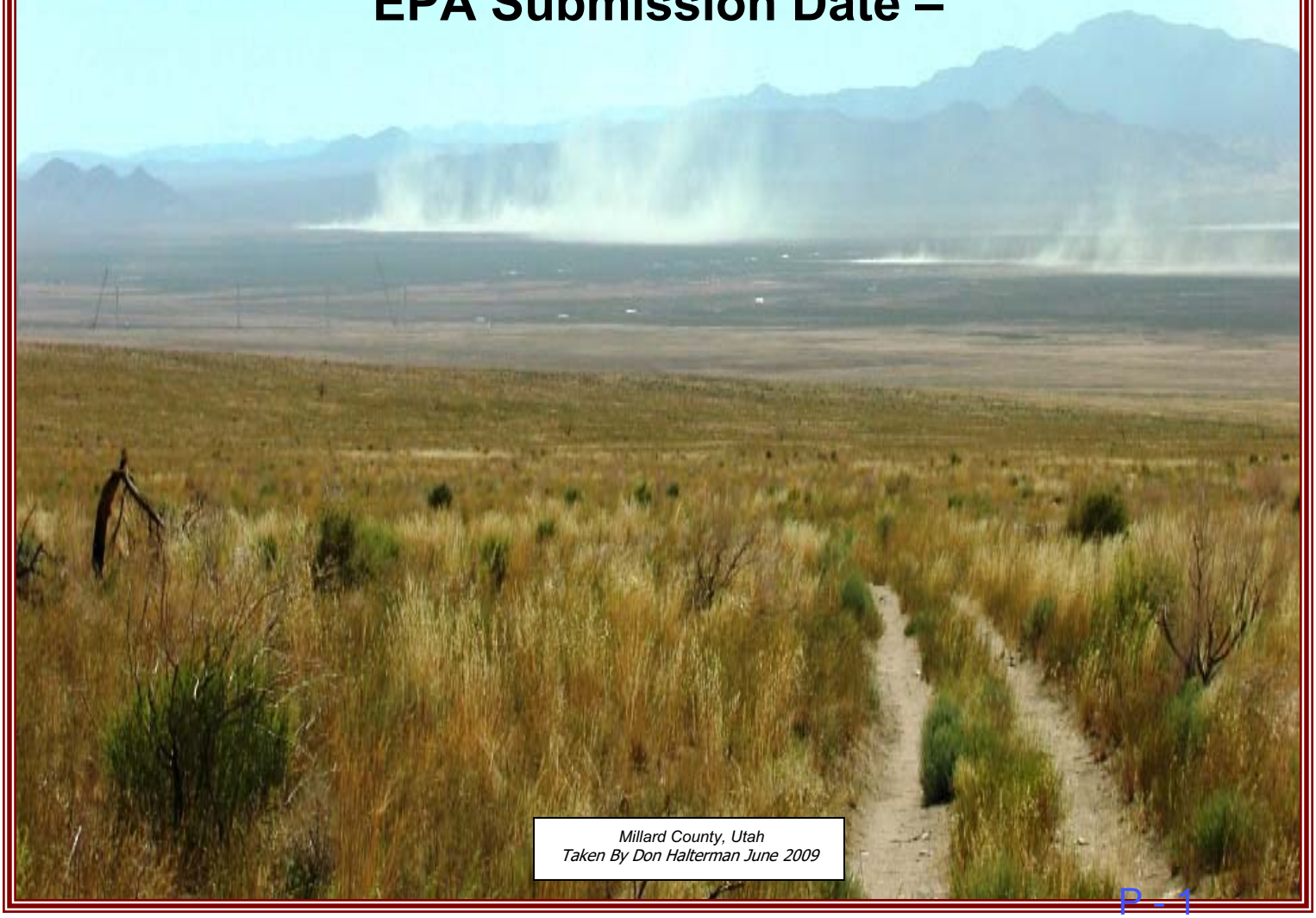
EPA Submission Date –



Millard County, Utah
Taken By Don Halterman June 2009

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Definition of Event (40 CFR 50.1(j)) and Introduction

The Code of Federal Regulations (CFR) provides the definition and criteria for determining whether air quality data is impacted by an exceptional event. The 40 CFR 50.1 (j) definition states that "exceptional event means an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event." The demonstration to justify data exclusion as outlined in 40 CFR 50.14(c)(3)(iv-v) specifies that evidence must be provided that:

1. The event meets the definition of an exceptional event;
2. The event is associated with a measured concentration in excess of normal historical fluctuations, including background;
3. There is a clear causal relationship between the measurements under consideration and the event that is claimed to have affected air quality in the area;
4. There would have been no exceedance or violation but for the event; and
5. The demonstration must include a public comment process and documentation of such to the Environmental Protection Agency (EPA).

This report documents that the event meets the above criteria and provides analyses to demonstrate that:

I. The dust event was not reasonably controllable or preventable because a significant portion of the PM10 (approximately 80 -100 $\mu g/m^3$) originated from desert playa, a non-anthropogenic source. Further, reasonable controls, based on EPA guidance, are in place for anthropogenic sources through regulatory structures and programs sponsored by state, federal and local agencies as described in the Mitigation Section;

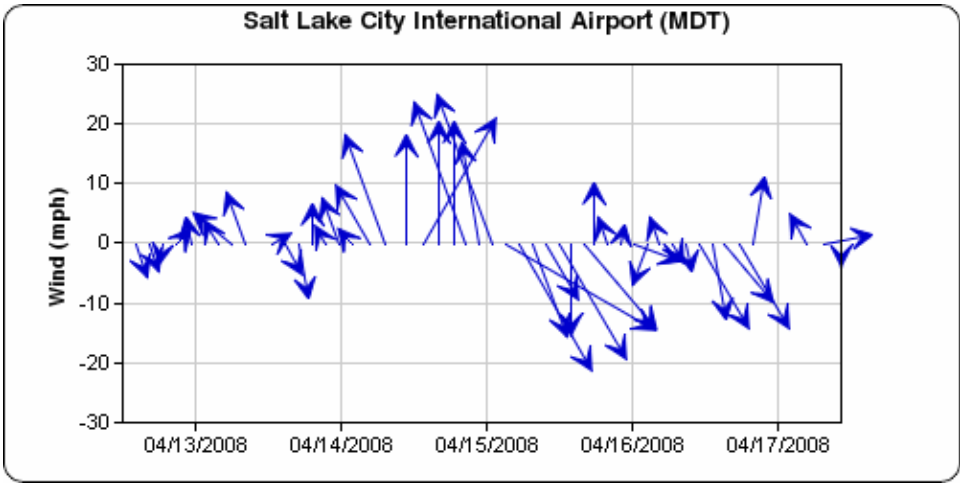
II. There is a clear-causal connection between the high wind event and the exceedances at the Wasatch Front monitoring stations;

III. The measured PM10 concentrations and high winds were beyond normal historical levels; and

IV. The exceedances would not have occurred "but for" the high winds.

On April 15, 2008, Utah experienced a natural high wind meteorological event associated with the passage of a storm pattern. Meteorological parameters for this storm event include:

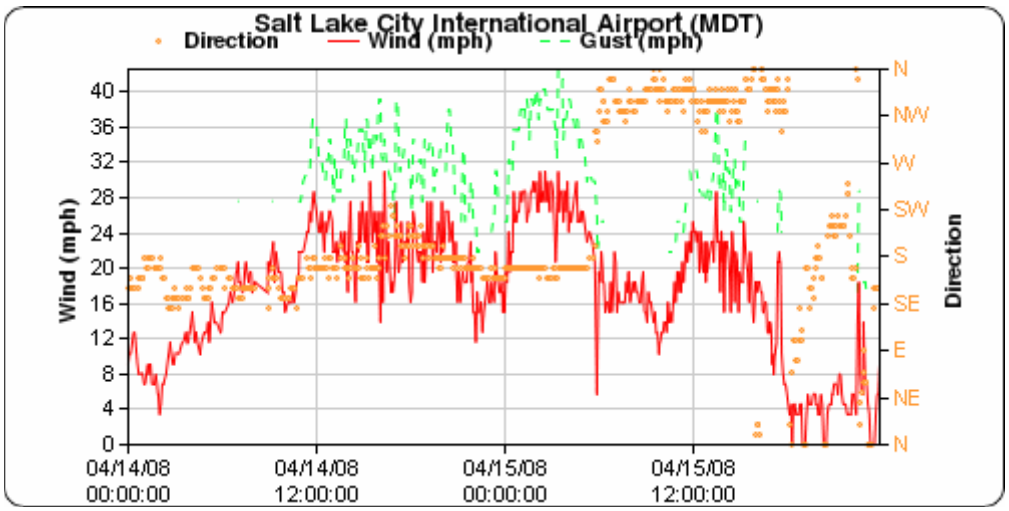
a. Wind direction changed 90° (Source: MesoWest).



b. Temperatures dropped 18°F within three hours, from 4 a.m. to 7 a.m. MDT on April 15, 2008. By 4 p.m. MDT, the temperature dropped to 37.4°F (Source: MesoWest, SLC airport).

04/15/08 04:00	66.2°F
04/15/08 06:00	59°F
04/15/08 07:00	48.2°F
04/15/08 16:00	37.4°F

c. Average maximum wind velocity measured at the SLC airport was 31 mph at 03:25 p.m. MDT, gusting to a maximum of 43 mph (Source: MesoWest).



This exceptional natural event entrained particulates into the air by high winds through a mechanism of surface erosion occurring in various locations up-wind and southwest of the Wasatch Front monitoring network.

The Salt Lake Tribune carried a full feature article on April 16, 2008 on the wind storm. The article included interviews with Division of Environmental Quality (DEQ), Utah State University, and Utah Farm Bureau personnel who were asked to explain the event. Possible contributing factors that were cited included drought conditions and the Milford Flats fire of 2007 that exposed 329,000 acres of soil subject to wind erosion, especially under gusting winds of 40-50 mph.

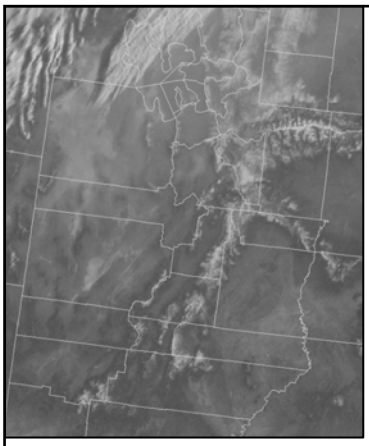
Dust storm blows through, temporarily muddles air
By Judy Fahys
The Salt Lake Tribune
Article Last Updated: 04/16/2008 01:04:57 AM MDT

Wind pumped thick dust clouds into northern Utah early Tuesday ahead of a cold, rainy front that rolled in at midday. It was a sharp contrast to Monday's balmy, bluebird skies. Gusts swept in tiny dirt particles from the Sevier Dry Lake and the Sevier Desert on Tuesday morning, then began lifting dust from the salt flats west of the Great Salt Lake by afternoon, according to National Weather Service satellites.

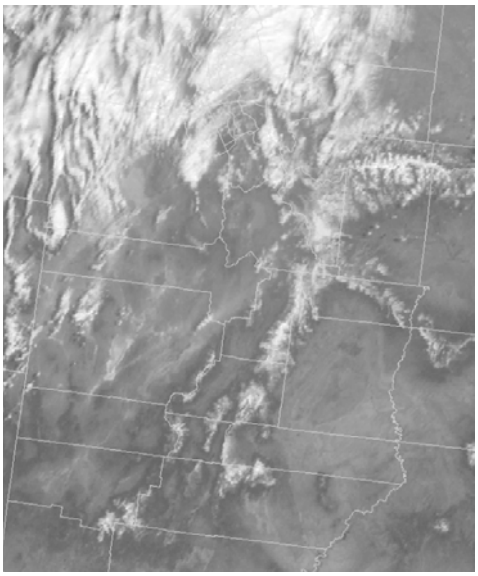
The heavy plumes - along with high readings for PM 10 early Tuesday morning - prompted state air-quality officials to issue a health advisory for people in sensitive groups. The very old, the very young and people with heart and lung trouble needed to avoid exerting themselves in the dust, the advisory said. "This is a fairly typical dust storm that we have" in spring, said Bob Dalley, who oversees air monitoring for the state. Wind storms kick up the dust this way two or three times a year, he noted. But Bryce Bird, planning branch manager for the state Division of Air Quality, pointed out: "We're seeing some of the highest [PM 10] levels we've seen in a long time." Could last summer's wildfires and years of drought be partly to blame? It's too soon to tell for sure, said Bird. State air-quality experts will study the weather maps and wind patterns. They might need the data connecting Tuesday's storms to the northern Utah dust spikes to convince the U.S. Environmental Protection Agency that man-made pollution wasn't responsible for the high air-pollution readings. Alan Moller, a meteorologist with the Utah Climate Center at Utah State University, said the Milford Flats fire last summer and the drought "could be a factor." Hot temperatures over the weekend and on Monday might have left the top layers of soil vulnerable to widespread winds that gusted at around 50 mph in much of the state, he said. The winds came from the south, the direction of the fires, he added. "There's another clue the fires were contributing to the dust." It's a connection Randy Parker of the Utah Farm Bureau is also making. He was in Washington, D.C., with the Utah Partners for Conservation on Tuesday to make a pitch to Congress for mounting a war on cheatgrass, which is making Western landscapes susceptible to wildfire. He watched the dust blow into the Salt Lake Valley on Monday night during a son's soccer game. "You could probably assume that some of those areas - not just in last summer's fires in Milford Flats, but from the drought in the last decade - are part of it," he said of the dust. By Tuesday afternoon, snow was falling in valleys that had seen 70-degree temperatures the previous day, and air monitoring officials had called off the health alert in Utah, Salt Lake, Davis and Weber counties. The cold set in and promised to stick around through the night and into today, according to the weather service. Temperatures nearing freezing were expected overnight and daytime highs were expected to be in the mid-40s - about 10 degrees below normal - under partly cloudy skies. Snow showers were expected in the mountains. But things will warm up and the skies will clear beginning Thursday, the weather service said.

Mr. Randy Graham of the National Weather Service confirmed the source of the dust cited in the Tribune, “one plume was from the Sevier Lake bed and the other was from the Milford Flat burn scar. By mid-morning a plume is clearly visible all the way into Utah County, but the impact of the plume extended all the way in the Salt Lake Valley.”

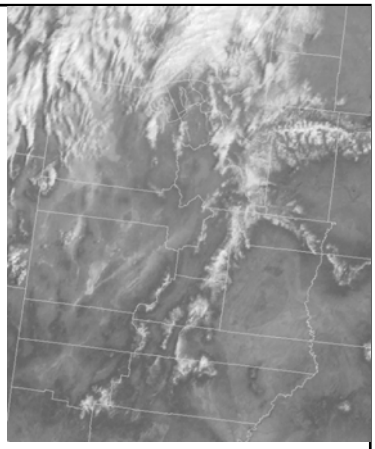
Satellite Images Provided by the National Weather Service Showing Dust Storm Sources



4-15-08 1500 Z



4-15-08 1730 Z



4-15-08 1700 Z

Study Area Background

Soil Resources

Soil resources within the study area have formed within one Major Land Resource Area (MLRA); MLRA 28A – The Great Salt Lake Area (USDA 2006).

MLRA 28A consists of the following soil orders: Aridisols, Entisols, and Mollisols. Aridisols are soils that develop in dry arid ecosystems. Entisols lack soil development and typically are shallow or sandy. Mollisols have a thick, dark, fertile surface layer (USDA 2006).

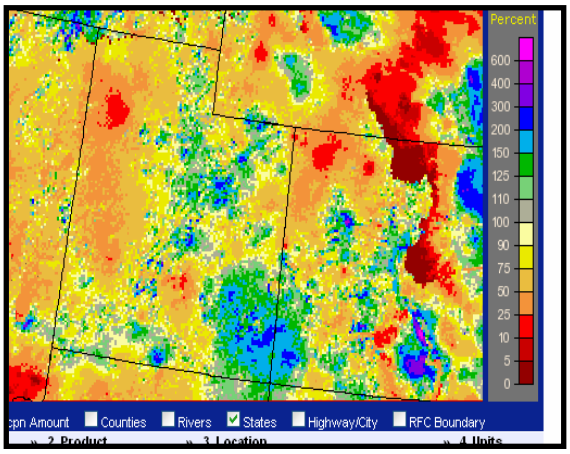
The Great Salt Lake Area is comprised of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes, and are not well dissected because of low rainfall. **A large salt desert playa is located south and west of Great Salt Lake** (prone to erosion). **Most of the valleys are closed basins containing sinks or playa lakes**. The soils in this area

generally are well drained or somewhat excessively drained, loamy or loamy skeletal (lacking soil horizons and rocky), and very deep. Soils in this area commonly contain high calcium carbonate contents. Alkalinity commonly increases with depth. Soils along alluvial fans, lake plains, and flats often have high concentrations of salts and sodium (USDA 2006).

Climate

The average annual precipitation is 5 to 12 inches in the valleys. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The driest period is from midsummer to early autumn. Precipitation in winter typically occurs as snow (USDA 2006).

The Delta weather station is located near the Sevier Lake bed, a region that contributed dust to the storm (based on National Weather Service information, back trajectory and surface wind directions during a segment of the event). Precipitation at Delta for March and April of 2008 was: March 2008 0.51 in., 60% of normal; and April 2008 0.10 in., 12% of normal (NOAA). Similarly, below normal precipitation occurred in February and January as well (NOAA). This data corroborates the drought conditions cited by Mr. Moller in the Salt Lake City Tribune article (page 3). Dry conditions enhance wind erosion conditions.

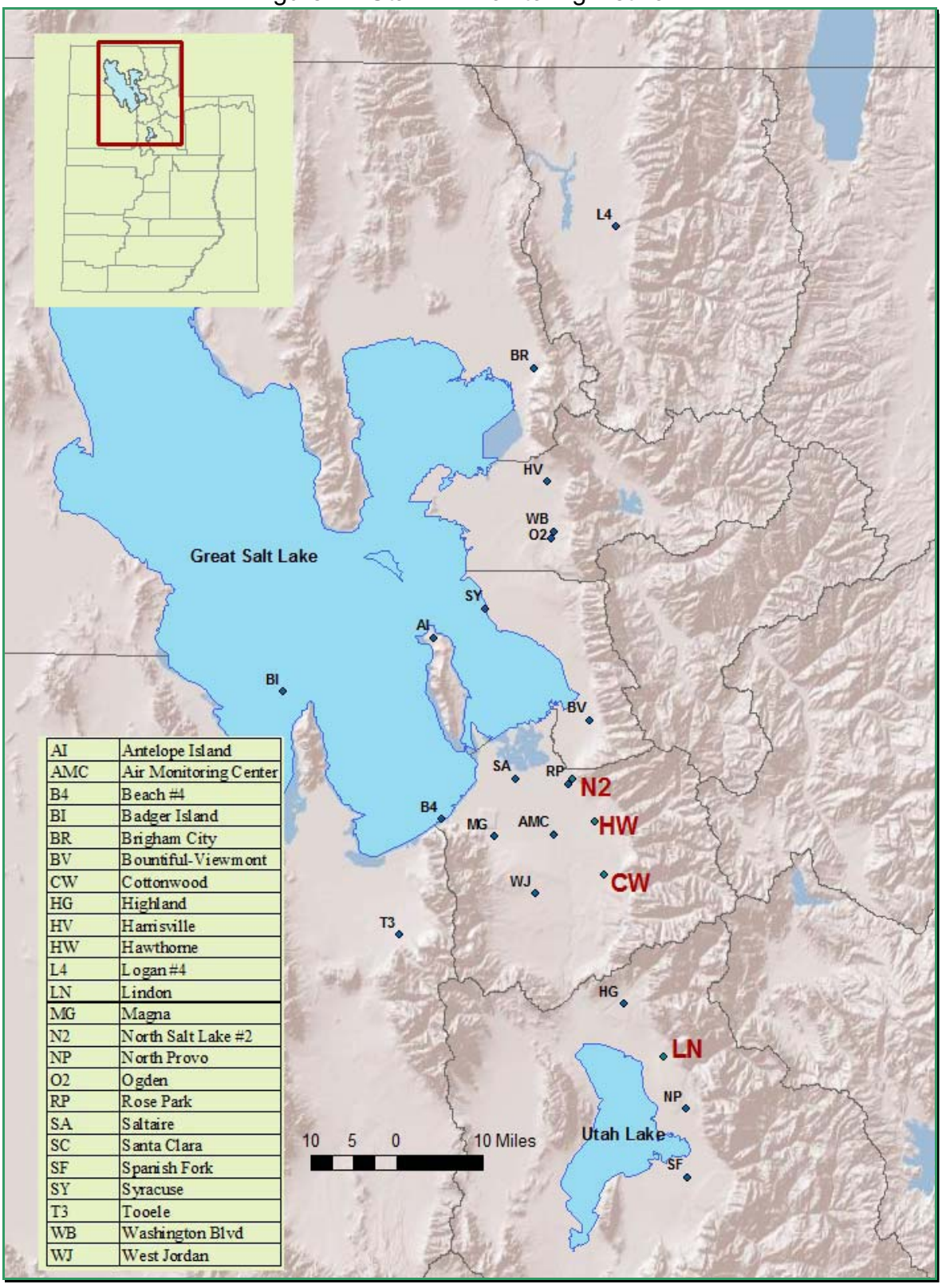


Utah Precipitation from Norm – February 2008
NOAA Advanced Hydrologic Prediction Service

Affect Air Quality

The Wasatch Front experienced an overnight dust storm resulting in PM10 levels in excess of the 24-hour standard (affecting the 95th percentile (%ile) values at some locations) and elevated PM2.5 levels. PM10 exceedances were measured at the North Salt Lake, Hawthorne, Cottonwood, and Lindon air monitoring stations. Figure 1 shows the locations of these monitoring stations, as well as the entire Utah monitoring network.

Figure 1 - Utah Air Monitoring Network



AI	Antelope Island
AMC	Air Monitoring Center
B4	Beach #4
BI	Badger Island
BR	Brigham City
BV	Bountiful-Viewmont
CW	Cottonwood
HG	Highland
HV	Harrisville
HW	Hawthorne
L4	Logan #4
LN	Lindon
MG	Magna
N2	North Salt Lake #2
NP	North Provo
O2	Ogden
RP	Rose Park
SA	Saltaire
SC	Santa Clara
SF	Spanish Fork
SY	Syracuse
T3	Tooele
WB	Washington Blvd
WJ	West Jordan

The National Ambient Air Quality Standards (NAAQS) exceedances for PM10 on April 15, 2008, are shown in Table 1 and Figure 2. Figure 2 also shows that the entire PM10 monitoring network measured greatly elevated values (including Logan, Ogden, Magna and North Provo).

Table 1 – PM10 Exceedances

Monitor	µg/m^3	AQS Mon. #	Lat.	Long.
Lindon	164	49-049-4001	40.33952	-111.71344
Cottonwood	177	49-035-0003	40.64405	-111.84976
Hawthorne	166	49-035-3006	40.73436	-111.87201
North Salt Lake	188	49-035-0012	40.80536	-111.92101
North Salt Lake – Co Located	220	49-035-0012	40.80536	-111.92101

Figure 2 – PM10 24-hr Values

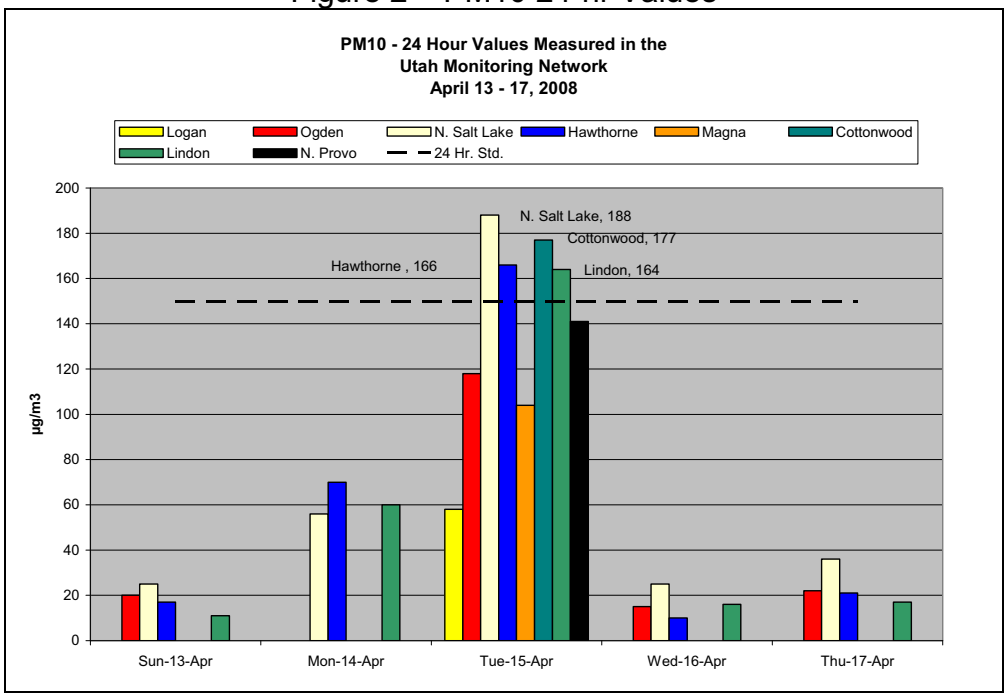


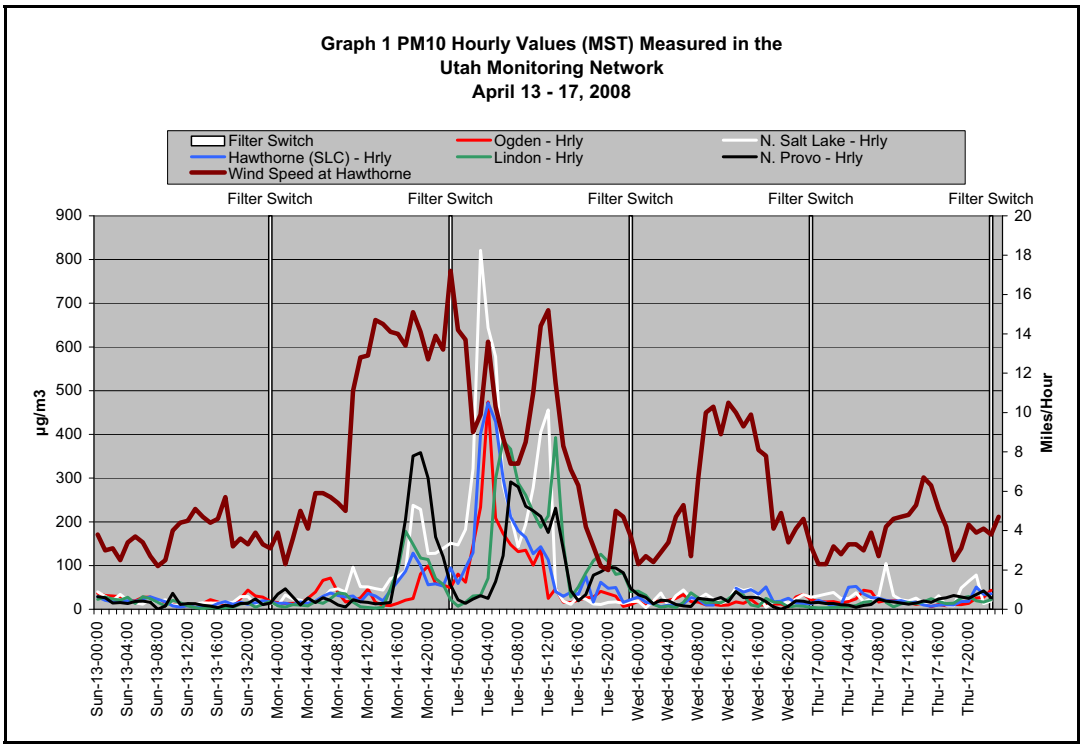
Image 1 presents an aerial view of monitoring sites in the valley, along with the PM10 24-hr concentrations. Higher PM10 levels were measured along the west side of the Wasatch Mountain range, than along the east side of the Oquirrh Mountains (Magna station location). When winds are from the south-southwest, there is a wind over flow component that occurs over the Oquirrh Mountains because they are only 3,000 ft. above the valley's base elevation. Winds on the eastern side of the valley tend to hug the Wasatch Front because these mountains are much higher at 5,000 ft above the valley's base elevation. These effects can cause higher PM10 levels on the eastern than western regions of the valley, which contributes to the lower PM10 at the Magna station.

Image 1 – Aerial View of Select PM10 Levels

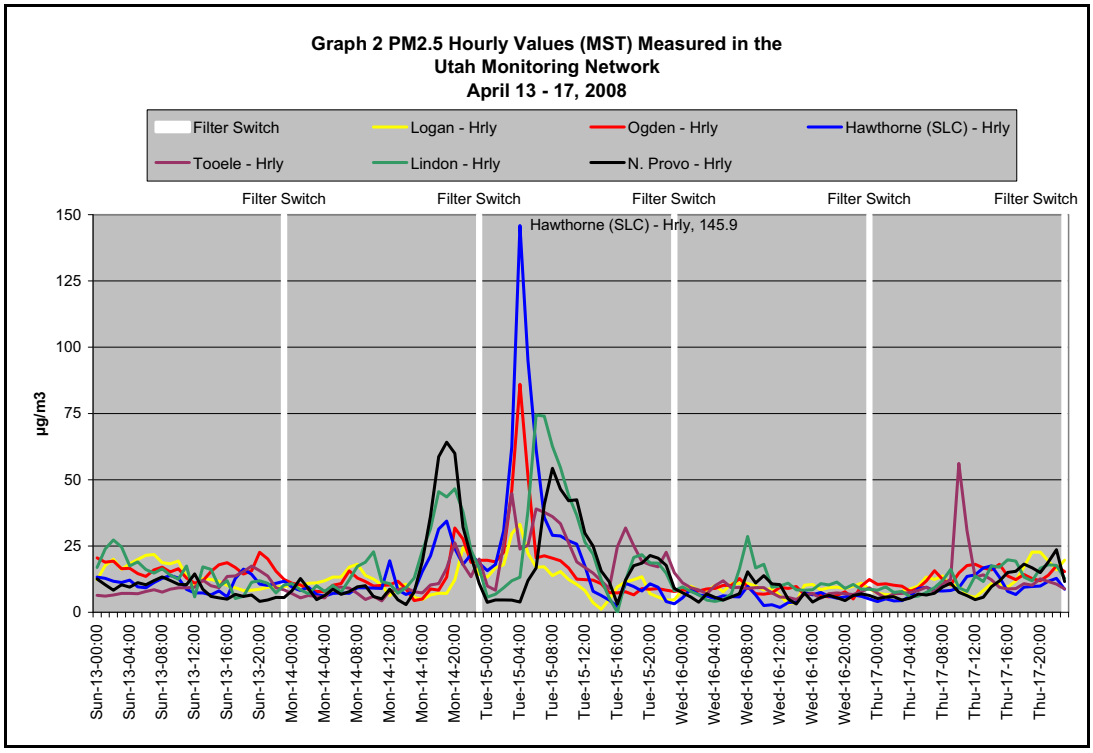
Graph 1 shows the hourly measurements for PM10, at available TEIOM monitors, and wind speed, measured at the Hawthorne station, beginning on Sunday 13, 2008, through Thursday 17, 2008. Graph 2 presents the measurements for PM2.5 for the same timeframe. It is evident from both graphs that particulate matter levels were stable from Sunday to Monday 16:00 MST, than were significantly elevated after 16:00 MST, peaking at around 20:00 MST on Monday. The wind speed shown in Graph 1 represents an excellent relationship between wind speed and PM10 levels. As the winds increased from 2-4 mph on Sunday and Monday to 15 mph and beyond, PM10 levels increased dramatically. High winds preceding and following the passage of a cold front caused the NAAQS exceedances.

Precipitation from the cold front kept PM10 at normal levels despite increased winds on Wednesday.

Graph 1 PM10 Hourly Values (MST) Measured in the Utah Monitoring Network April 13 - 17, 2008



Graph 2 PM2.5 Hourly Values (MST) Measured in the Utah Monitoring Network April 13 - 17, 2008

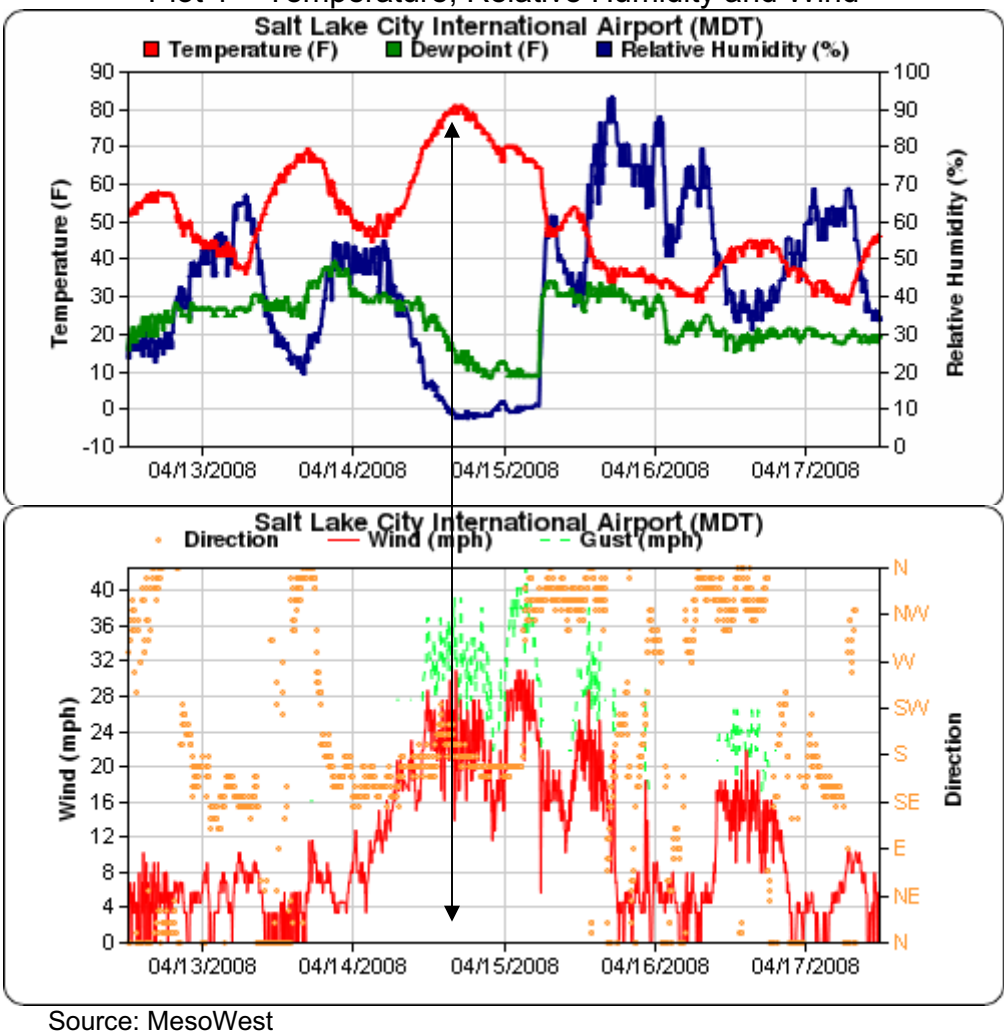


Not Reasonably Controllable or Preventable & Natural Event

Rapidly developed cold fronts produce strong winds and dramatic temperature gradients over the Intermountain West (Shafer and Steenburgh 2008). As such, these storms are natural events. This seasonal spring occurrence creates the potential for wind eroded surface soils in the deserts of western Utah and eastern Nevada. Soil particles are susceptible to erosion when rapid heating releases it's adhesion to the strata and surface wind velocities are sufficient to suspend them into the air mass.

Plot 1 presents the 5-day temperature-relative humidity-dew point profile for the Salt Lake City airport for April 13-17, 2008. Plot 1 depicts the rapid temperature increase on the 14th with normal night time cooling. At the same time, the relative humidity and dew points plunged, indicating the passage of the dry line. This phenomenon is in fact the definition of a dry line, i.e., rising temperatures with sharp drop in dew point. Blowing dust and rising temperatures are characteristic effects during dry line fronts. As the cold front approached the Wasatch Front, the relative humidity dramatically increased.

Plot 1 – Temperature, Relative Humidity and Wind



Source: MesoWest

Aligning the 5-day temperature profile with the 5-day wind profile for the same period shows the increased wind associated with the dry line and subsequent cold front. The wind speed before the dry line passage on the 14th was below 10 mph. During the dry line, the wind increased from about 11-30 mph on the 15th (the day of the event), with winds gusting as high as 42 mph on the 15th.

As the relative humidity increased on the 15th, the temperature rapidly decreased and it began to rain. By the afternoon of the 15th, the rain changed to snow (refer to Plot 2). The airborne particulate levels also quickly receded, as shown on graphs 1 and 2 around 08:00 (MDT) on the 15th.

Plot 2 – Event Precipitation

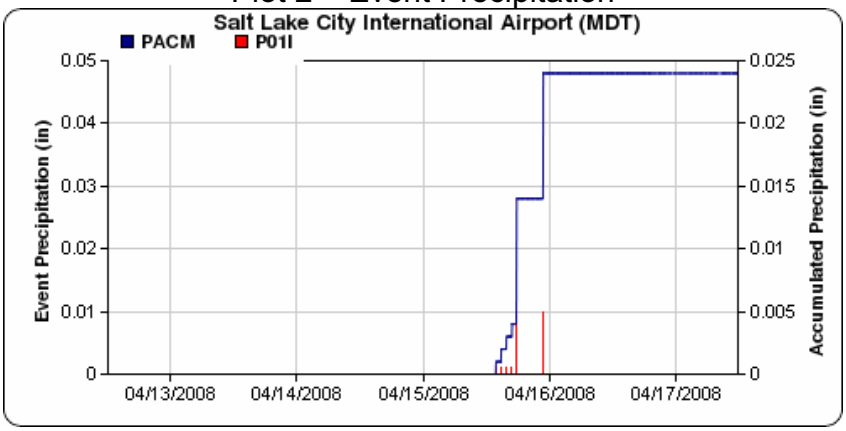
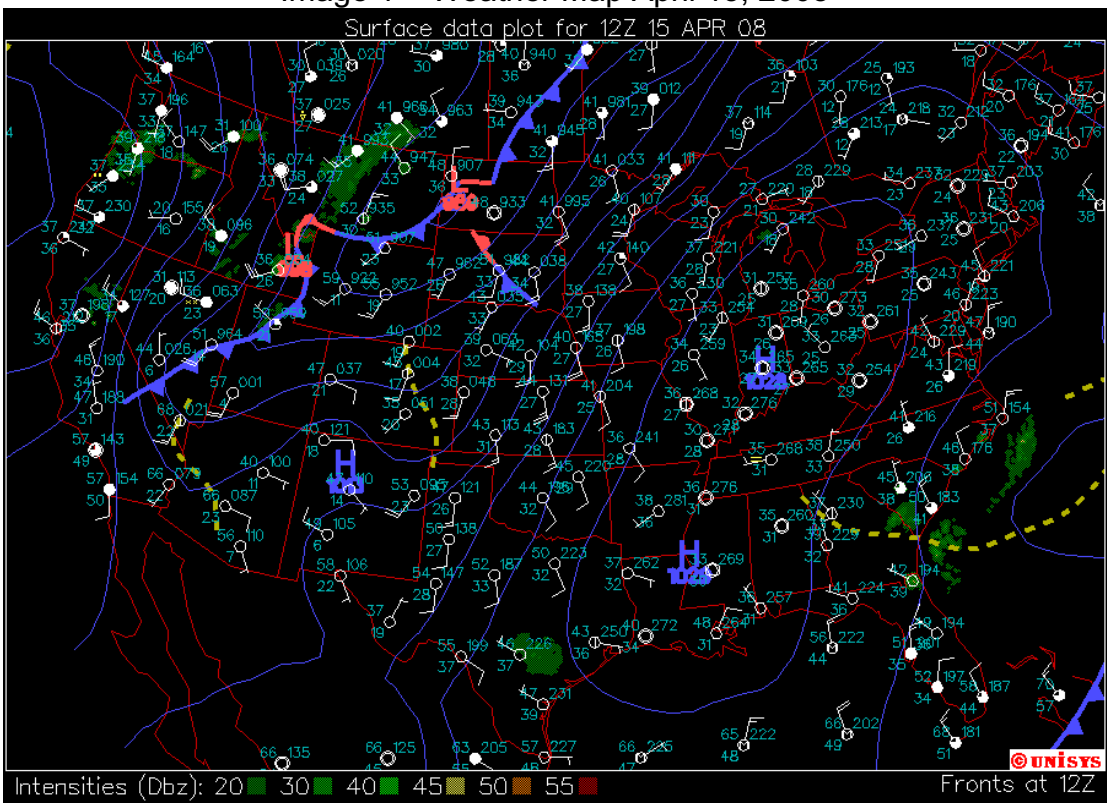


Image 1 – Weather Map April 15, 2008



The Unisys composite surface map (Image 1) for April 15, 2008, at 6 a.m., shows the cold front moving into the Salt Lake Valley. The winds at this point were out of the south at 20.7-25.3 mph. This natural event could not be reasonably controllable or preventable.

Image 2 – Salt Lake Valley on April 15

Image 2 of the Salt lake Valley was taken by the Meteorological Solutions Incorporated. This image was taken at 7 a.m. on April 15, 2008. The Hawthorne monitoring station is located within the view to the lower right of the image.

Image 3 – Salt Lake Valley on April 15 Mid-afternoon

By mid-afternoon, the temperature was near freezing, as the cold front captured the valley. The storm initially brought rain that quickly turned to snow (Image 3).

Normal Historical Fluctuation (40 CFR 50.14)

Utah experiences naturally occurring wind storms, predominantly in the spring. These storms are typically caused by the passage of a cold front resulting in high winds passing over desert playa soils that are entrained in the wind and transported into the Salt Lake City valley causing elevated particulate levels. These natural events are included in the Exceptional Event rule even though they are recurring because they generate **unpreventable** and **uncontrollable** high wind.

PM10

Normal historical fluctuation for PM10 was computed in a three-step process in order to assess whether an observed value is in excess.

First, all historical PM10 values from each monitoring station were aligned from least to greatest. The location of the effected value in relation to the rest of the historically values is expressed as a %ile.

Second, a box plot analysis was preformed on the historical data. The interquartile range (IQR) was calculated. This was then compared to the event value.

Third, a lognormal distribution analysis was preformed on the historical data. The geometric mean, geometric standard deviation, and the 1st, 2nd, and 3rd geomantic standard deviations above the geometric mean where calculated. These where then compared to the event value.

In addition, an analysis is included showing that winds speeds during this event are not the norm.

Ranking

Guidance found at 72 Federal Register 55 March 22, 2007, pages 13560-81, states that a lesser amount of documentation would likely be necessary for “extremely high” concentrations (e.g. > 95th%ile) than for concentrations that were closer to “typical levels” (e.g. < 75th%ile.).

Lindon - LN - 49-049-4001

The data ranking described above for the Lindon monitoring station data collected from 1993 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The data ranking for the Cottonwood monitoring station data collected from 1993 through verifies that the PM10 concentration on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The data ranking for the Hawthorne monitoring station data collected from 1997 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 95th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The data ranking for the North Salt Lake monitoring station data collected from 1993 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 95th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

The co-located monitor at North Salt Lake was also elevated for PM10 on April 15, 2008. Monitoring at this station for PM10 began in January 2008; thus, insufficient data is presently available to conduct a detailed analysis but, of the 52 available data points, the measured value of 220 µg/m^3 is the highest value recorded for the monitor. Further more, it is the only exceedance recorded at the monitor.

Interquartile Range

The IQR is a measure of statistical dispersion, and is a "robust statistic." Robust statistics seek to provide methods that emulate classical methods, but which are not unduly affected by outliers or other small departures from model assumptions. The IQR was calculated on a quarterly basis and on a yearly basis.

Lindon - LN - 49-049-4001

The following is the IQR for all Lindon data:

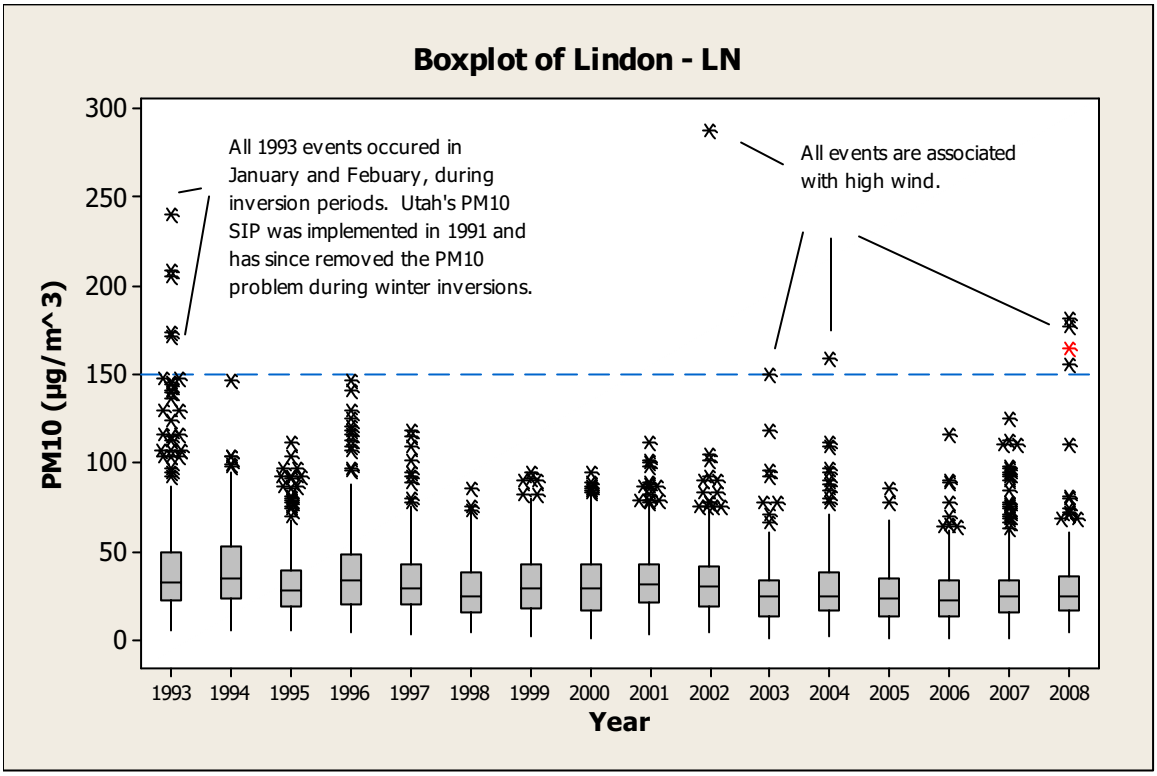
First Quartile (Q1): 17 µg/m^3
Median (Q2): 27 µg/m^3
Third Quartile (Q3): 40 µg/m^3
IQR: 23 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 2) along with the annual.

Table – 2 Lindon Interquartile (µg/m^3)

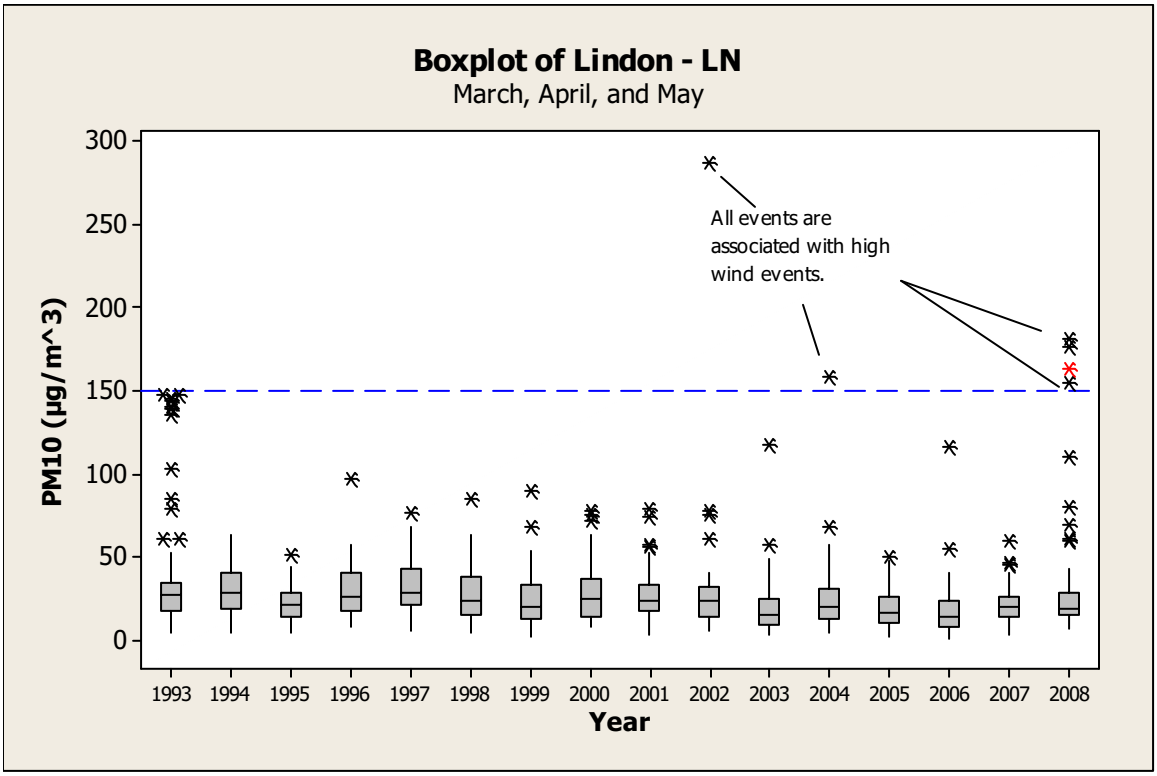
Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	1366	15	27	49	34
2	1423	14	22	32	18
3	1357	25	33	43	18
4	1300	17	26	38	21
All	5446	17	27	40	23

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



The boxplot whiskers extend to points (events) that are statistically considered to be outliers from the sample population, typically 1.5 times the IQR above the third quartile (Q3). All outliers that exceed the 24hr PM10 standard since 1994 are associated with high winds.

Because this event occurred during the second quarter, it may be more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, all events that exceed the current PM10 standard are associated with high wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Cottonwood - CW - 49-035-0003

The following is the IQR for all Cottonwood data:

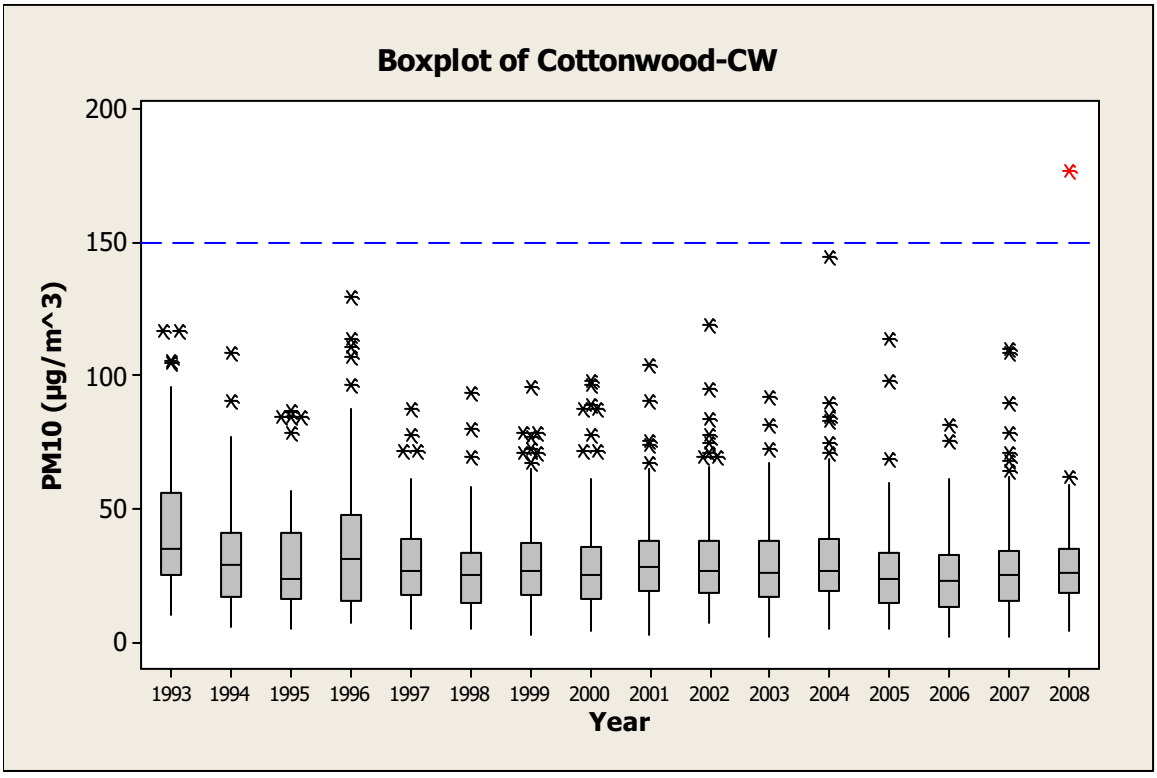
Q1: 17 µg/m^3
Q2: 26 µg/m^3
Q3: 38 µg/m^3
IQR: 21 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 3) along with the annual.

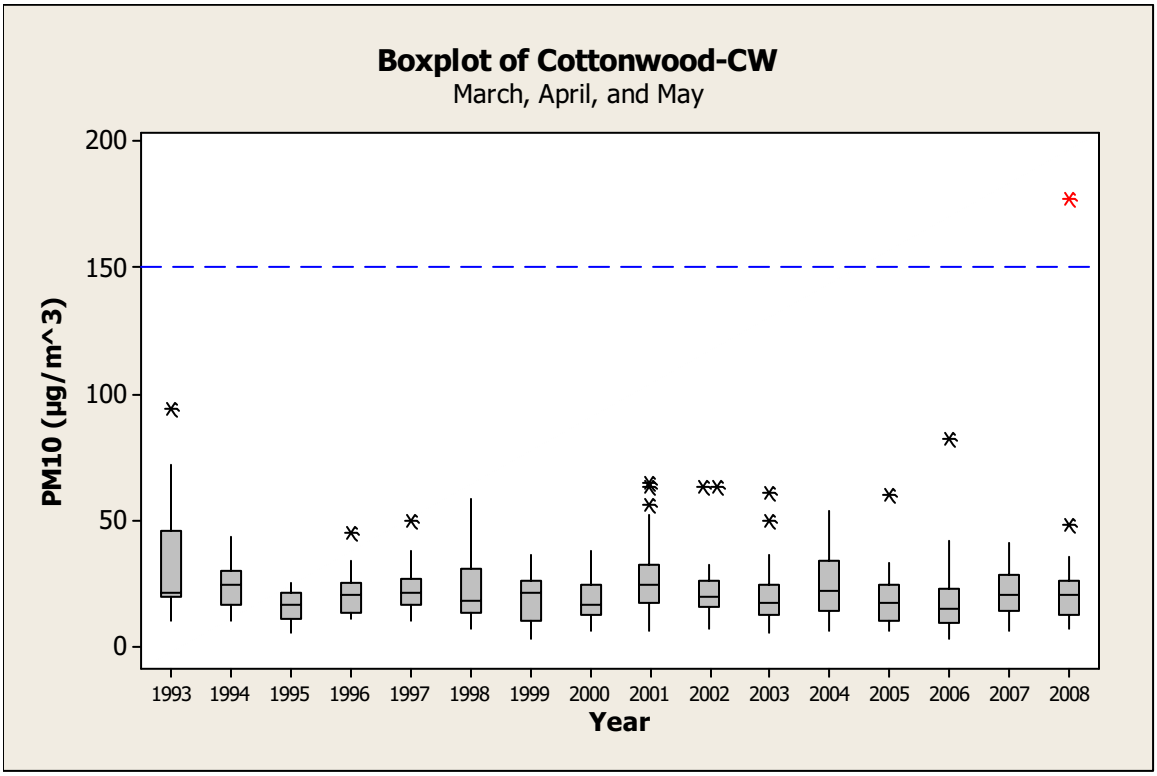
Table – 3 Cottonwood Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	564	16	28.5	48.75	32
2	385	13	19	26	13
3	382	25	32	40	15
4	396	18	27	34	16
All	1727	17	26	38	21

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



The only exceedance of the standard is the April 15, 2008, wind event. Because this event occurred during the second quarter, it may be more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, the only event that exceeds the current PM10 standard is the April 15, 2008, event.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Hawthorne - HW - 49-035-3006

The following is the IQR for all Hawthorne data:

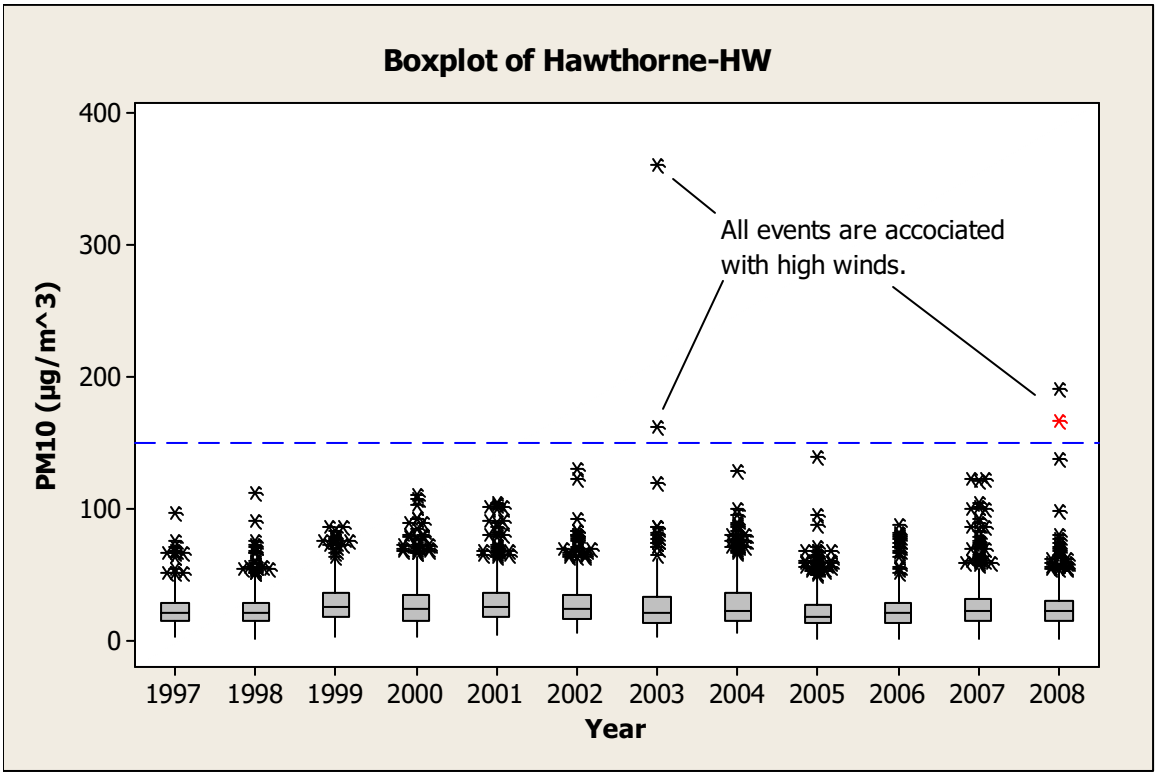
Q1: 16 µg/m^3
Q2: 23 µg/m^3
Q3: 32 µg/m^3
IQR: 16 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 4) along with the annual.

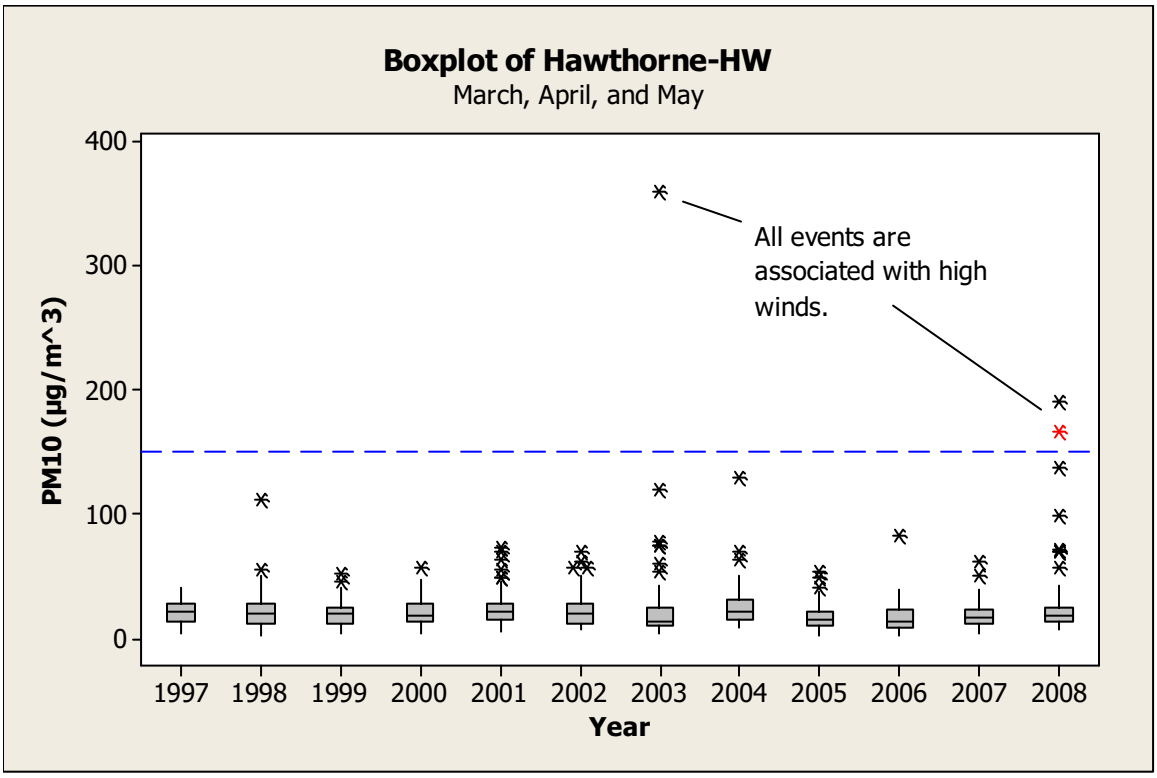
Table – 4 Hawthorne Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	954	17	29	51	34
2	1034	12	18	26	14
3	1039	18	23	30	12
4	1012	16	24	32	16
All	4039	16	23	32	16

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



All outliers that exceed the 24hr PM10 standard are associated with high winds. Because this event occurred during the second quarter, it may be more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, all events that exceed the current PM10 standard are associated with high wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

North Salt Lake - N2 - 49-035-0012

The following is the IQR for all North Salt Lake data:

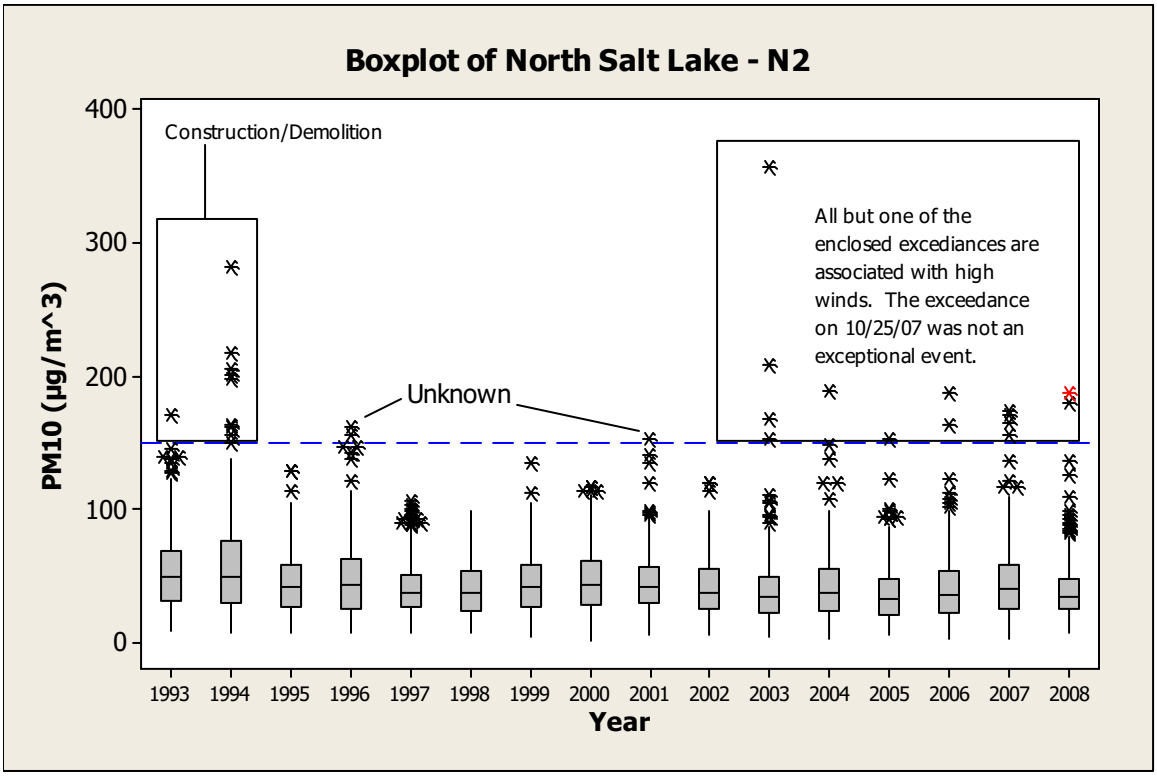
Q1: 25 µg/m^3
Q2: 40 µg/m^3
Q3: 57 µg/m^3
IQR: 32 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 5) along with the annual.

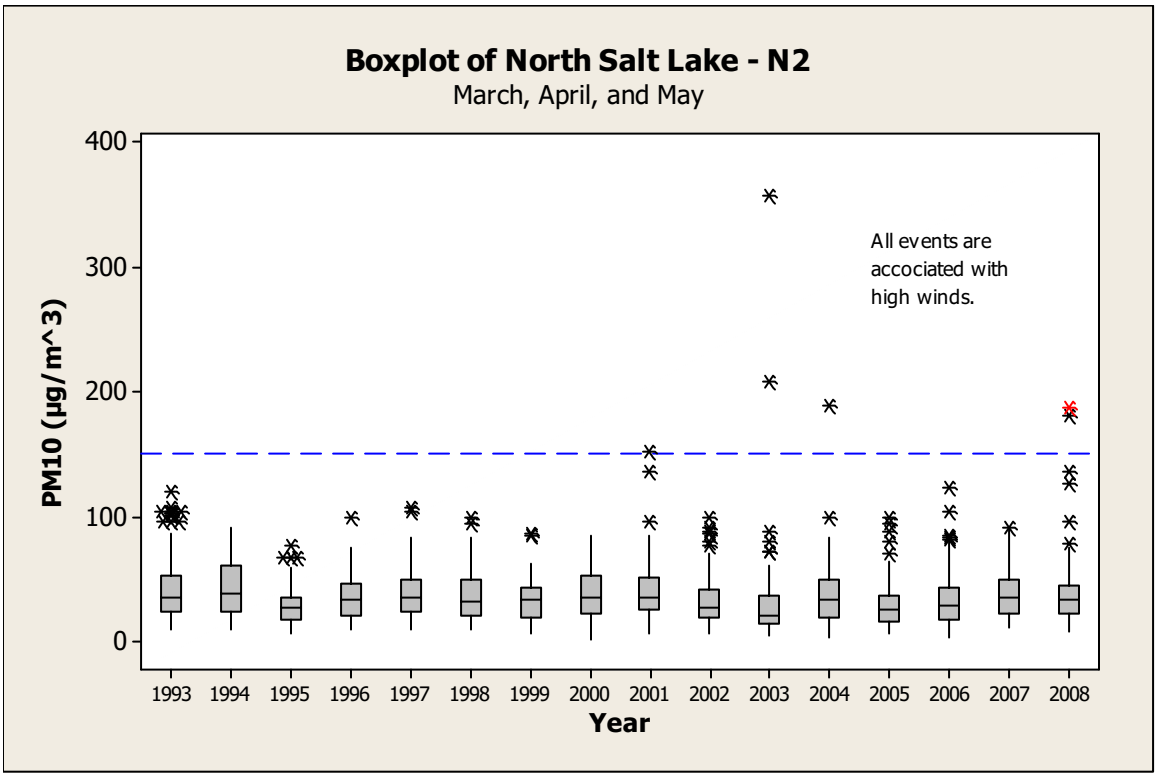
Table – 5 North Salt Lake Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	1295	23	37	59	36
2	1408	20	32	47	27
3	1380	34	46	62	28
4	1349	26	42	62	36
All	5432	25	40	57	16

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



All but one exceedances of the 24hr PM10 standard since 2002 are associated with high winds. Because this event occurred during the second quarter, it may be more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



All exceedances of the current PM10 standard since 2002 are associated with High Wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Lognormal Distribution

Lognormal distribution analysis was conducted to establish the normal historical fluctuations for the four subject stations (inclusive of exceptional event results). Lognormal distribution was selected because of its ability to accurately describe the distribution of measured concentrations of PM10. The geometric mean (µgeo) was calculated on a quarterly basis (shown in Table 6) and on an annual basis. The annual basis provides the greatest number of data points and is sufficiently similar to the spring quarterly value; thus, the annual geometric mean is used to reflect the normal historical values for the four stations.

Table 6 – Geometric Mean of PM10

Location	Quarter	N Quarterly	µgeo (µg/m^3)	Annual µgeo (µg/m^3)
Lindon 01/01/1993 to 12/31/2008	1	1366	26.00	25.38
	2	1423	20.72	
	3	1357	31.72	
	4	1300	24.53	
Cottonwood 01/01/1993 to 12/31/2008	1	564	27.30	25.10
	2	385	18.62	
	3	382	30.69	
	4	396	24.58	
Hawthorne 03/01/1997 to 12/31/2008	1	954	28.62	22.48
	2	1034	17.57	
	3	1039	22.87	
	4	1012	22.67	
North Salt Lake 01/01/1993 to 12/31/2008	1	1295	35.87	37.42
	2	1408	30.72	
	3	1380	45.24	
	4	1349	39.37	

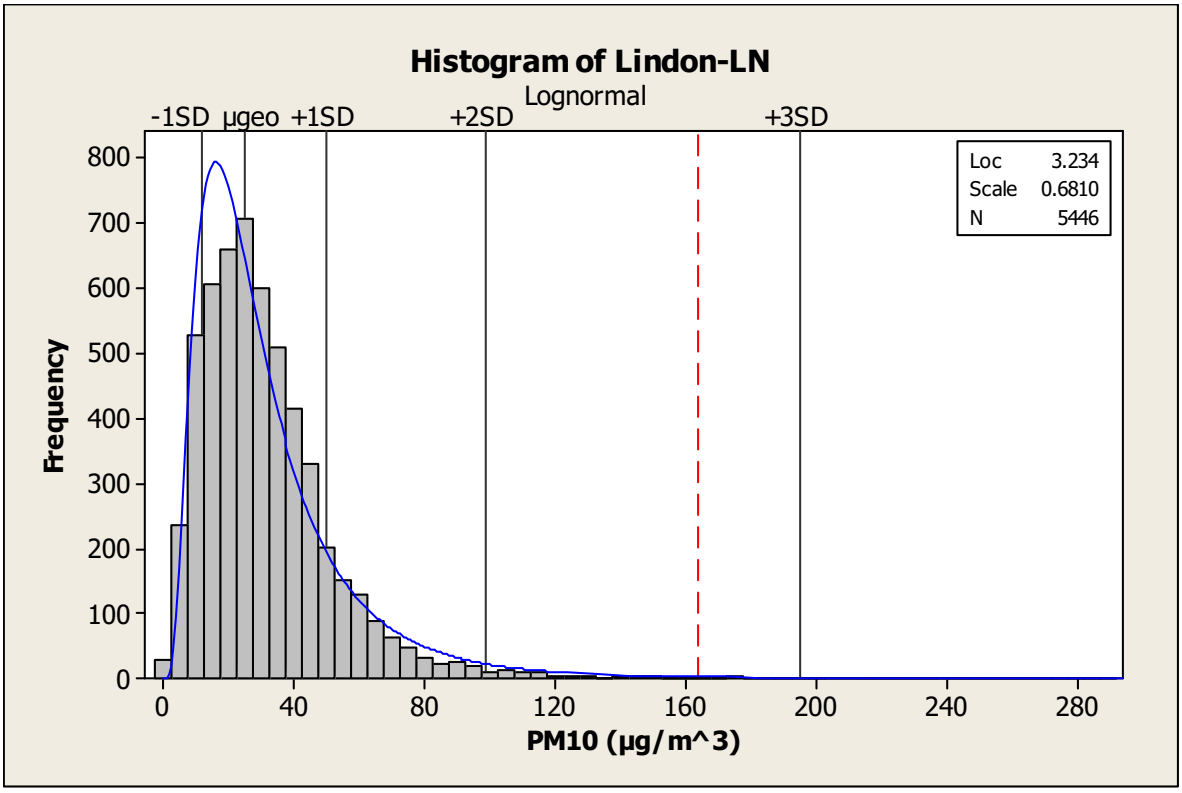
The annual values are far below the April 15th event, which ranged from 164-220 µg/m^3.

Lindon - LN - 49-049-4001

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

Geometric Mean (µgeo): Exp(Loc)=25.38 µg/m^3
Geometric Standard Deviation (σgeo): Exp(Scale)= 1.9758
+1 Standard Deviation (+1SD): Exp(Loc +Scale)= µgeo* σgeo= 50.14 µg/m^3
+2 Standard Deviation (+2SD): Exp(Loc +2*Scale)= µgeo* (σgeo)^2= 99.08 µg/m^3
+3 Standard Deviation (+3SD): Exp(Loc +3*Scale)= µgeo* (σgeo)^3= 195.78 µg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



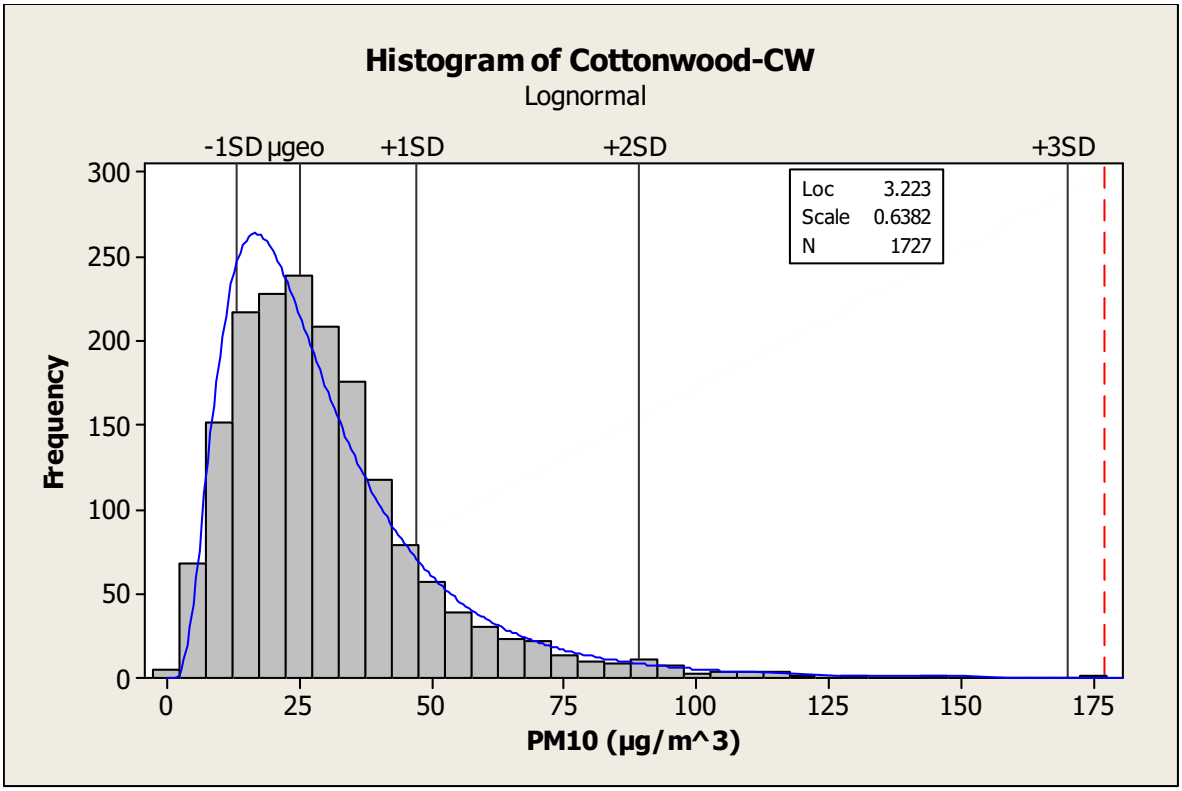
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **approaches 3SD.** The event value is clearly outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
μgeo = 25.10 μg/m^3
σgeo = 1.893
+1SD = 47.52 μg/m^3
+2SD = 89.96 μg/m^3
+3SD = 170.30 μg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



Because this station samples every 6-day's instead of daily, as in the case at Lindon, there is less than half the amount of data points at Cottonwood resulting in a larger data distribution.

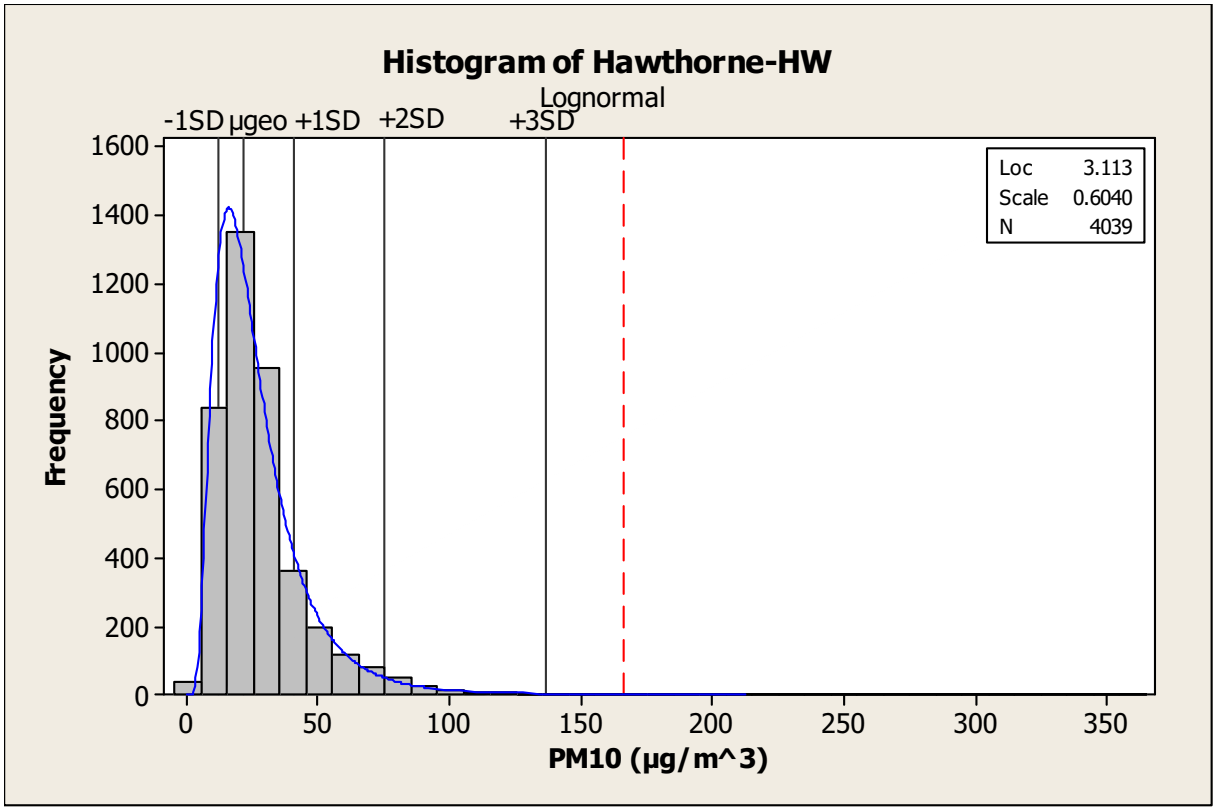
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **exceeds 3SD.** The event value is clearly outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
µgeo = 22.48 µg/m^3
σgeo = 1.829
+1SD = 41.14 µg/m^3
+2SD = 75.26 µg/m^3
+3SD = 137.68 µg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



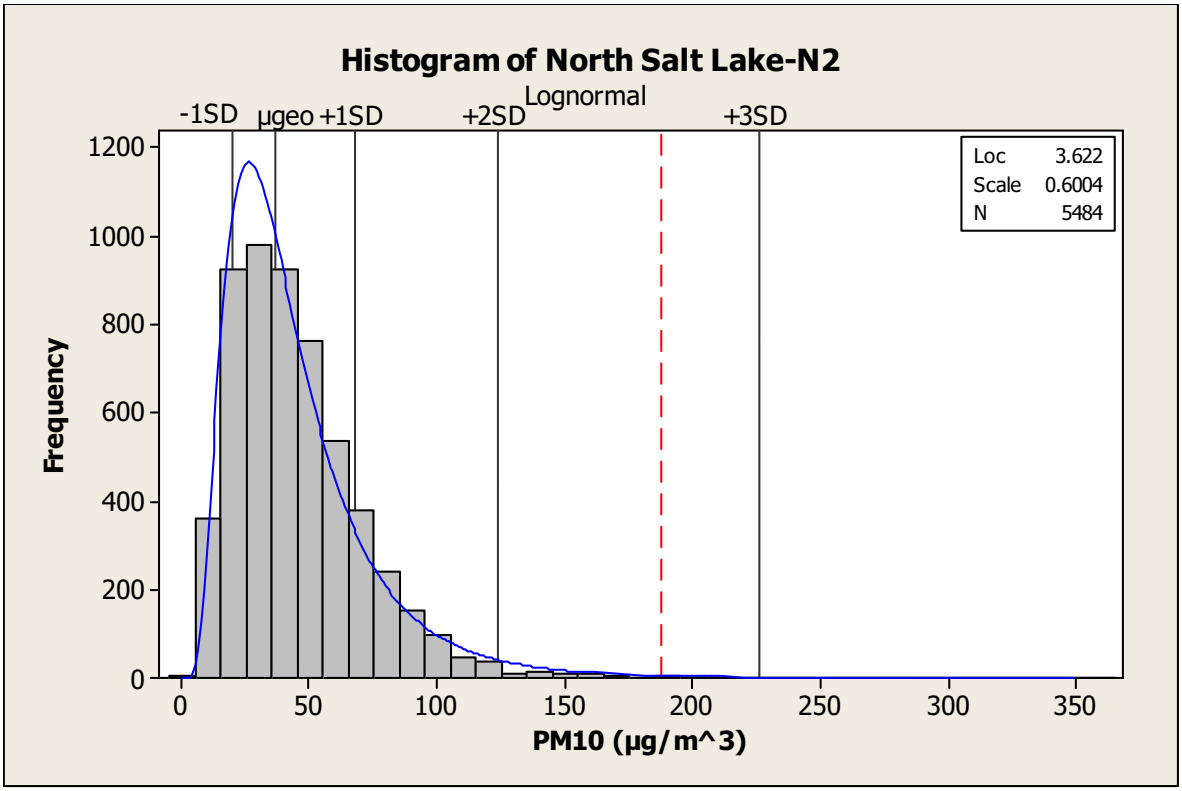
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **exceeds 3SD.** The event value is clearly outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
μgeo = 37.42 μg/m^3
σgeo = 1.822
+1SD = 68.19 μg/m^3
+2SD = 124.33 μg/m^3
+3SD = 226.60 μg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **approaches 3SD**. The event value is clearly outside the normal historical fluctuation.

A co-located monitor also recorded an elevated level of PM10 at 220 µg/m^3, on April 15, 2008. Monitoring at this station for PM10 began in January 2008 thus, insufficient data is presently available to conduct a detailed analysis but, of the 52 available data points, the measured value of 220 µg/m^3 is the highest value recorded for the monitor. Further more, it is the only exceedance recorded at the monitor.

Wind Speed

The Exceptional Event Rule requires states to include "a historical typical wind speed levels for the season of the year that the event is claimed" (Federal Register Vol. 71, No. 55, Page 13566).

Regional Airport Data

Table 7 - Average Wind Speed in mph for 1996-2006

Station	Jan	Feb	Mar	Apr	May	Jun	Annual	MesoWest Hourly Average on 4-15-0-8
Provo	4.9	6.0	7.2	7.9	7.4	7.3	6.3	17.5
Salt Lake City	6.9	7.6	8.9	9.8	9.2	9.6	8.6	16.5

Data Source: Western Regional Climate Center

Weather measurements for April 15, 2008, at the Salt Lake City International Airport (KSLC) by the National Weather service as reported by MesoWest.

24 hr. maximum wind speed: 21 mph
24 hr. maximum wind gust: 32 mph

Ranking

A Ranked method was used to determine if the wind speed measured on April 15, 2008, was outside what is normally observed. All historical wind speeds from each monitoring station was aligned from least to greatest. The location of the effected value in relation to the rest of the historically values is expressed as a percentile (%ile). If we use the same format for wind as was used initially for PM10, it can be extrapolated that "extremely high" measurements are above the 95th%ile and that "typical levels" are closer to the 75th%ile.

Lindon - LN - 49-049-4001

The data ranking for the Lindon monitoring station for data collected since 1993 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The data ranking for the Cottonwood monitoring station for data collected since 1993 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 97th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The data ranking for the Hawthorne monitoring station for data collected since 1997 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 96th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The data ranking for the North Salt Lake monitoring station for data collected since 2005 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 97th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Clear Causal Relationship (40 CFR 50.14)

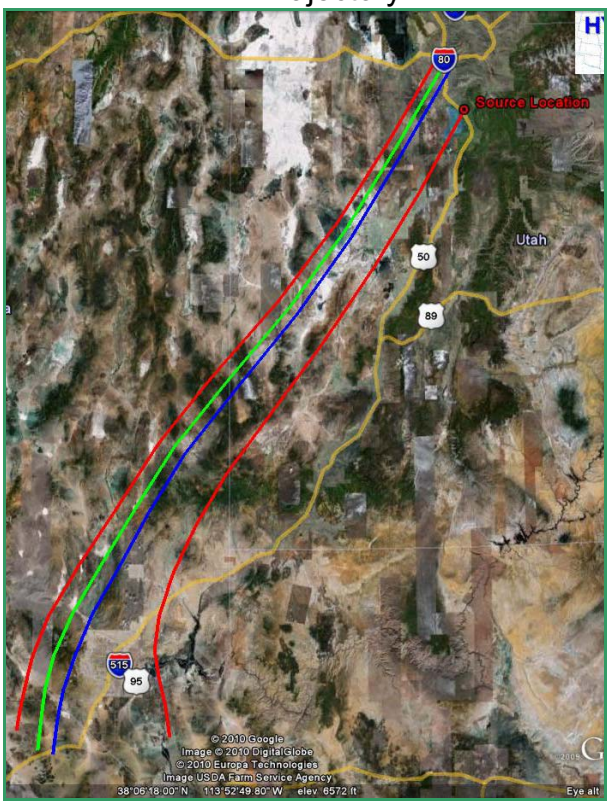
Trajectory and Impacted Area

Backwards trajectory analysis using the NOAA HYSPLIT model was used to project the winds before, during and after the storm event. The four stations were modeled (EDAS meteorological data) at 1000 meters, 12 hour back trajectory (MDT) and plotted onto Google Earth satellite images for visual enhancement of the salt desert playa described in the Soil Resources section. A height of 1000 meters was selected to represent the steering height of the air mass over the complex terrain.

The first wind trajectory is for the day before the storm on April 14, 2008, showing the winds from the south, crossing the Nevada-Utah desert regions and following the I-15 and Wasatch Front mountain range.

Trajectory 1

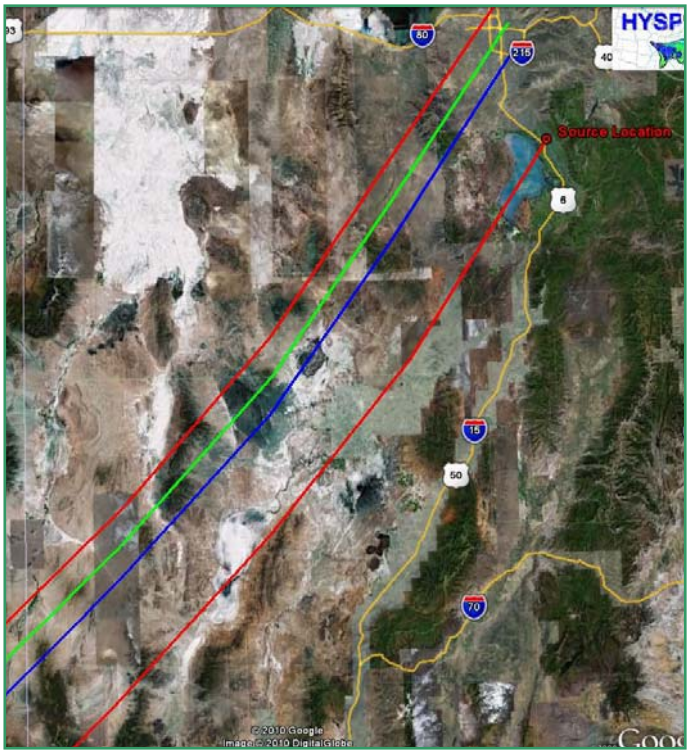
Trajectory 2



The second trajectory is at the beginning of the storm on April 15, 2008 at midnight. Note the shift to the north-west across the Sevier Desert.

Trajectory 3

Trajectory 4



Trajectory 3 is at 4 a.m. MDT on April 15, 2008, at the height of the storm, corresponding with the maximum hourly values shown on Graphs 1 and 2. The winds continued their passage over desert playa. Trajectory 4 is a close-up of Trajectory 3 clearly showing the desert regions.

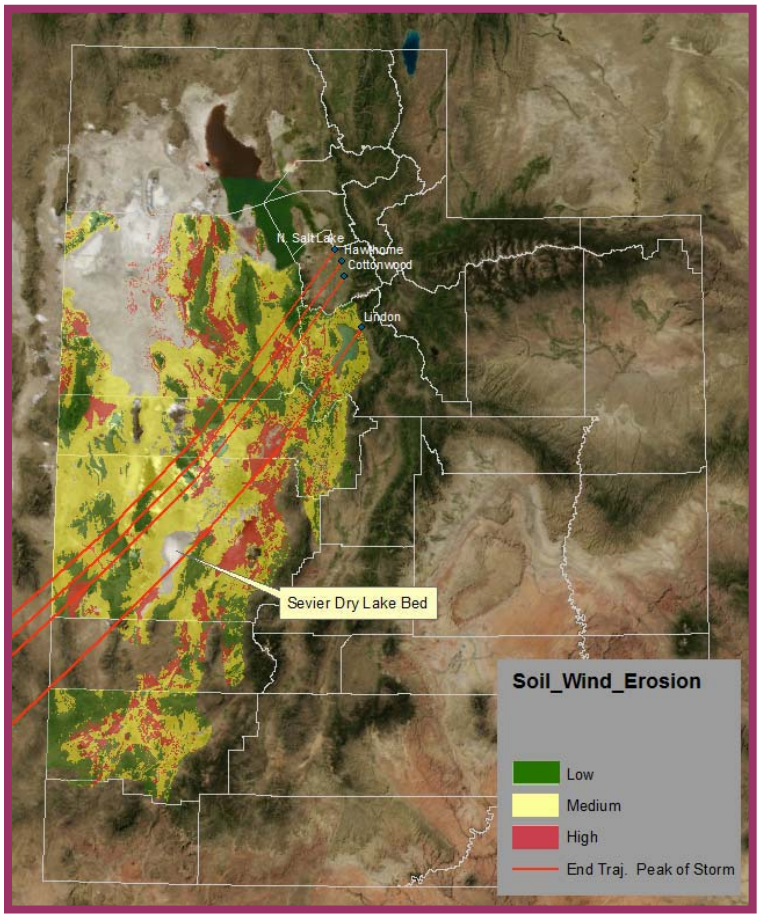
Trajectory 5

The final image is at 8 a.m. MDT on April 15, 2008, showing the wind shift as a result of the cold front with declining wind speed.

Wind Storm Passed Over Wind Erosion Prone Soils in Utah

The U. S. Department of Agriculture, Natural Resources Conservation Service (NRCS), developed a wind erosion GIS map of Major Land Resource Area 28A for the DEQ using the Wind Erodibility Index that assigns an erosion rate to soil.

The NRCS categorized soil wind erosion into three categories; low, medium and high erodibility. The HYSPLIT wind trajectory for the height of the storm event (same as Trajectory 3 above) has been layered on to the wind erosion GIS map. All four station trajectories, at this point of the storm, passed over salt desert playa regions consistent with the news report by the Salt Lake Tribute ("Gusts swept in tiny dirt particles from the Sevier Dry Lake and the Sevier Desert on Tuesday morning….)"



Speciation

Coarse Mass Composition

Studies conducted in national parks on coarse mass (2.5-10 um) indicates the composition of course mass consists of crustal minerals, carbonaceous material and salts. Sampling sites were selected to be representative of the continental United States and were operated according to IMPROVE protocol analytical procedures. Crustal minerals (soil) were reported to be the single largest contributor, followed by organic mass, nitrates and sulfates.

Crustal Minerals	34-74%
Organic Mass	20-59%
Nitrates	10-12%
Sulfates	≈ 5%

(Malm, et al, 2007).

Speciation samples of PM2.5 are collected at the Hawthorne monitoring station every third day and one was collected on April 15, 2008. DEQ also included a special speciation

request for the Lindon PM2.5 sample because of the exceedance on that day. The analytes were tabulated according to the classifications above (Table 8).

Crustal minerals – soil minerals SiO2, Al2O3, CaO, Fe2O3, K2O, MgO, FeO, Na2O, TiO2, SO2, P2O5, and Ba were tabulated using their elemental components (Pettijohn 1975).

Table 8 – Coarse Mass Analysis for Event Day

	Hawthorne %	Lindon %	Published Values
Crustal Minerals	28	36*	34-74%
Total Carbon	30^	No Analysis	20-59%
Nitrate	2	2	10-12%
Sulfate	4	4	≈ 5%

*Potassium value not available. Percentage is slightly under stated.
^Carbon data flagged for flow restriction, value likely under stated.

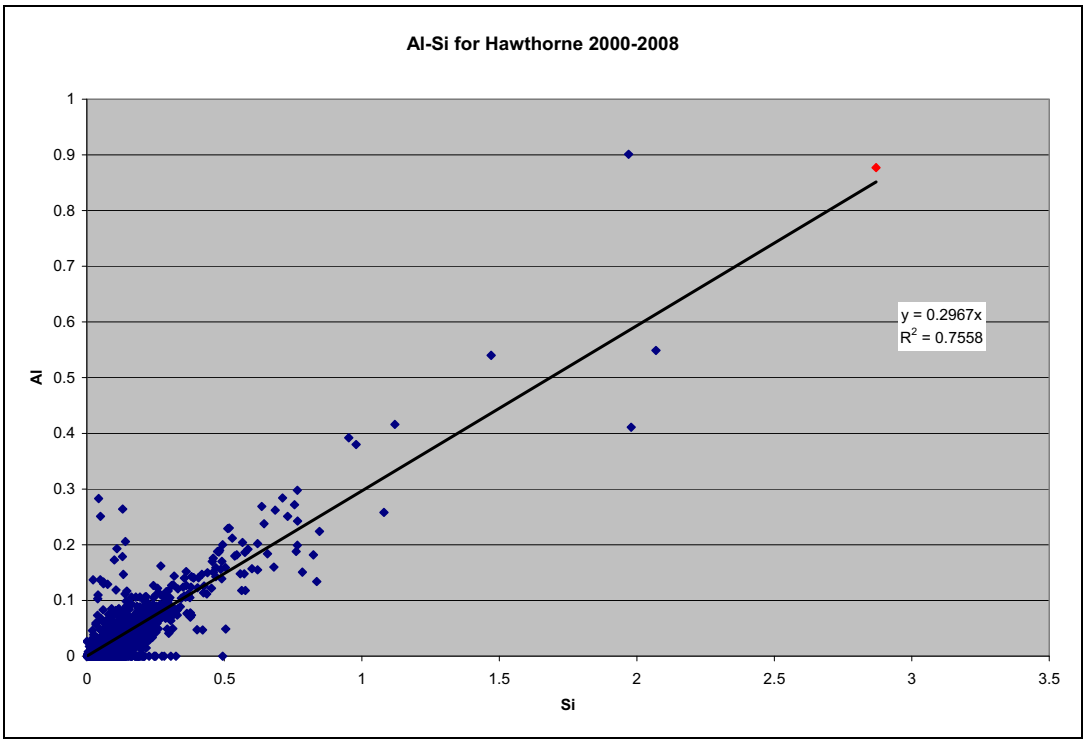
This analysis suggests that both dust samples collected during the exceptional event are consistent with coarse mass (soil).

Heterotrophic bacteria decompose organic matter, releasing ammonia, which can subsequently be nitrified to nitrate by nitrifying bacteria. Nitrate is poorly adsorbed to soils and is readily leached. Since organic matter is limited in arid regions and because nitrate levels in soil is normally low, one would expect that arid dust associated with high wind events would be low in nitrate level. Consequently, it is reasonable to conclude that these low nitrate levels support the premise that the sources of the windborne dust are primarily non-anthropogenic.

Soil Aluminum-Silica Ratio

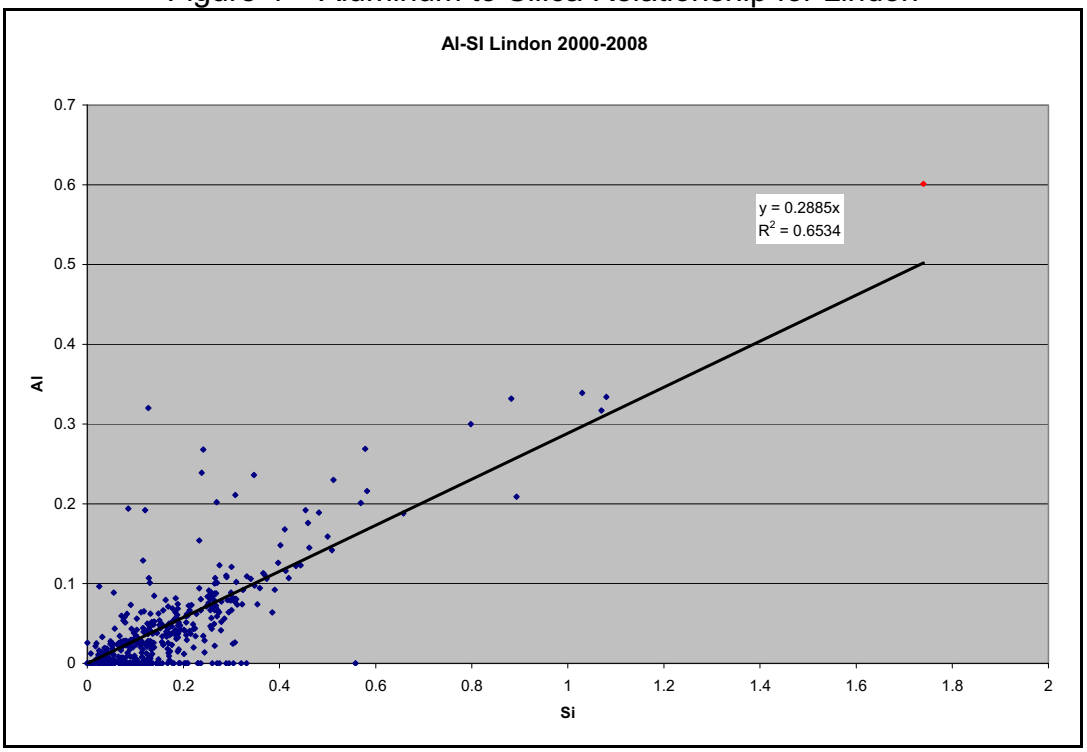
Aluminum is highly reactive and does not occur freely in nature. Instead, it is bound up as aluminum silicate in clay, minerals, and rocks. There is a strong observed relationship when aluminum is plotted against silica. An internal IMPROVE memo by Bob Eldred (June 20, 2003) described the relationship he observed when he plotted IMPROVE Al-Si data from December 1999 to November 2000. The plot was an excellent relationship with a slope of 0.46 with R^2=0.96. When Eldred plotted earlier data, he observed a slope of 0.60. Eldred attributed this difference to migration of Sahara dust to the continental U.S, influencing the natural Al-Si ratio common to North America. When we plot the Hawthorne Al-Si data from 2000-2008 (Figure 3), we observe a slope of 0.3. The red data point represents the exceptional event of April 15, 2008.

Figure 3 – Aluminum to Silica Relationship for Hawthorne



Plotting the Lindon data (Figure 4), we observe a slope of 0.29, essentially identical to the Hawthorne plot.

Figure 4 – Aluminum to Silica Relationship for Lindon



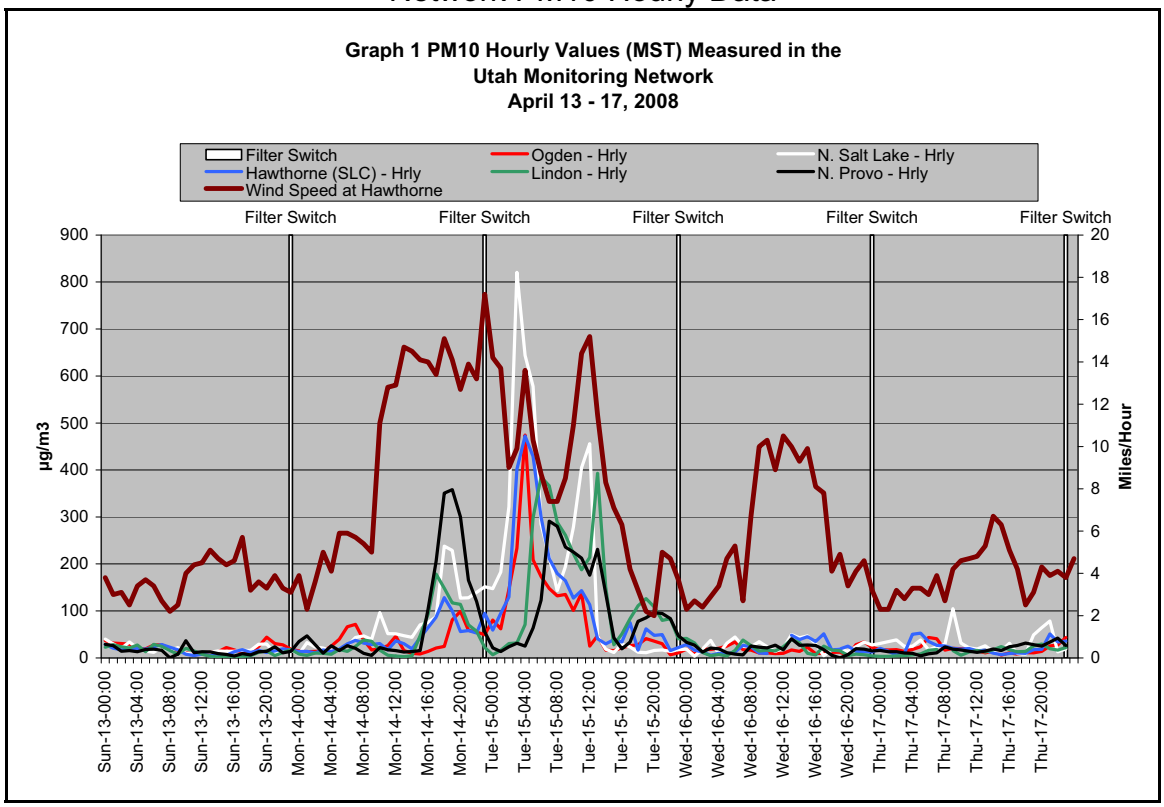
Aluminum's relationship to silica may be helpful in determining if soils have been anthropogenically enriched. We can infer from Eldred's research that we should be able to detect anthropogenic enrichment of soils when the Al-Si ratio deviates upward significantly from 0.46. Our lower slope **may** suggest that anthropogenic dust sources are not major components.

No Exceedance or Violation But For the Event

Wind Storm Event

There were no unusual local anthropogenic emissions reported before, during, and after the event. Figure 5 is a plot of the wind speed measured at the Hawthorne monitoring station along with the PM10 hourly values for the northern monitoring stations starting on April 13 through April 17, 2008. We have plotted PM10 levels before and after the event to demonstrate that PM10 levels at all of these stations were substantially below the 24-hr standard of 150 ug/m^3, even on Sunday the 13th, despite dry conditions and slight wind. The increased wind speed (and south-southeasterly direction), starting on April 14 at 1100, correspond accordingly with the PM10 peaks for all stations until April 16 at 2100. The cold front brought with it precipitation and wind but the wet conditions reduced wind blown dust on April 16 and 17. If not for the storm event and associated winds from the south-southeast, crossing the salt desert playa regions, PM10 values in the network would not have been elevated and PM10 levels would not have exceeded the 24-hr standard at North Salt Lake, Hawthorne, Cottonwood and Lindon.

Figure 5 – Hawthorne Station Wind Speed and Northern Monitoring Network PM10 Hourly Data



We substantiate the "but not for" wind storm position based on the demonstration made in the following Mitigation section, that the Utah Division of Air Quality, together with Utah counties and federal agencies, has established reasonably well-controlled dust programs, consistent with EPA guidance. Further, there were no smoke reports or other complaints at the time that would impact the network to this degree. Anthropogenic emissions remained constant before and after the event. Figure 5 shows that the PM10 levels averaged between 24-38 ug/m^3 for April 13, 14, 16, and 17, in comparison to event levels of 164-220 ug/m^3. This indicates that the significant increase was not due to anthropogenic emissions activity, but more related to high wind.

Coarse Mass Analysis

The same coarse mass analysis was conducted for the Hawthorne and Lindon stations for PM2.5, before and after the wind storm event.

Table 9 – Coarse Mass Analysis, Pre and During Event

	Hawthorne 3-days Before EE	Lindon 3-days Before EE	Published Values Malm et al 2007	Hawthorne EE Day	Lindon EE Day
Crustal Minerals	9%	9%	34-74%	28%	36*%
Total Carbon	73%	~~100~~#%	20-59%	30%	No Analysis
Nitrate	25%	37%	10-12%	2%	2%
Sulfate	12%	11%	≈ 5%	4%	4%

Notes: # error in TC analysis. *Potassium value not available, % slightly under stated.

The crustal mineral contents 3-days before the event were only 9%, than escalated to 28-36% the day of the event, clearly proving that the entrained dust was carried along from the salt desert playa regions as projected by the HYSPLIT model.

Kim (et al 2007) concluded that nitrate in PM2.5 is highly correlated with anthropogenic species such as ammonium [ammonium nitrate is the stable form]. Nitrate is often a major component of fine particles, especially in more polluted urban areas (Finlayson-Pitts and Pitts, 2000). The California Regional PM10 and PM2.5 Air Quality Study (CRPAQS), Factors Limiting the Formation of Secondary Nitrate and Sulfate, December 10, 2002, is a study of PM during winter pollution episodes. The report concluded that, "analysis of the chemical composition of PM during winter pollution episodes indicates high levels of nitrate, modest levels of sulfate, and levels of ammonium sufficient for these two anions to exist primarily as ammonium nitrate and ammonium sulfate in atmospheric aerosols. The nitrate and sulfate found in PM are believed to be secondary because there are no known primary emission sources with significant emission rates of these compounds and because there are known chemical reactions that lead to their formation in the atmosphere. "As a group, the secondary inorganic species (nitrate, sulfate, and ammonium) can account for up to

70% of PM2.5 mass and up to 50% of PM10 mass in extreme wintertime pollution events in California's San Joaquin Valley (SJV). These species represent such a large portion of the PM that it is essential to characterize the factors influencing and, especially, limiting their formation."

These studies support that PM nitrate and sulfate are primarily associated with anthropogenic emissions. The vast change in nitrate and sulfate levels in our data indicates anthropogenic sources before the event (nitrate 25-37%, sulfate 11-12%). While the total carbon data was not always reliable, it too provides a general indication supporting anthropogenic dominance before the storm, 73% at Hawthorn, than less so the day of the storm, 30%, which is in line with Malm's et al findings of soils in the rural U.S.

Statistical Analysis

A statistical analysis approach was taken to estimate the amount of PM10 contributed by the wind storm. The analysis calculated the difference between PM10 and PM2.5 measured at Hawthorne (HW), Cottonwood (CW), and Lindon (LN). A PM2.5 monitor is not located at N2; however, it can be assumed that the results would be similar. All coinciding data available for PM10 and PM2.5 at each monitoring location was used. This analysis is severely limited since it does not take into account the effect of the dust on PM2.5. The resultants over estimate the expected amount of PM10 had the event not occurred.

Table 10 – Lognormal Descriptive Statistics of the Difference between PM10 and PM2.5

Location	Loc	Scale	N	μgeo	σgeo	+1SD	+2SD
LN	2.639	0.9243	3290	14.00	2.5201	35.28	88.91
CW	2.610	0.7808	1112	13.60	2.1832	29.69	64.82
HW	2.573	0.7299	3224	13.11	2.0749	27.19	56.42

When the differences calculated in Table 10 are applied to the measured concentration of PM2.5 on April 15, 2008, several estimates for the expected PM10 value can be made.

Table 11 – Measured and Expected PM10 Values for April 15, 2008

	Measured		Expected		
Location	PM10	PM2.5	PM2.5 + μgeo	PM2.5 + 1SD	PM2.5 + 2SD
LN	164	24.5	38.50	41.02	76.30
CW	177	26	39.60	41.78	71.47
HW	166	26.8	39.91	41.98	69.17
N2	141				

Using the calculated expected PM10, PM2.5+2SD, we can attribute approximately **80-100 μg/m^3** of PM10 to the wind event. If it had not been for the wind event, PM10 would not have exceeded the standard.

Clear Causal Relationship and But For the Event Summary

A "clear and casual relationship" and "but for the event" demonstration has been made based on:

- The cold front produced storms with high winds and dust clouds that is a natural event;
- PM10 and PM2.5 concentration patterns correspond directly to the storm event, inclined due to high winds, than declined due to cold front precipitation, showing direct relationship;
- Backwards trajectory modeling is consistent with the National Weather Service report and images that dust sources included the Sevier Lake bed and Milford Flat burn scar. It also correlates with hourly PM increases;
- Speciation analysis for crustal matter (increase in crustal mass with reduction in nitrate and sulfate mass) and Al-Si ratio suggests that the source(s) of the PM samples are primarily non-anthropogenic;
- Wind speed and PM10 concentrations correlate well; and
- Statistical analysis attribute about **80-100 µg/m^3** of PM10 to the wind event.

Mitigation (40 CFR 51.930)

The Exceptional Events Rule requires states to "take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." The intent of this section is to describe the State of Utah's dust control and public health protection programs.

Division of Air Quality State Implementation Plan

The Exceptional Events Rule Preamble states that, "where high wind events results in exceedances or violations of the particulate matter standards, EPA proposed that they be treated as natural events if…, and if anthropogenic activities which contribute to particulate matter emissions in conjunction with the high wind event are **reasonably well-controlled**."

The State of Utah has developed a comprehensive program of controls for airborne fugitive dust implemented through existing Utah Air Quality Rules, stationary source permitting, and State Implementation Plans (approved by EPA). This system of control techniques for fugitive dust has been in place since 1992 when the current Utah PM10 SIP was developed. The SIP requires control measures for both specific and general PM10 fugitive dust sources along the Wasatch Front. The SIP process introduced Reasonably Available Control Technology (RACT) and Best Available Control Measures (RACM) for sources that existed prior to the SIP process and required Best Available Control Technology (BACT) for new sources and modifications of existing sources. BACT requirements are enforced through Utah administrative rule R307-401. Since 1992, the state has implemented and continually updated two administrative rules that control fugitive dust throughout the state. R307-205 and R307-309 which, taken together, apply to all significant fugitive dust sources in the state. These rules require each significant fugitive dust source to develop and implement a site-specific fugitive dust control plan. In effect, an approved dust plan defines Best Available Control Measures (BACM) for a source, and provides a flexible mechanism

for controlling airborne dust. Under the Utah SIP requirements and the Air Quality Rules, all eligible sources in Utah are subject to emission controls defined by RACT, BACT or BACM.

Utah Air Rules, Permitting

R307-205: Fugitive Emissions and Fugitive Dust

This rule applies statewide to all sources of fugitive emissions and fugitive dust, except for agricultural or horticultural activities. Fugitive emissions may not exceed 20% opacity. The rule applies to construction activities that disturb an area greater than 1/4 acre in size. The rule also applies to roadway emission controls, mining activities and tailings piles and ponds. While a permit, known as an Approval Order, is not required from the Executive Secretary of the Air Quality Board, steps need to be taken to minimize fugitive dust. Control measures may include; watering, chemical stabilization, synthetic cover, vegetative cover, windbreaks, minimizing the area of disturbed tailings, restricting the speed of vehicles in and around operations and other techniques approvable by the executive secretary. These control measures are in keeping with the USEPA document titled *Fugitive Dust Background Document and Technical information Document for Best Available Control Measures*.

Treatment effectiveness is based on EPA's AP-42 Factors;

- Section 11.19.1.2 states:

"Wet suppression techniques include application of water, chemicals and/or foam, usually at crusher or conveyor feed and/or discharge points. Such spray systems at transfer points and on material handling operations have been estimated to reduce emissions 70 to 95 percent. Spray systems can also reduce loading and wind erosion emissions from storage piles of various materials 80 to 90 percent. Control efficiencies depend upon local climatic conditions, source properties and duration of control effectiveness. Wet suppression has a carryover effect downstream of the point of application of water or other wetting agents, as long as the surface moisture content is high enough to cause the fines to adhere to the larger rock particles."

- Section 13.2.4.4 "Controls", states:

"Watering and the use of chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent."

Table B.2-3

Particle Size:	0 - 2.5	2.5 - 6	6 - 10
Efficiency: Dust suppression by water sprays			
	40%	65%	90%
Efficiency: Dust suppression by chemical stabilizer or wetting agents			
	40%	65%	90%

R307-309: Nonattainment and Maintenance Areas for PM10: Fugitive Emissions and Fugitive Dust.
This rule establishes minimum work practices and emission standards for sources of fugitive emissions and fugitive dust for sources listed in the State SIP or located in a PM10 nonattainment and maintenance areas to meet the reasonably available control measures for PM10. A fugitive dust control plan must be submitted to the Executive Secretary at the Utah Division of Air Quality for review and approval prior to commencement of a project.

For temporary aggregate processing projects, portable permits are issued for the specific equipment. A permit application, known as a Notice of Intent must be submitted to the Executive Secretary at the Utah Division of Air Quality before project initiation and must include a dust control plan.

Fugitive emissions from stationary sources may not exceed 15%. Opacity caused by fugitive dust must not exceed 10% at a property boundary and 20% on site, with the exclusion when wind speed exceeds 25 mph and the owner/operator is taking appropriate actions to control fugitive dust. Appropriate measures include an approved dust control plan.

Any person owning or operating a new or existing source of fugitive dust, including storage, hauling or handling operations, or engaging in clearing or leveling of land one-quarter acre or greater in size, earthmoving, excavation, or movement of trucks or construction equipment over cleared land one-quarter acre or greater in size or access haul roads, or engaging in demolition activities including razing homes, buildings or other structures shall submit a plan to control fugitive dust to the executive secretary no later than 30 days after the source becomes subject to R307-309. The plan shall address fugitive dust control strategies for the following operations as applicable:

- Material Storage;
- Material handling and transfer;
- Material processing;
- Road ways and yard areas;
- Material loading and dumping;
- Hauling of materials;
- Drilling, blasting and pushing operations;
- Clearing and leveling;
- Earth moving and excavation;
- Exposed surfaces;
- Any other source of fugitive dust;
- Strategies to control fugitive dust may include;
- Wetting or watering;
- Chemical stabilization;
- Enclosing or covering operations;
- Planting vegetative cover;
- Providing synthetic cover;
- Wind breaks;
- Reducing vehicular traffic;

- Reducing vehicular speed;
- Cleaning haul trucks before leaving loading area;
- Limiting pushing operations to wet seasons;
- Paving or cleaning road ways;
- Covering loads;
- Conveyor systems;
- Boots on drop points;
- Reducing the height of drop areas;
- Using dust collectors;
- Reducing production;
- Mulching;
- Limiting the number and power of blasts;
- Limiting blasts to non-windy days and wet seasons;
- Hydro drilling;
- Wetting materials before processing;
- Using a cattle guard before entering a paved road;
- Washing haul trucks before leaving the loading site;
- Terracing; or
- Cleaning the materials that may create fugitive dust on a public or private paved road promptly; or Preventing, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site.

Each source must comply with all provisions of the fugitive dust control plan as approved by the executive secretary.

Any person owning, operating or maintaining a new or existing material storage, handling or hauling operation must prevent, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site. Any such person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Any person engaging in clearing or leveling of land with an area of one-quarter acre or more, earthmoving, excavating, construction, demolition, or moving trucks or construction equipment over cleared land or access haul roads must prevent, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site. Any such person who deposits materials that may create fugitive dust on a public or private paved road shall clean the road promptly.

Any person responsible for construction or maintenance of any existing road or having right-of-way easement or possessing the right to use the same whose activities result in fugitive dust from the road must minimize fugitive dust to the maximum extent possible. Any such person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Unpaved Roads - any person responsible for construction or maintenance of any new or existing unpaved road must prevent, to the maximum extent possible, the deposit of material from the unpaved road onto any intersecting paved road during construction or

maintenance. Any person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Any person who owns or operates a mining operation shall minimize fugitive dust as an integral part of site preparation, mining activities, and reclamation operations. The fugitive dust control measures to be used may include:

- Periodic watering of unpaved roads;
- Chemical stabilization of unpaved roads;
- Paving of roads;
- Prompt removal of coal, rock minerals, soil, and other dust-forming debris from roads and frequent scraping and compaction of unpaved roads to stabilize the road surface;
- Restricting the speed of vehicles in and around the mining operation;
- Revegetating, mulching, or otherwise stabilizing the surface of all areas adjoining roads that are a source of fugitive dust;
- Restricting the travel of vehicles on other than established roads;
- Enclosing, covering, watering, or otherwise treating loaded haul trucks and railroad cars, to minimize loss of material to wind and spillage;
- Substitution of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subject to wind erosion;
- Minimizing the area of disturbed land;
- Prompt revegetation of regraded lands;
- Planting of special windbreak vegetation at critical points in the permit area;
- Control of dust from drilling, using water sprays, hoods, dust collectors or other controls approved by the executive secretary;
- Restricting the areas to be blasted at any one time;
- Reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization;
- Restricting fugitive dust at spoil and coal transfer and loading points; or
- Control of dust from storage piles through use of enclosures, covers, or stabilization and other equivalent methods or techniques as approved by the executive secretary, or Other techniques as determined necessary by the executive secretary.

Any person owning or operating an existing tailings operation where fugitive dust results from grading, excavating, depositing, or natural erosion or other causes in association with such operation must take steps to minimize fugitive dust from such activities. Such controls may include:

- Watering,
- Chemical stabilization,
- Synthetic covers,
- Vegetative covers,
- Wind breaks,
- Minimizing the area of disturbed tailings,
- Restricting the speed of vehicles in and around the tailings operation, or other equivalent methods or techniques which may be approvable by the executive secretary.

Utah R307-202-3
Prohibits burning of trash and other waste and salvage operations by open burning. Persons/agencies wishing to open burn tree cuttings, slash in forest areas etc., must seek a permit from DEQ that include control measures.

Compliance

The seven DEQ inspectors conduct daily surveillance inspections and have been advised to include in their routes dust prone areas and areas with particularly dust prone industries, such as aggregate industries (quarries, concrete manufacturing, etc.) during the dust season. Construction sites are also subject to inspection and verification.

A Compliance Advisory Notice is delivered to sources that appear to be out of compliance and provides an opportunity for DEQ and the regulated source to discuss the findings of the inspection. If a source is issued a Compliance Advisory Notice and responds by promptly returning to compliance, a reduced penalty may be offered for their expedient cooperation (fines are $2,000-7,000 for dust violations). Dust control violations are typically quickly resolved upon receipt of a Compliance Advisory Notice. However, the DEQ is able to proceed with Notices of Violation and Orders to Comply, if necessary.

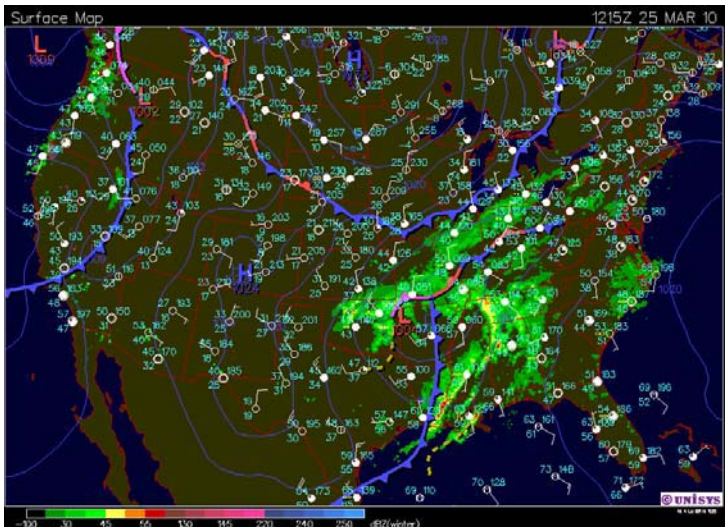
2009 DEQ Compliance Summary

TASK	2009
Annual Inspections Completed (19 inspectors)	978
Temporary Relocations Accepted	103
Fugitive Dust Control Plans Accepted, Mostly Construction	**57**
Complaints Received	149
VOC Inspections	73
Warning Letters	16
Notices of Violations	3
Compliance Advisories, 7 Directly Related to Dust	65
Settlements	43
Penalties Assessed	$569,543
85% Compliance measured via inspections, reports and stack testing	

Control Measures Demonstration Case Study - Kennecott Mine Tailing Impoundments

Successful implementation of Utah's PM10 SIP is perhaps best demonstrated by the lack of dust generated at the Kennecott Copper Mine tailing impoundments during a dust storm event that occurred on March 25, 2010.

A natural spring dust storm was generated on March 25 by an approaching cold front that arrived into Utah the next day, akin to this report event date of April 15, 2008.



High western winds traversed the Western Desert and Great Salt Lake, entraining dust that traveled across the lake and into the Salt Lake valley. Figure 6 shows the hourly PM10 values across the valley before, during and after the dust storm. The highest PM10 values were in the northern portions of the valley consistent with the dust storm location and general directional movement.

Figure – 6 PM10 Hourly Values for Case Study

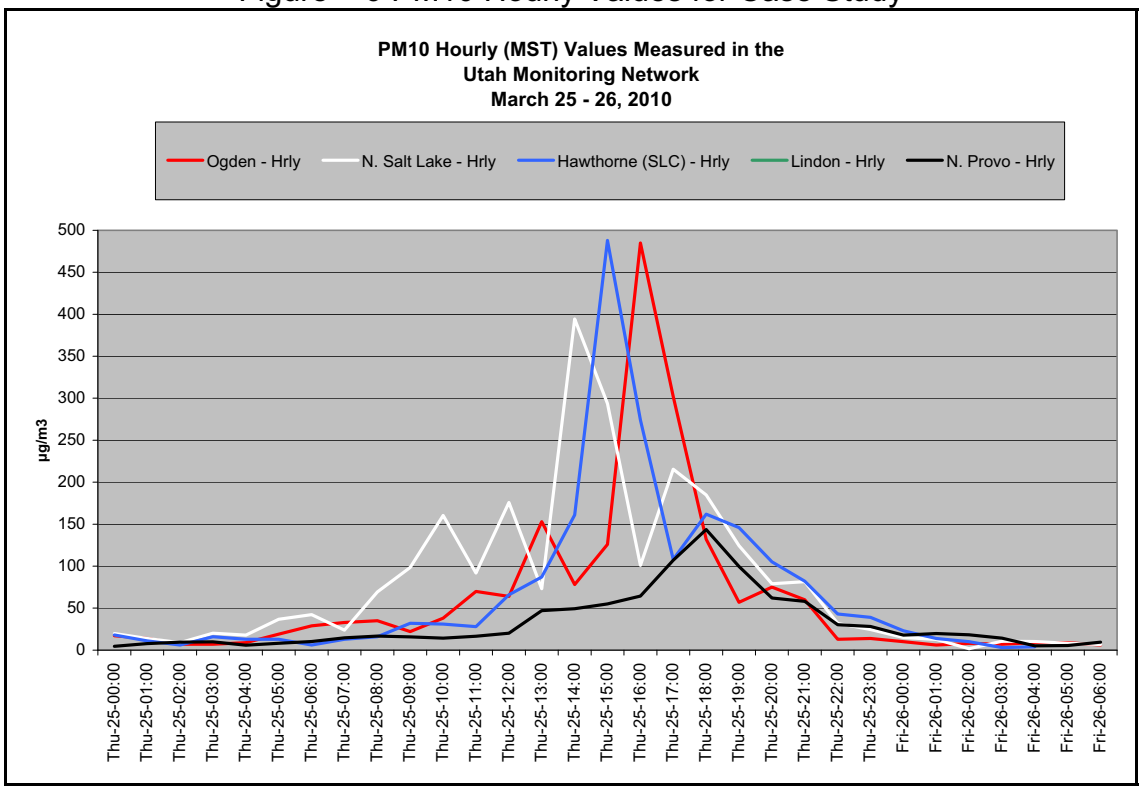


Image 4 shows the locations of the Western Desert, Kennecott tailings impoundments and the Saltaire concert venue that is located on the shore of the Great Salt Lake (lake visible in black/blue and white shore areas).

Image 4 – locations of Western Desert and Kennecott Impoundments

Image 5 provides an aerial view of the Kennecott impoundments which are hundreds of thousands of acres in size and the Great Salt Lake shoreline.

Image 5 – Aerial View of Kennecott Tailing Impoundments-Great Salt Lake Shoreline and Wind Vector at 2100Z March 25, 2010

The impoundments were a major source of particulate matter in the Salt Lake valley until Kennecott implemented a fugitive dust abatement program that was first implemented in

1997 and revised July 2002, as mandated by DEQ through permitting and compliance. The program effectiveness can be seen through a series of photographs that were taken of the March 25, 2010 dust storm as it came across the Great Salt Lake and traversed across the Kennecott property on its way to the Salt Lake valley.

March 25, 2010 Dust Storm Photo Documentation

View of dust storm coming across the Great Salt Lake at the Saltaire concert venue on the shore of the Lake, located across the road from Kennecott tailing impoundments.

The Great Salt Lake is obscured by the dust storm crossing it near the Kennecott tailings impoundment.

Kennecott smelter shrouded in dust storm.

The first photograph is of the dust storm crossing the southeast shore of the Great Salt Lake heading towards Kennecott in the afternoon around 3 p.m. MDT. The Saltaire concert venue located on the lake shore is visible in the background. The second photograph is of a truck traveling on Interstate 80 along the lake and across from the impoundments. Notice the Lake is not visible behind the truck. The last photograph in this series shows how the dust storm moved onto land shrouding the Kennecott smelter. Wind speed ranged from 20-25 mph with visibility limited to half mile at times (per Kennecott, measurements are required in their dust suppression plan).

March 25, 2010 Dust Storm Photo Documentation

View of Salt Lake valley from Olympus Cove.

The top photographs are of the impoundments, showing the dust storm but no contribution from the impoundments. The bottom photograph is of the Salt Lake valley shrouded by the dust storm.

This case study demonstrates:

1. Natural storm events in Utah generate high winds that traverse desert playa regions entraining arid surface soils creating dust storms. In this case, high winds were caused by an advancing cold front. The winds generated the dust storm as they traveled from the west to southeast across the Western Desert and the Great Salt Lake.
2. Photo documentation was made that the dust storm was in full force before landing on the lake southeast shore before reaching Kennecott.
3. Monitoring data confirms very high PM10 levels associated with the storm event starting around 1-2 p.m. MDT, consistent with dust storm observations made at Kennecott.
4. Photo documentation was made that the massive impoundments did not contribute to the dust storm; thus verifying that DEQ enforcement control measures are reasonably effective and consistent with the intent of the Exceptional Events Rule Preamble on this matter.

Mobile Sources Particulate Reduction

Automotive Inspection Maintenance Program

Utah is required by Section 182 of the Clean Air Act to implement an inspection maintenance program in Salt Lake County that is at least as effective as the EPA's Basic Performance Standard. Salt Lake County began its program in 1984. The program exceeds the Basic inspection maintenance performance standard for all pollutants and in doing so, mitigates PM.

Utah Clean Diesel Program

Agriculture: Diesel engines are a major source of pollution, emitting particulates, amongst other pollutants. DAQ applied for and received $750,000 from the American Recovery and Reinvestment Act to replace 11 agricultural vehicles and equipment, repower 21 engines in agricultural vehicles and equipment, and install 30 Auxiliary Power Units on agricultural vehicles. DAQ collaborated with the Utah Department of Agriculture and Food and Utah State University to identify agricultural operators whose operations are negatively impacting non-attainment areas in the state. The project's scope of replacing, repowering, and installing more fuel efficient technology on agricultural vehicles and equipment will ensure that stricter emissions standards requirements are met and yield more diesel fuel conservation.

School Bus Project: In 2007, DAQ started the Utah Clean School Bus Project in conjunction with Utah Office of Education, local school districts, county and municipal governments, as well as community and non-profit organizations. This coalition is working together to secure funding sources for school districts to purchase emission reducing technologies for buses statewide. The application of these technologies is expected to reduce particulate matter by 30%. As of 2009, a total of 247 buses have been retrofitted. By the fall of 2010, 454 buses will be retrofitted.

Clean Diesel Trucking Initiative: DAQ initiated the Clean Diesel Grant Program to install APUs (Auxiliary Power Units) on 48 long-haul tractors that will reduce diesel emissions and fuel usage from diesel-powered, long-haul trucks that travel and idle within the non-attainment areas of the Wasatch Front. The funding was provided by a State allocation of $352,941 through EPA's National Clean Diesel Campaign and a State match of $235,294, for a total of $588,235. EPA awarded DAQ a grant in 2010 to continue installation of APUs.

Clean Fuel Vehicle Tax Credit and Loan Program

The Utah Clean Fuels and Vehicle Technology Grant and Loan Program, funded through the Clean Fuels and Vehicle Technology Fund, provides grants to assist businesses and government entities in covering:

1) The cost of converting a vehicle to operate on clean fuels.
2) The incremental cost of purchasing an Original Equipment Manufacturer (OEM) clean fuel vehicle.
3) The cost of retrofitting diesel vehicles with EPA verified closed crankcase filtration devices, diesel oxidation catalysts, and/or diesel particulate filters.

The Clean-Fuels Grant and Loan Program also provides loans for the cost of converting a vehicle to operate on a clean fuel, for the purchase of OEM clean fuel vehicle, and for the purchase of fueling equipment for public/private sector business and government vehicles. Finally, the program can provide grants and loans to serve as matching funds for federal and non-federal grants for the purpose of converting vehicles to operate on a clean fuel, purchasing OEM clean fuel vehicles, or retrofitting diesel vehicles.

Smoking Vehicles

Vehicles emitting excessive smoke contribute to airborne particles. Five local health departments (Cache, Davis, Salt Lake, Utah and Weber Counties) operate smoking vehicle education and notification programs. People who spot a vehicle producing excessive smoke can report it through their respective county health department.

In 2009, 724 vehicles were reported to Salt Lake County Health Department alone. The County issued 490 notices.

Utah Clean City

Utah's Clean Cities Coalition is one of 85 coalitions around the country that's part of the U.S. Department of Energy's strategy to reduce America's dependence on imported foreign oil. The Utah coalition sponsored Idle Free Awareness Week which included educating school bus drivers on the air quality value of limiting idling.

Variable Message Signage

The Utah Department of Transportation (UDOT), in conjunction with the DEQ air quality forecasting program, issues air quality warnings on electronic message boards placed along Utah's highways. The signage asks drivers to limit their driving on high alert days. An informal study conducted this winter by UDOT during 6-days with and without air quality alerts indicates that there was a 3-5% auto traffic reduction (per Glen Blackwelder, UDOT Traffic Operations Engineer).

Division of Air Quality Community Outreach

Choose Clean Air

An interactive source of information about ways individuals can help improve air quality by making smart choices in their personal lives can be found on the DEQ website. The site includes 50 suggestions for daily life.

The UDEQ also offers an electronic mail server (Listserv). Subscribers are automatically notified by e-mail when unhealthy air pollution levels are forecast for the Wasatch Front.

Dust Control Education

The DEQ website includes a page on dust control and the aggregate industry. The page is intended to educate the public about dust, control methods and community aggregate locations near them by providing links to aggregate firms Approval Orders containing fugitive dust control conditions.

Clean Utah

DEQ is committed to working with businesses to ensure the ongoing protection of public health and the environment. Clean Utah is a program that encourages and rewards business and other permit holders for going beyond compliance to preserve and protect Utah's environment.

Small Business Environmental Assistance Program

The Small Business Environmental Assistance Program helps small businesses with permitting assistance, emission calculations, technical issues, regulatory interpretation, and pollution prevention techniques. For example, this program provides businesses with tools to understand and meet Utah's environmental requirements. For example, see the best management practices pamphlet below.


1 Preservation of Existing Vegetation
• Minimize clearing and the amount of exposed soil.
• Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
• Protect streams, stream barriers, wild wood lands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.
2 Construction Phasing
• Sequence construction activities so that the soil is not exposed for long periods of time.
• Schedule or limit grading to small areas.
• Install key sediment control practices before site grading begins.
• Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.
3 Construction Entrances
• Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
• Make sure that the construction entrance does not become buried in soil.
• Properly site entrance BMPs for all anticipated vehicles.
4 Silt Fencing
• Inspect and maintain silt fences after each storm.
• Make sure the bottom of the silt fence is buried.
• Securely attach the material to the stakes.
• Don't place silt fences in the middle of a waterway or use them as a check dam.
• Stormwater should not flow around the silt fence.
TOP TEN BMPs
for Pollution Prevention at the Construction Site
For More Information on Pollution Prevention and Construction BMPs contact:
Utah Department of Environmental Quality
www.deq.utah.gov/construction
Environmental Hotline: 1-800-458-0145
5 Storm Drain Inlet Protection
• Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
• Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
• If you use inlet filters, maintain them regularly.
6 Vegetative Buffers
• Protect and install vegetative buffers along waterbodies to slow and filter stormwater run-off.
• Maintain buffers by mowing or replanting periodically to ensure their effectiveness.
7 Site Stabilization
• Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.
8 Equipment Fueling and Containment
• Use offsite fueling stations as much as possible, or dedicated fueling areas onsite.
• Discourage "topping-off" of fuel tanks.
• Dedicated fueling areas should be level, protected from stormwater, and located at least 50 ft from downstream drainage facilities and watercourses.
• Protect fueling areas with berms and dikes to prevent run-on, run-off, and to contain spills.
• Use vapor recovery nozzles with automatic shutoffs to control drips as well as air pollution.
9 Waste Management
• Choose smaller containers and more frequent collection. Do not allow waste to accumulate on-site.
• Separate recyclable materials from waste.
• Conduct visual inspections of dumpsters and recycling bins and remove contaminants.
• Stockpile processed materials on-site separately. Place, grade, and shape stockpiles to drain surfacewater. Cover to prevent windblown dust.
10 Fugitive Dust Suppression
• Apply water on haul roads.
• Haul materials in properly tarped or sealed containers.
• Restrict vehicle speeds to 10 mph.
• Cover excavated areas and material after excavation activity ceases.
• Reduce the excavation size and/or number of excavations.
• Water-down equipment and excavation faces.

Resource Development Coordinating Committee (RDCC)

The RDCC is a clearinghouse for information and coordination of state response on activities affecting state and public lands (including federal lands) throughout Utah. The RDCC includes representatives from the state agencies that are involved or impacted by public lands management. The RDCC coordinates the review of technical and policy actions that may affect the physical resources of the state and facilitates the exchange of information on those actions among federal, state, and local government agencies. The types of projects that are submitted for RDCC approval include oil and gas drilling and exploration, stream alteration, natural gas pipelines, transportation and construction projects of all sorts, forest fuel management, potable water management projects and recreational project development. The DEQ is a permanent agency member of the RDCC and as such, RDCC project approvals must include DEQ concurrence. Since the vast majority of the projects submitted for RDCC approval are of substantial size and scope, most projects include soil disturbance with the potential to generate fugitive dust. The DEQ assures that all projects receiving RDCC approval with the potential to generate fugitive dust include conditions that the projects will meet Utah air quality regulations and include fugitive dust management plans.

DEQ RDCC Project Reviews

Year	Projects Reviewed
2004	533
2005	1236
2006	1245
2007	1256
2008	1251
2009	810
Total	**6331+**

Division of Water Quality

The Utah Division of Water Quality is responsible for a variety of programs that monitor, assess, and protect the surface and ground waters of the state. These programs overlap with the DEQ, to some degree, in regard to soil and sediment nonpoint sources pollution prevention.

UPDES Storm Water General Permit for Construction Activities

Utah R317-8-3.9(6)(d)(l0) and R317-8-3.9(6)(e)(l), require a UPDES storm water permit when construction activities disturb one or more acres of land. Permit requirements include the development and approval of a pollution prevention plan (PPP) to control and mitigate erosion and sediment migration. The PPP must include slope and wind erosion controls for material piles at construction sites.

Nonpoint Source Pollution 319 Program

Section 319 of the Clean Water Act deals with nonpoint sources (NPS) of pollution. Land use activities such as agricultural production, road and building construction, mining, and forestry operations can all potentially be NPS polluters. The 1987 reauthorization of the Clean Water Act authorized the U.S. Environmental Protection Agency to fund individual state programs designed to control and eliminate NPS problems. Utah's Nonpoint Source Task Force has spent the past decade or more setting up local areas of the state to take on demonstration projects in specific watershed areas. Some of the largest watershed efforts have taken place in the Little Bear River in Cache County, Chalk Creek in Summit County, and Otter Creek in Piute and Sevier counties.

Agriculture

Recognizing the problems associated with soil erosion on agricultural cropland, rangeland and other environmentally sensitive cropland areas, the U.S. Department of Agriculture (USDA) included conservation provisions in the Farm Security and Rural Investment Act of 2002 (Farm Bill). The conservation provisions of the legislation are designed to assist farmers and ranchers with a number of voluntary programs including cost-share, land rental, incentive payments, and technical assistance. The conservation programs of the Farm Bill are administered by the NRCS.

The Farm Bill legislation created and reauthorized three programs that are designed to reduce erodible land:

- Conservation Reserve Program (CRP)
- Conservation Survey Program (CSP)
- Environmental Quality Incentives Program (EQIP)

The Conservation Reserve Program (CRP) encourages farmers to enter into contracts with USDA to place erodible cropland and other environmentally sensitive land into long-term conservation reserve. The reserves are generally 10 to 15 years in duration and the reserve is established by the implementation of environmental practices to reduce soil erosion.

The CRP systematically reduces soil erosion by planting vegetative cover on highly erodible lands (HEL). In Utah, HEL soils are normally on steeper valley side slopes subject to erosion from washing or open areas vulnerable to high wind events. In exchange, landowners receive annual rental payments for the land and cost-sharing assistance for the established practices. In the early years of the program, the emphasis was on HEL soils. Since 1996, there is an additional authorization to address wild life habitat and air quality. The more recent authorization includes additional conservation practices including windbreaks, riparian buffers and wetland mitigation which are instrumental in reducing soil erosion. Furthermore, the USDA and DEQ conducted an analysis of eligible parcels for the 2010 awards to preferentially select parcels that are in or adjacent to nonattainment areas in order to maximize program benefits. **There are 127,262 acres in this program in Utah**.

The Conservation Security Program (CSP) is a newer approach to agricultural land protection authorized under the 2002 Farm Bill that rewards agricultural producers who have already undertaken conservation practices and commit to additional efforts. The CSP program, unlike other conservation programs, is available on pastureland, rangelands and all types of cropland including orchards, vegetable, and dry agriculture prevalent in Utah. The program has designated three watershed areas as eligible to participate in the program including two, Lower Bear-Malad (Cache County) and San Pitch Watershed (Sanpete County) that are within the north and south high-wind corridors identified by DAQ' source attribution model. **There are 232,847 acres in the CSP program in Utah.**

The Environmental Quality Incentives Program (EQIP) is a voluntary program that assists farmers and ranchers, who face existing soil and water resource degradation. The EQIP promotes agricultural production in a manner that allows producers to meet federal, state and local environmental requirements. Some of the stated aims of the program are as follows:

- Reduction of non-point source pollution, such as nutrients, pesticides;
- Reduction of emissions including particulate matter, nitrogen oxides, ozone precursors, and volatile organic compounds that can contribute to degradation air quality standards; and
- Reduction in soil erosion and sedimentation on agricultural lands.

In general, NRCS programs encourage agricultural practices that improve topsoil and prevent wind blown dust during high-wind events. Notable examples of techniques and practices advocated include:

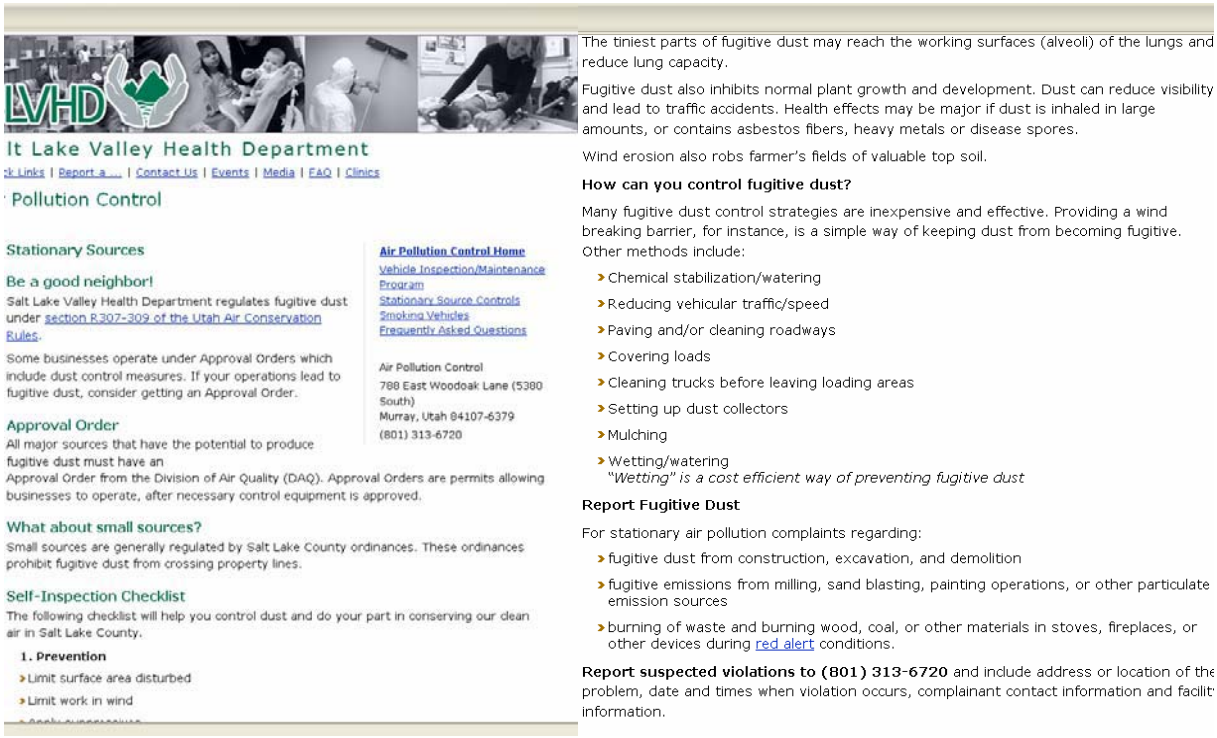
- Planting of cover crops and perennials to protect agricultural soils with emphasis on HEL soils;
- NRCS encourages the use of perennial crops and existing weeds on corners and non-utilized areas of agricultural land to resist soil erosion;
- NRCS "costs shares" on conservation practices with local farmers to prevent soil erosion; and
- NRCS works with Utah State University to identify agricultural techniques and practices to minimize soil erosion.

A primary aim of this process is to reduce soil erosion on agricultural land, which in turn reduces wind blown dust during high-wind events. This program is open to attainment and nonattainment areas in Utah. **There are 1,133,687 acres in this program in Utah.**

Representative County Dust Control Programs

Salt Lake County

Salt Lake Valley Health Department regulates fugitive dust under section R307-309 of the Utah Air Conservation Rules. The County enforces fugitive dust from construction, aggregate industries, sand blasting, painting and burning. The web site includes information on reporting violations. County inspectors actively inspect dust prone activities.



It Lake Valley Health Department

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Pollution Control

Stationary Sources

Be a good neighbor!

Salt Lake Valley Health Department regulates fugitive dust under section R307-309 of the Utah Air Conservation Rules.

Some businesses operate under Approval Orders which include dust control measures. If your operations lead to fugitive dust, consider getting an Approval Order.

Approval Order

All major sources that have the potential to produce fugitive dust must have an Approval Order from the Division of Air Quality (DAQ). Approval Orders are permits allowing businesses to operate, after necessary control equipment is approved.

What about small sources?

Small sources are generally regulated by Salt Lake County ordinances. These ordinances prohibit fugitive dust from crossing property lines.

Self-Inspection Checklist

The following checklist will help you control dust and do your part in conserving our clean air in Salt Lake County.

1. Prevention
   - Limit surface area disturbed
   - Limit work in wind

Air Pollution Control Home
Vehicle Inspection/Maintenance Program
Stationary Source Controls
Smoking Vehicles
Frequently Asked Questions

Air Pollution Control
788 East Woodoak Lane (5380 South)
Murray, Utah 84107-6379
(801) 313-6720

The tiniest parts of fugitive dust may reach the working surfaces (alveoli) of the lungs and reduce lung capacity.

Fugitive dust also inhibits normal plant growth and development. Dust can reduce visibility and lead to traffic accidents. Health effects may be major if dust is inhaled in large amounts, or contains asbestos fibers, heavy metals or disease spores.

Wind erosion also robs farmer's fields of valuable top soil.

How can you control fugitive dust?

Many fugitive dust control strategies are inexpensive and effective. Providing a wind breaking barrier, for instance, is a simple way of keeping dust from becoming fugitive. Other methods include:

- Chemical stabilization/watering
- Reducing vehicular traffic/speed
- Paving and/or cleaning roadways
- Covering loads
- Cleaning trucks before leaving loading areas
- Setting up dust collectors
- Mulching
- Wetting/watering
  "Wetting" is a cost efficient way of preventing fugitive dust

Report Fugitive Dust

For stationary air pollution complaints regarding:

- fugitive dust from construction, excavation, and demolition
- fugitive emissions from milling, sand blasting, painting operations, or other particulate emission sources
- burning of waste and burning wood, coal, or other materials in stoves, fireplaces, or other devices during red alert conditions.

Report suspected violations to (801) 313-6720 and include address or location of the problem, date and times when violation occurs, complainant contact information and facility information.

Davis County

Davis, like Salt Lake County, enforces fugitive dust through Utah R307-309 and also maintains a fugitive dust web page and violation reporting. Inspectors have been known to park themselves all day long on Beck Street to enforce compliance. Beck Street contains refineries and very large aggregate industries that are a source of fugitive dust.

The following is taken from the Davis County 2009 Annual Report:

"The Staff of the Air Quality Bureau is composed of both Environmental Health Scientists and employees of the Inspection/Maintenance program. Some of the activities in this bureau are to investigate any air related discharge from fuel and other volatile organic compounds (VOC) such as spills and fuel transfer operations. To investigate smoke of any kind, including open burning, point or stack emissions and mobile source violations."

Selected Statistics Taken From Annual Report

Air Quality	2009	2008	2007
Environmental Investigations in Air Quality	70	441	64
Open Burning Activities	28	18	21
Air Quality Complaints	31	10	70
Air Quality Consultations with the Public	297	156	422

Weber County

Weber County has its own Excavation Ordinance for construction that includes dust control. Application must be made and approved before construction. An application fee includes the cost for reviewing engineering plans and site inspection.

Cache County

Cache County maintains zoning ordnances that include dust controls.

Utah Air Quality Public Notifications

In order to improve the presentation of air quality information to the public, DAQ has improved our air quality forecasting webpage. The web page now shows the air quality forecast for today and the next two days. The Air Monitoring Center (AMC) provides air pollution information based on daily air quality status. The AMC data is used to determine the relationship of existing pollutant concentrations to the National Ambient Air Quality Standards. There is a three tiered air quality alert system: Green, Yellow (alert days), and Red (actions days) that is used to implement winter and summer **controls on the use of wood and coal burning stoves, fire places**, and motor vehicles. There are five health advisory categories: good, moderate, unhealthy advisories A and B, and very unhealthy. The AMC advisory is calculated for five major pollutants including ground-level ozone, particulate pollution (particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The new index now also incorporates recommendations for actions to take on days when concentrations are in the red zone, to mitigate the effects of pollution for affected groups and recommendations for industry and citizens that help reduce pollution levels. The outreach program information consolidated in the three day forecast includes the Summer and Winter Control Programs and Choose Clean Air information.

The web site includes additional information on wind blown dust.

News Release to Media

In additional to web site alerts, DEQ also notifies the media in order to maximize public distribution.

Air Monitoring Manager, Robert Dalley, notified DEQ staff via e-mail of RED alert day.

From: Robert Dalley
To: EQ ALL DEPT
Date: 4/15/2008 8:11 AM
Subject: Air Quality RED Alert blowing dust

The Utah Department of Environmental Quality has issued a RED air quality ALERT today April 15, 2008 because of blowing dust in Davis, Salt Lake, Utah and Weber Counties. A Health Advisory is issued for sensitive people, those with respiratory disease or heart disease, the elderly and children should avoid prolonged or heavy exertion outdoors and avoid dusty situations. Conditions will improve late tonight and tomorrow.

A similar notice was sent to the media by Mr. Dalley as indicated below from the Salt Lake Tribune.

Utah posts rare spring air alert because of blowing dust
The Salt Lake Tribune
Article Last Updated: 04/15/2008 09:38:47 AM MDT

Updated: 9:37 AM- Blowing dust this morning has prompted the Utah Department of Environmental Quality to issue a red air quality alert in Davis, Salt Lake, Weber and Utah counties.
A Health Advisory is issued for sensitive people, those with respiratory disease or heart disease, the elderly and children should avoid prolonged or heavy exertion outdoors and avoid dusty situations.
DEQ officials say conditions will improve late tonight and tomorrow.

Public Comment (Preamble V.G.)

The DEQ established a 30-day comment period from **June 1, 2010 through June 30, 2010**. The announcement of the comment period was published in the Salt Lake Tribune and Deseret News on **May 17, 2010 and June 1, 2010**.

Affidavit of publication will be inserted in final documentation.

All comments received will be inserted in the final documentation.

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Appendix A

Hourly data from real time monitors during the event.

		PM10							PM2.5							
		Ogden - Hr	N. Salt Lak	Hawthorne	Lindon - Hr	N. Provo -	24 Hr Std	Filter Switch	Logan - Hrl	Ogden - Hr	Hawthorne	Tooele - Hr	Lindon - Hr	N. Provo -	24 Hr Std	Filter Switcl
4/13/08 0:00	0:00	37	40	28	23	29	150		0:00	12.3	20.5	13.3	6.4	16.9	12.54	35	
4/13/08 1:00	1:00	31	30	21	28	26	150		1:00	17.6	18.9	12.8	6.1	23.9	10.36	35	
4/13/08 2:00	2:00	31	20	17	24	14	150		2:00	20	19.3	11.7	6.5	27.3	8.35	35	
4/13/08 3:00	3:00	29	34	19	21	16	150		3:00	16.2	16.4	11.2	7.1	24.6	10.39	35	
4/13/08 4:00	4:00	20	21	20	28	13	150		4:00	18.3	16.6	12.1	7.1	17.5	9.48	35	
4/13/08 5:00	5:00	20	15	19	13	18	150		5:00	19.9	14.6	9.6	7	19	11.19	35	
4/13/08 6:00	6:00	28	12	24	29	19	150		6:00	21.5	13.5	9.2	7.8	16.1	10.34	35	
4/13/08 7:00	7:00	28	23	29	24	16	150		7:00	21.8	16	11.2	8.5	14.8	11.95	35	
4/13/08 8:00	8:00	19	16	23	16	0	150		8:00	18.7	17	12.8	7.6	16.4	13.32	35	
4/13/08 9:00	9:00	17	22	17	8	8	150		9:00	18.3	15.2	13.9	8.7	14	12.01	35	
4/13/08 10:00	10:00	10	10	8	21	37	150		10:00	19.3	16.4	12.9	9.2	12.5	10.53	35	
4/13/08 11:00	11:00	8	8	5	15	11	150		11:00	13.6	12.9	8.6	9.2	17.4	10.35	35	
4/13/08 12:00	12:00	9	13	8	8	13	150		12:00	10.2	11	7.3	9.5	5.8	14.47	35	
4/13/08 13:00	13:00	13	12	5	4	13	150		13:00	12.7	11.8	7.3	12.1	17.1	8.68	35	
4/13/08 14:00	14:00	13	15	6	2	9	150		14:00	12.4	15.4	6.6	10	16.2	5.96	35	
4/13/08 15:00	15:00	22	14	6	4	7	150		15:00	11.7	17.9	8.1	9.3	9.7	5.4	35	
4/13/08 16:00	16:00	17	14	13	3	4	150		16:00	10.1	18.7	5.8	13.5	11.9	4.89	35	
4/13/08 17:00	17:00	11	16	18	4	9	150		17:00	9.2	16.9	12.7	13.7	5.2	6.73	35	
4/13/08 18:00	18:00	10	16	12	5	6	150		18:00	8.2	14.4	16.3	15.3	6	5.93	35	
4/13/08 19:00	19:00	25	29	16	12	13	150		19:00	8.3	15.6	14.3	17.4	11.3	6.47	35	
4/13/08 20:00	20:00	44	30	11	15	14	150		20:00	8.7	22.6	10.6	15.7	11.9	4.07	35	
4/13/08 21:00	21:00	31	10	15	5	24	150		21:00	9.4	20.1	10.1	13.6	10.9	4.67	35	
4/13/08 22:00	22:00	28	17	19	12	11	150		22:00	9.5	15.5	10.9	9.2	7.3	5.61	35	
4/13/08 23:00	23:00	19	17	17	18	14	150	900	23:00	9.7	12.4	11.7	8.4	10.3	5.54	35	150
4/14/08 0:00	0:00	15	8	14	8	35	150		0:00	10.1	10.9	9.4	7	10.8	8.28	35	
4/14/08 1:00	1:00	13	33	14	5	47	150		1:00	10	10.3	8.2	5.4	8.4	12.73	35	
4/14/08 2:00	2:00	14	23	11	11	28	150		2:00	10.9	8.6	9.5	6.3	7	8.84	35	
4/14/08 3:00	3:00	14	21	17	10	10	150		3:00	11.1	7.8	6.7	5.9	10	4.77	35	
4/14/08 4:00	4:00	25	15	14	8	26	150		4:00	11.9	7.7	6.1	5.4	7.8	6.29	35	
4/14/08 5:00	5:00	40	19	19	18	16	150		5:00	13.3	10.2	7.1	9.3	10.1	8.65	35	
4/14/08 6:00	6:00	66	25	30	14	26	150		6:00	13.3	10.8	7.3	9.5	7.6	6.77	35	
4/14/08 7:00	7:00	72	44	38	24	20	150		7:00	17	15.6	7.1	9.1	12.2	7.76	35	
4/14/08 8:00	8:00	39	47	32	38	10	150		8:00	18.1	12.9	9.2	7.1	17.3	9.55	35	
4/14/08 9:00	9:00	17	40	29	35	5	150		9:00	13.9	11.6	9.2	4.8	18.9	10.04	35	
4/14/08 10:00	10:00	20	96	31	17	22	150		10:00	12.5	9.9	9.1	6	22.8	5.88	35	
4/14/08 11:00	11:00	26	52	17	6	17	150		11:00	10.4	10.1	9	4.3	11.5	5.08	35	
4/14/08 12:00	12:00	46	52	36	4	16	150		12:00	6.2	10.3	19.4	8	10.8	8.66	35	
4/14/08 13:00	13:00	16	47	31	3	13	150		13:00	9.4	11.7	8.4	8.5	7.2	4.7	35	
4/14/08 14:00	14:00	10	44	19	5	13	150		14:00	10.6	8.8	6.7	9.2	9.3	2.91	35	
4/14/08 15:00	15:00	8	70	43	47	16	150		15:00	5.6	4.4	8	7.7	12.9	7.64	35	
4/14/08 16:00	16:00	14	76	65	93	105	150		16:00	4.8	5	15.4	7.3	23.2	19.22	35	
4/14/08 17:00	17:00	21	88	87	179	206	150		17:00	6.5	8.8	21.3	10.3	31.5	36.33	35	
4/14/08 18:00	18:00	25	238	129	149	351	150		18:00	7.2	8.3	31.4	10.8	45.5	58.7	35	
4/14/08 19:00	19:00	81	229	100	117	358	150		19:00	7.1	13.3	34.4	16.6	43.5	64.17	35	
4/14/08 20:00	20:00	99	127	56	114	300	150		20:00	12.2	31.8	24.1	26.2	46.6	59.89	35	
4/14/08 21:00	21:00	59	128	58	70	165	150		21:00	24.4	27.6	18	18	37.9	32.13	35	
4/14/08 22:00	22:00	55	140	53	57	120	150		22:00	20.8	18.8	21.8	13.4	23.5	21.09	35	
4/14/08 23:00	23:00	49	151	95	22	55	150	900	23:00	14.3	19.6	18.5	20.1	16.6	10.92	35	150
4/15/08 0:00	0:00	81	147	59	7	22	150		0:00	13.3	19.6	15.7	9.9	5.7	3.74	35	
4/15/08 1:00	1:00	62	183	95	16	13	150		1:00	16.8	19	18	8.3	6.8	4.67	35	
4/15/08 2:00	2:00	146	322	130	31	24	150		2:00	17.9	22.6	30.7	25.8	9.2	4.62	35	
4/15/08 3:00	3:00	234	821	402	32	31	150		3:00	29.7	46.1	62.5	44.8	11.9	4.53	35	
4/15/08 4:00	4:00	474	644	472	71	25	150		4:00	33.2	86	145.9	23.8	13.2	3.82	35	

4/15/08 5:00	5:00	209	578	429	299	64	150		5:00	22.2	51.4	95	25.2	38.2	11.97	35	
4/15/08 6:00	6:00	173	285	300	385	123	150		6:00	17	20.5	61.6	39	74.4	16.74	35	
4/15/08 7:00	7:00	148	214	211	366	291	150		7:00	17.1	21.3	35.8	37.7	74	40.58	35	
4/15/08 8:00	8:00	132	143	180	289	280	150		8:00	13.8	20.4	29	36.1	62.6	54.32	35	
4/15/08 9:00	9:00	135	194	165	261	236	150		9:00	15.4	19.4	28.8	33.4	54.6	46.43	35	
4/15/08 10:00	10:00	101	278	127	222	226	150		10:00	12.4	16.7	27	26.2	44.1	42.06	35	
4/15/08 11:00	11:00	138	405	143	188	212	150		11:00	10.5	12.5	25.7	19	36.6	42.44	35	
4/15/08 12:00	12:00	25	456	113	214	176	150		12:00	8.2	12.3	17.4	16.9	26.5	29.79	35	
4/15/08 13:00	13:00	47	47	41	393	231	150		13:00	3.6	12.1	7.9	14.8	21.9	25	35	
4/15/08 14:00	14:00	17	19	30	151	137	150		14:00	1.1	10.7	6.3	11.8	12.3	15.57	35	
4/15/08 15:00	15:00	16	12	39	28	43	150		15:00	4.8	7.4	4.6	9	5.4	11.49	35	
4/15/08 16:00	16:00	21	29	34	51	19	150		16:00	9.6	7.3	2.2	24.7	0	3.09	35	
4/15/08 17:00	17:00	26	23	75	83	34	150		17:00	11.4	7.7	10.9	31.8	12	12.18	35	
4/15/08 18:00	18:00	28	12	17	111	78	150		18:00	12.3	6.6	9.7	25.1	20.7	17.59	35	
4/15/08 19:00	19:00	41	11	62	126	86	150		19:00	13.4	8.9	8	19.2	21.7	18.55	35	
4/15/08 20:00	20:00	36	16	48	109	96	150		20:00	7	8.7	10.7	17.9	18.6	21.4	35	
4/15/08 21:00	21:00	30	17	50	80	95	150		21:00	5.7	8.9	9.4	17.1	18.5	20.41	35	
4/15/08 22:00	22:00	7	14	16	84	84	150		22:00	4.6	8.3	4	22.6	14.7	17.65	35	
4/15/08 23:00	23:00	11	18	22	41	48	150	900	23:00	4.7	7.8	3.2	14.9	8.1	8.96	35	150
4/16/08 0:00	0:00	19	19	29	41	33	150		0:00	8.5	8.4	5.4	11.1	9.6	7.37	35	
4/16/08 1:00	1:00	8	4	17	32	27	150		1:00	9.8	8.1	8.6	9.3	7.9	5.75	35	
4/16/08 2:00	2:00	19	19	13	12	13	150		2:00	8.3	8	6.6	8.4	6.6	3.79	35	
4/16/08 3:00	3:00	18	38	6	5	21	150		3:00	7.8	8.8	6.1	7	4.6	6.94	35	
4/16/08 4:00	4:00	21	9	10	7	19	150		4:00	10.1	9	5.2	10	4.1	5.59	35	
4/16/08 5:00	5:00	25	31	8	4	11	150		5:00	7.7	10.1	6.2	11.9	4.7	4.58	35	
4/16/08 6:00	6:00	34	45	13	16	8	150		6:00	10.7	10.1	5.9	9.2	6.9	5.79	35	
4/16/08 7:00	7:00	18	25	27	38	6	150		7:00	10.9	12.7	5.8	9.4	16.4	6.99	35	
4/16/08 8:00	8:00	17	24	23	26	26	150		8:00	10.9	9.6	9.8	9	28.6	15.27	35	
4/16/08 9:00	9:00	10	35	10	15	23	150		9:00	9.9	7	6.5	9.3	16.7	11.04	35	
4/16/08 10:00	10:00	11	24	10	17	21	150		10:00	8.4	6.8	2.5	9.3	18.1	13.79	35	
4/16/08 11:00	11:00	9	14		15	27	150		11:00	9	7.3	2.8	7.3	9.5	10.68	35	
4/16/08 12:00	12:00	10	21		24	18	150		12:00	6.3	9.4	1.8	5.7	9.9	10.44	35	
4/16/08 13:00	13:00	17	50	48	40	41	150		13:00	3.2	9	3.6	5.6	11	4.97	35	
4/16/08 14:00	14:00	14	43	39	32	27	150		14:00	3.8	9.7	3.9	4.8	8.4	3.16	35	
4/16/08 15:00	15:00	23	47	45	10	27	150		15:00	10.2	6.7	7.4	6.7	8.3	7.29	35	
4/16/08 16:00	16:00	9	30	35	6	27	150		16:00	10.5	7	6.6	7	8.5	3.87	35	
4/16/08 17:00	17:00	10	5	51	25	18	150		17:00	8.5	6.3	7.5	5.3	10.8	5.53	35	
4/16/08 18:00	18:00	12	17	17	17	6	150		18:00	9.3	5.8	6	7	10.3	6.39	35	
4/16/08 19:00	19:00	12	20	19	15	0	150		19:00	9.5	6.3	5.3	7.3	11.4	5.48	35	
4/16/08 20:00	20:00	5	14	25	5	7	150		20:00	9	7.7	5.8	7	9	4.39	35	
4/16/08 21:00	21:00	28	24	14	8	20	150		21:00	9.8	5	6.5	6.7	10.5	6.34	35	
4/16/08 22:00	22:00	34	34	13	7	19	150		22:00	11	9.9	6	7.7	8.7	6.94	35	
4/16/08 23:00	23:00	23	28	12	5	15	150	900	23:00	8.8	12.4	5	9.2	8.7	6.34	35	150
4/17/08 0:00	0:00	18	31	20	3	16	150		0:00	7.2	10.5	4	7.2	8.3	5.18	35	
4/17/08 1:00	1:00	17	35	14	4	13	150		1:00	6.7	10.7	5.1	5.4	9.6	5.73	35	
4/17/08 2:00	2:00	18	38	6	5	13	150		2:00	6.6	10.2	4.3	7	7.5	5.82	35	
4/17/08 3:00	3:00	14	25	10	5	10	150		3:00	8	9.8	4.4	7.1	7.8	4.6	35	
4/17/08 4:00	4:00	18	25	51	6	10	150		4:00	8.8	7.9	6	7.4	5.8	5.36	35	
4/17/08 5:00	5:00	24	38	53	8	5	150		5:00	9.9	9.1	8.9	8.2	6.1	6.84	35	
4/17/08 6:00	6:00	44	17	35	16	9	150		6:00	13.3	11.8	9.4	9.5	7.5	6.5	35	
4/17/08 7:00	7:00	41	24	27	18	11	150		7:00	12.4	15.7	8.1	7.7	9.3	7.2	35	
4/17/08 8:00	8:00	17	29	26		24	150		8:00	13.7	12.4	8	10.7	12	9.53	35	
4/17/08 9:00	9:00	20	105	21	16	19	150		9:00	10.2	10.3	8.2	12.4	16.2	10.96	35	
4/17/08 10:00	10:00	20	32	19	6	17	150		10:00	10.2	14.8	9.2	56.1	9.3	7.55	35	
4/17/08 11:00	11:00	19	22	20	13	14	150		11:00	6.4	17.6	13.5	30.8	7.8	6.27	35	

4/17/08 12:00	12:00	16	19	15	16	12	150		12:00	5.6	18.1	14.1	13.2	13.7	4.78	35	
4/17/08 13:00	13:00	11	26	16	13	14	150		13:00	8.2	16.7	16.7	14.1	11.6	5.67	35	
4/17/08 14:00	14:00	14	14	10	17	19	150		14:00	10.8	16	17.5	12.2	17.5	9.68	35	
4/17/08 15:00	15:00	6	15	7	24	16	150		15:00	10.7	18.1	13.2	9.4	17	11.8	35	
4/17/08 16:00	16:00	11	31	9	18	24	150		16:00	9.5	13.7	7.9	8.8	19.8	15.03	35	
4/17/08 17:00	17:00	8	9	10	13	27	150		17:00	11.8	12.3	6.7	8.9	19.3	15.44	35	
4/17/08 18:00	18:00	11	8	10	14	32	150		18:00	17.1	14.2	9.5	10.8	13.3	18.16	35	
4/17/08 19:00	19:00	11	49	18	26	28	150		19:00	22.7	12.7	9.7	10.2	11.8	16.75	35	
4/17/08 20:00	20:00	14	64	18	30	25	150		20:00	22.7	11.9	9.9	12.6	16.6	14.97	35	
4/17/08 21:00	21:00	26	79	51	20	34	150		21:00	19.3	14	11.7	11.6	17.9	18.99	35	
4/17/08 22:00	22:00	28	13	34	17	42	150		22:00	16	17.5	12.8	10.6	17.7	23.59	35	
4/17/08 23:00	23:00	44	19	36	22	26	150	900	23:00	19.7	15.3	8.7	8.8	12.8	11.58	35	150
4/18/08 0:00	0:00	54	30	49	21	20	150		0:00	19.1	12.4	12.1	9.2	14.7	9.51	35	

Appendix B

PM2.5 Speciation filter data for Lindon on April 15, 2008.

STATE OF UTAH DEQ

CLIENT # U005
REPORT # 09-089

SUBMITTED BY:
CHESTER LabNet
12242 S.W. GARDEN PLACE
TIGARD, OR 97223
(503)624-2183/FAX (503)624-2653
www.ChesterLab.Net

CHESTER LabNet

12242 SW Garden Place ❖ Tigard, OR 97223-8246 ❖ USA
Telephone 503-624-2183 ❖ Fax 503-624-2653 ❖ www.chesterlab.net

Case Narrative

Date: April 16, 2009

General Information

Client:	State of Utah DEQ
Client Number:	U005
Report Number:	09-089
Sample Description:	47mm Quartz and Teflon filters
Sample Numbers:	09-U253 – 09-U259, 09-X779 – 09-X787

Analysis

Analytes:	XRF Metals (Na - Pb), Cl, Br, NO_3, SO_4, Na, NH_4, K, Organic Carbon, Elemental Carbon
Analytical Protocols:	X-Ray Fluorescence protcol 6, Ion Chromatography, OC/EC by TOT
Analytical Notes:	No problems were encountered during the analyses. The method blanks and laboratory control samples were not from the same lot of filters as the samples since the filters did not originate from Chester LabNet. Results have **not** been blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

Paul Duda 4/16/09

Project Manager Date
Paul Duda

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U253
Client ID: 20080488
Site: Lindon (LN)
Sample Date: 4/15/08
Mass: 3487. +- 40. µg
Volume: 21.20 +- 2.120 m³
Deposit Area: 12.0 cm²
Size Fraction: PM10
Suspended
Particulates: 164.5 +- 16.56 µg/m³

Analyte	µg/filter	percent	µg/m³
XRF			
Al	91.39 ± 6.854	2.621 ± 0.1989	4.311 ± 0.5389
P	0.0000 ± 3.158	0.0000 ± 0.0906	0.0000 ± 0.1490
S	24.49 ± 2.188	0.7024 ± 0.0633	1.155 ± 0.1549
Cl	41.28 ± 2.989	1.184 ± 0.0868	1.947 ± 0.2404
K	89.58 ± 5.582	2.569 ± 0.1628	4.225 ± 0.4979
Ca	326.0 ± 19.56	9.350 ± 0.5711	15.38 ± 1.793
Ti	9.868 ± 0.6192	0.2830 ± 0.0181	0.4655 ± 0.0550
V	0.0000 ± 0.1188	0.0000 ± 0.0034	0.0000 ± 0.0056
Cr	1.241 ± 0.0996	0.0356 ± 0.0029	0.0585 ± 0.0075
Mn	2.862 ± 0.1848	0.0821 ± 0.0054	0.1350 ± 0.0161
Fe	136.0 ± 10.85	3.899 ± 0.3144	6.413 ± 0.8206
Co	0.0000 ± 0.0744	0.0000 ± 0.0021	0.0000 ± 0.0035
Ni	0.3456 ± 0.0384	0.0099 ± 0.0011	0.0163 ± 0.0024
Cu	0.6900 ± 0.1152	0.0198 ± 0.0033	0.0325 ± 0.0063
Zn	1.145 ± 0.1380	0.0328 ± 0.0040	0.0540 ± 0.0085
Ga	0.2448 ± 0.0816	0.0070 ± 0.0023	0.0115 ± 0.0040
Ge	0.3120 ± 0.0708	0.0089 ± 0.0020	0.0147 ± 0.0036
As	0.1452 ± 0.0624	0.0042 ± 0.0018	0.0068 ± 0.0030
Se	0.0984 ± 0.0576	0.0028 ± 0.0017	0.0046 ± 0.0028
Br	0.3684 ± 0.0588	0.0106 ± 0.0017	0.0174 ± 0.0033
Rb	0.6912 ± 0.0804	0.0198 ± 0.0023	0.0326 ± 0.0050
Sr	2.746 ± 0.1632	0.0787 ± 0.0048	0.1295 ± 0.0151
Y	0.2256 ± 0.0924	0.0065 ± 0.0027	0.0106 ± 0.0045
Zr	1.908 ± 0.1512	0.0547 ± 0.0044	0.0900 ± 0.0115
Mo	1.196 ± 0.1644	0.0343 ± 0.0047	0.0564 ± 0.0096
Pd	0.1656 ± 0.0936	0.0047 ± 0.0027	0.0078 ± 0.0045
Ag	0.2676 ± 0.0888	0.0077 ± 0.0025	0.0126 ± 0.0044
Cd	0.2772 ± 0.0876	0.0079 ± 0.0025	0.0131 ± 0.0043
In	0.3984 ± 0.0912	0.0114 ± 0.0026	0.0188 ± 0.0047
Sn	0.6480 ± 0.1080	0.0186 ± 0.0031	0.0306 ± 0.0059
Sb	0.1080 ± 0.1296	0.0031 ± 0.0037	0.0051 ± 0.0061
Ba	5.394 ± 0.5952	0.1547 ± 0.0172	0.2544 ± 0.0379
La	3.188 ± 0.6648	0.0914 ± 0.0191	0.1504 ± 0.0348
Hg	0.1476 ± 0.1572	0.0042 ± 0.0045	0.0070 ± 0.0074
Pb	0.4392 ± 0.1584	0.0126 ± 0.0045	0.0207 ± 0.0078
IC			
Cl	50.96 ± 2.548	1.461 ± 0.0174	2.404 ± 0.2688
Br	0.0000 ± 1.000	0.0000 ± 0.0029	0.0000 ± 0.0472
NO3	26.60 ± 1.330	0.7628 ± 0.0094	1.255 ± 0.1403
SO4	90.70 ± 4.535	2.601 ± 0.0305	4.278 ± 0.4783
Na	114.1 ± 5.704	3.272 ± 0.0381	5.381 ± 0.6016
NH4	3.600 ± 0.1800	0.1032 ± 0.0017	0.1698 ± 0.0190
K	7.440 ± 0.3720	0.2134 ± 0.0030	0.3509 ± 0.0392
OC/EC			
OC	278.4 ± 16.32	7.984 ± 0.4769	13.13 ± 1.522
EC	5.004 ± 2.652	0.1435 ± 0.0761	0.2360 ± 0.1273
TC	283.2 ± 17.76	8.122 ± 0.5178	13.36 ± 1.577

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U254
Client ID: 20080492
Site: Lindon (LN)
Sample Date: 4/19/08
Mass: 3717. +- 40. µg
Volume: 20.50 +- 2.050 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 181.3 +- 18.24 $\mu g/m^3$

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	87.83 ± 6.602	2.363 ± 0.1794	4.284 ± 0.5360
P	0.0000 ± 3.022	0.0000 ± 0.0813	0.0000 ± 0.1474
S	33.84 ± 2.782	0.9104 ± 0.0755	1.651 ± 0.2137
Cl	28.01 ± 2.063	0.7535 ± 0.0561	1.366 ± 0.1697
K	87.80 ± 5.424	2.362 ± 0.1481	4.283 ± 0.5034
Ca	444.6 ± 26.46	11.96 ± 0.7234	21.69 ± 2.524
Ti	9.743 ± 0.6096	0.2621 ± 0.0166	0.4753 ± 0.0561
V	0.1548 ± 0.1236	0.0042 ± 0.0033	0.0076 ± 0.0061
Cr	1.568 ± 0.1176	0.0422 ± 0.0032	0.0765 ± 0.0096
Mn	2.923 ± 0.1884	0.0786 ± 0.0051	0.1426 ± 0.0170
Fe	107.5 ± 5.972	2.892 ± 0.1637	5.244 ± 0.5999
Co	0.0000 ± 0.0744	0.0000 ± 0.0020	0.0000 ± 0.0036
Ni	0.2868 ± 0.0384	0.0077 ± 0.0010	0.0140 ± 0.0023
Cu	0.4704 ± 0.0948	0.0127 ± 0.0026	0.0229 ± 0.0052
Zn	0.7344 ± 0.1044	0.0198 ± 0.0028	0.0358 ± 0.0062
Ga	0.0396 ± 0.0660	0.0011 ± 0.0018	0.0019 ± 0.0032
Ge	0.1992 ± 0.0588	0.0054 ± 0.0016	0.0097 ± 0.0030
As	0.0048 ± 0.0504	0.0001 ± 0.0014	0.0002 ± 0.0025
Se	0.0240 ± 0.0468	0.0006 ± 0.0013	0.0012 ± 0.0023
Br	0.1884 ± 0.0468	0.0051 ± 0.0013	0.0092 ± 0.0025
Rb	0.5676 ± 0.0648	0.0153 ± 0.0018	0.0277 ± 0.0042
Sr	2.670 ± 0.1548	0.0718 ± 0.0042	0.1302 ± 0.0151
Y	0.0036 ± 0.0744	0.0001 ± 0.0020	0.0002 ± 0.0036
Zr	1.033 ± 0.1080	0.0278 ± 0.0029	0.0504 ± 0.0073
Mo	0.9228 ± 0.1320	0.0248 ± 0.0036	0.0450 ± 0.0079
Pd	0.1236 ± 0.0828	0.0033 ± 0.0022	0.0060 ± 0.0041
Ag	0.1536 ± 0.0792	0.0041 ± 0.0021	0.0075 ± 0.0039
Cd	0.1872 ± 0.0780	0.0050 ± 0.0021	0.0091 ± 0.0039
In	0.0336 ± 0.0792	0.0009 ± 0.0021	0.0016 ± 0.0039
Sn	0.4656 ± 0.0948	0.0125 ± 0.0026	0.0227 ± 0.0052
Sb	0.0072 ± 0.1164	0.0002 ± 0.0031	0.0004 ± 0.0057
Ba	2.825 ± 0.4920	0.0760 ± 0.0133	0.1378 ± 0.0277
La	1.766 ± 0.5832	0.0475 ± 0.0157	0.0862 ± 0.0297
Hg	0.0000 ± 0.1296	0.0000 ± 0.0035	0.0000 ± 0.0063
Pb	0.3228 ± 0.1272	0.0087 ± 0.0034	0.0157 ± 0.0064
IC			
Cl	42.24 ± 2.112	1.136 ± 0.0128	2.060 ± 0.2304
Br	0.0000 ± 1.000	0.0000 ± 0.0027	0.0000 ± 0.0488
NO3	28.76 ± 1.438	0.7737 ± 0.0089	1.403 ± 0.1569
SO4	126.9 ± 6.344	3.414 ± 0.0374	6.189 ± 0.6920
Na	136.1 ± 6.806	3.662 ± 0.0400	6.640 ± 0.7424
NH4	7.280 ± 0.3640	0.1959 ± 0.0027	0.3551 ± 0.0397
K	8.400 ± 0.4200	0.2260 ± 0.0030	0.4098 ± 0.0458
OC/EC			
OC	319.2 ± 18.36	8.588 ± 0.5025	15.57 ± 1.796
EC	1.416 ± 2.472	0.0381 ± 0.0665	0.0691 ± 0.1208
TC	320.4 ± 19.68	8.620 ± 0.5375	15.63 ± 1.834

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U255
Client ID: 20080609
Site: Hawthorn (HW)
Sample Date: 4/19/08
Mass: 3960. +- 40. µg
Volume: 20.70 +- 2.070 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 191.3 +- 19.23 $\mu g/m^3$

Analyte	µg/filter	percent	$\mu g/m^3$
XRF			
Al	57.18 ± 4.878	1.444 ± 0.1240	2.762 ± 0.3631
P	0.0000 ± 2.762	0.0000 ± 0.0698	0.0000 ± 0.1334
S	127.3 ± 9.353	3.215 ± 0.2384	6.151 ± 0.7632
Cl	108.7 ± 7.381	2.745 ± 0.1884	5.252 ± 0.6348
K	68.60 ± 4.230	1.732 ± 0.1082	3.314 ± 0.3894
Ca	469.3 ± 27.79	11.85 ± 0.7120	22.67 ± 2.635
Ti	6.448 ± 0.4332	0.1628 ± 0.0111	0.3115 ± 0.0375
V	0.0000 ± 0.1236	0.0000 ± 0.0031	0.0000 ± 0.0060
Cr	1.499 ± 0.1164	0.0378 ± 0.0030	0.0724 ± 0.0092
Mn	1.870 ± 0.1332	0.0472 ± 0.0034	0.0903 ± 0.0111
Fe	80.65 ± 4.475	2.037 ± 0.1149	3.896 ± 0.4456
Co	0.0000 ± 0.0660	0.0000 ± 0.0017	0.0000 ± 0.0032
Ni	0.3156 ± 0.0372	0.0080 ± 0.0009	0.0152 ± 0.0024
Cu	0.8004 ± 0.0528	0.0202 ± 0.0013	0.0387 ± 0.0046
Zn	1.234 ± 0.1344	0.0312 ± 0.0034	0.0596 ± 0.0088
Ga	0.2304 ± 0.0720	0.0058 ± 0.0018	0.0111 ± 0.0037
Ge	0.4032 ± 0.0672	0.0102 ± 0.0017	0.0195 ± 0.0038
As	0.1920 ± 0.0564	0.0048 ± 0.0014	0.0093 ± 0.0029
Se	0.0000 ± 0.0504	0.0000 ± 0.0013	0.0000 ± 0.0024
Br	0.2760 ± 0.0516	0.0070 ± 0.0013	0.0133 ± 0.0028
Rb	0.5112 ± 0.0684	0.0129 ± 0.0017	0.0247 ± 0.0041
Sr	11.11 ± 0.5676	0.2807 ± 0.0146	0.5369 ± 0.0603
Y	0.1248 ± 0.0792	0.0032 ± 0.0020	0.0060 ± 0.0039
Zr	0.9468 ± 0.1164	0.0239 ± 0.0029	0.0457 ± 0.0072
Mo	0.8460 ± 0.1404	0.0214 ± 0.0036	0.0409 ± 0.0079
Pd	0.0948 ± 0.0864	0.0024 ± 0.0022	0.0046 ± 0.0042
Ag	0.1200 ± 0.0816	0.0030 ± 0.0021	0.0058 ± 0.0040
Cd	0.0780 ± 0.0804	0.0020 ± 0.0020	0.0038 ± 0.0039
In	0.1536 ± 0.0828	0.0039 ± 0.0021	0.0074 ± 0.0041
Sn	0.5760 ± 0.1008	0.0145 ± 0.0025	0.0278 ± 0.0056
Sb	0.0936 ± 0.1224	0.0024 ± 0.0031	0.0045 ± 0.0059
Ba	5.735 ± 0.5700	0.1448 ± 0.0145	0.2770 ± 0.0391
La	2.160 ± 0.6084	0.0545 ± 0.0154	0.1043 ± 0.0312
Hg	0.0000 ± 0.1416	0.0000 ± 0.0036	0.0000 ± 0.0068
Pb	0.1704 ± 0.1392	0.0043 ± 0.0035	0.0082 ± 0.0068
IC			
Cl	130.6 ± 6.531	3.298 ± 0.0339	6.310 ± 0.7055
Br	0.0000 ± 1.000	0.0000 ± 0.0025	0.0000 ± 0.0483
NO3	35.82 ± 1.791	0.9045 ± 0.0097	1.730 ± 0.1935
SO4	477.4 ± 23.87	12.06 ± 0.1224	23.06 ± 2.578
Na	331.8 ± 16.59	8.379 ± 0.0853	16.03 ± 1.792
NH4	5.680 ± 0.2840	0.1434 ± 0.0020	0.2744 ± 0.0307
K	10.94 ± 0.5470	0.2763 ± 0.0034	0.5285 ± 0.0591
OC/EC			
OC	337.2 ± 19.32	8.515 ± 0.4954	16.29 ± 1.877
EC	4.392 ± 2.616	0.1109 ± 0.0661	0.2122 ± 0.1281
TC	342.0 ± 20.64	8.636 ± 0.5285	16.52 ± 1.930

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U256
Client ID: 20080727
Site: Lindon (LN)
Sample Date: 5/20/08
Mass: 3584. +- 40. µg
Volume: 20.30 +- 2.030 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 176.6 +- 17.76 $\mu g/m^3$

Analyte	µg/filter	percent	$\mu g/m^3$
XRF			
Al	95.57 ± 7.046	2.667 ± 0.1988	4.708 ± 0.5849
P	0.0000 ± 3.252	0.0000 ± 0.0907	0.0000 ± 0.1602
S	10.32 ± 1.220	0.2879 ± 0.0342	0.5083 ± 0.0787
Cl	8.380 ± 0.8448	0.2338 ± 0.0237	0.4128 ± 0.0586
K	89.76 ± 5.552	2.504 ± 0.1574	4.422 ± 0.5199
Ca	463.1 ± 27.60	12.92 ± 0.7835	22.81 ± 2.656
Ti	9.788 ± 0.6144	0.2731 ± 0.0174	0.4822 ± 0.0569
V	0.1524 ± 0.1236	0.0043 ± 0.0034	0.0075 ± 0.0061
Cr	1.691 ± 0.1236	0.0472 ± 0.0035	0.0833 ± 0.0103
Mn	2.959 ± 0.1908	0.0826 ± 0.0054	0.1458 ± 0.0173
Fe	116.9 ± 9.254	3.260 ± 0.2608	5.756 ± 0.7343
Co	0.0000 ± 0.0744	0.0000 ± 0.0021	0.0000 ± 0.0037
Ni	0.2976 ± 0.0384	0.0083 ± 0.0011	0.0147 ± 0.0024
Cu	0.6720 ± 0.1056	0.0188 ± 0.0030	0.0331 ± 0.0062
Zn	1.848 ± 0.1704	0.0516 ± 0.0048	0.0910 ± 0.0124
Ga	0.1800 ± 0.0720	0.0050 ± 0.0020	0.0089 ± 0.0037
Ge	0.2364 ± 0.0648	0.0066 ± 0.0018	0.0116 ± 0.0034
As	0.2232 ± 0.0564	0.0062 ± 0.0016	0.0110 ± 0.0030
Se	0.0924 ± 0.0516	0.0026 ± 0.0014	0.0046 ± 0.0026
Br	0.2556 ± 0.0516	0.0071 ± 0.0014	0.0126 ± 0.0028
Rb	0.5556 ± 0.0708	0.0155 ± 0.0020	0.0274 ± 0.0044
Sr	2.278 ± 0.1392	0.0635 ± 0.0039	0.1122 ± 0.0131
Y	0.2664 ± 0.0828	0.0074 ± 0.0023	0.0131 ± 0.0043
Zr	1.364 ± 0.1248	0.0381 ± 0.0035	0.0672 ± 0.0091
Mo	1.121 ± 0.1464	0.0313 ± 0.0041	0.0552 ± 0.0091
Pd	0.0372 ± 0.0864	0.0010 ± 0.0024	0.0018 ± 0.0043
Ag	0.0252 ± 0.0816	0.0007 ± 0.0023	0.0012 ± 0.0040
Cd	0.1668 ± 0.0816	0.0047 ± 0.0023	0.0082 ± 0.0041
In	0.2004 ± 0.0840	0.0056 ± 0.0023	0.0099 ± 0.0043
Sn	0.7776 ± 0.1032	0.0217 ± 0.0029	0.0383 ± 0.0064
Sb	0.1608 ± 0.1212	0.0045 ± 0.0034	0.0079 ± 0.0060
Ba	3.445 ± 0.5232	0.0961 ± 0.0146	0.1697 ± 0.0309
La	0.7068 ± 0.6024	0.0197 ± 0.0168	0.0348 ± 0.0299
Hg	0.1116 ± 0.1440	0.0031 ± 0.0040	0.0055 ± 0.0071
Pb	0.0528 ± 0.1404	0.0015 ± 0.0039	0.0026 ± 0.0069
IC			
Cl	14.08 ± 0.7040	0.3929 ± 0.0050	0.6936 ± 0.0775
Br	0.0000 ± 1.000	0.0000 ± 0.0028	0.0000 ± 0.0493
NO3	31.40 ± 1.570	0.8761 ± 0.0104	1.547 ± 0.1729
SO4	40.34 ± 2.017	1.126 ± 0.0132	1.987 ± 0.2222
Na	48.36 ± 2.418	1.349 ± 0.0157	2.382 ± 0.2663
NH4	4.980 ± 0.2490	0.1390 ± 0.0021	0.2453 ± 0.0274
K	8.520 ± 0.4260	0.2377 ± 0.0032	0.4197 ± 0.0469
OC/EC			
OC	324.0 ± 18.60	9.040 ± 0.5287	15.96 ± 1.840
EC	20.04 ± 3.408	0.5592 ± 0.0953	0.9872 ± 0.1948
TC	344.4 ± 20.76	9.609 ± 0.5891	16.97 ± 1.981

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U257
Client ID: 20081074
Site: Ogden (O2)
Sample Date: 7/ 4/08
Mass: 1656. +- 40. µg
Volume: 20.30 +- 2.030 m³
Deposit Area: 12.0 cm²
Size Fraction: PM10
Suspended
Particulates: 81.58 +- 8.39 µg/m³

Analyte	µg/filter	percent	µg/m³
XRF			
Al	44.42 ± 4.576	2.683 ± 0.2838	2.188 ± 0.3142
P	0.0000 ± 2.050	0.0000 ± 0.1238	0.0000 ± 0.1010
S	80.22 ± 6.407	4.844 ± 0.4042	3.952 ± 0.5057
Cl	64.46 ± 4.652	3.893 ± 0.2963	3.176 ± 0.3916
K	277.0 ± 17.34	16.72 ± 1.122	13.64 ± 1.610
Ca	124.6 ± 7.595	7.522 ± 0.4933	6.136 ± 0.7187
Ti	2.754 ± 0.2796	0.1663 ± 0.0174	0.1357 ± 0.0193
V	0.1380 ± 0.1296	0.0083 ± 0.0078	0.0068 ± 0.0064
Cr	0.5352 ± 0.0756	0.0323 ± 0.0046	0.0264 ± 0.0046
Mn	1.418 ± 0.1080	0.0857 ± 0.0068	0.0699 ± 0.0088
Fe	35.03 ± 2.812	2.115 ± 0.1773	1.726 ± 0.2213
Co	0.0000 ± 0.0456	0.0000 ± 0.0028	0.0000 ± 0.0022
Ni	0.2784 ± 0.0324	0.0168 ± 0.0020	0.0137 ± 0.0021
Cu	8.588 ± 0.4356	0.5186 ± 0.0291	0.4231 ± 0.0474
Zn	2.456 ± 0.2160	0.1483 ± 0.0135	0.1210 ± 0.0161
Ga	0.0000 ± 0.0732	0.0000 ± 0.0044	0.0000 ± 0.0036
Ge	0.0168 ± 0.0648	0.0010 ± 0.0039	0.0008 ± 0.0032
As	0.1908 ± 0.0960	0.0115 ± 0.0058	0.0094 ± 0.0048
Se	0.0888 ± 0.0516	0.0054 ± 0.0031	0.0044 ± 0.0026
Br	0.2760 ± 0.0516	0.0167 ± 0.0031	0.0136 ± 0.0029
Rb	0.1848 ± 0.0624	0.0112 ± 0.0038	0.0091 ± 0.0032
Sr	5.948 ± 0.3132	0.3592 ± 0.0208	0.2930 ± 0.0331
Y	0.0240 ± 0.0792	0.0014 ± 0.0048	0.0012 ± 0.0039
Zr	0.8028 ± 0.1104	0.0485 ± 0.0068	0.0395 ± 0.0067
Mo	1.105 ± 0.1452	0.0667 ± 0.0089	0.0544 ± 0.0090
Pd	0.1176 ± 0.0876	0.0071 ± 0.0053	0.0058 ± 0.0044
Ag	0.2736 ± 0.0840	0.0165 ± 0.0051	0.0135 ± 0.0044
Cd	0.3108 ± 0.0828	0.0188 ± 0.0050	0.0153 ± 0.0044
In	0.3012 ± 0.0840	0.0182 ± 0.0051	0.0148 ± 0.0044
Sn	0.7752 ± 0.1032	0.0468 ± 0.0063	0.0382 ± 0.0064
Sb	1.256 ± 0.1416	0.0759 ± 0.0087	0.0619 ± 0.0093
Ba	26.35 ± 1.424	1.591 ± 0.0942	1.298 ± 0.1476
La	2.245 ± 0.6132	0.1356 ± 0.0372	0.1106 ± 0.0322
Hg	0.0084 ± 0.1452	0.0005 ± 0.0088	0.0004 ± 0.0072
Pb	0.5856 ± 0.1476	0.0354 ± 0.0090	0.0288 ± 0.0078
IC			
Cl	64.30 ± 3.215	3.883 ± 0.0944	3.167 ± 0.3541
Br	0.0000 ± 1.000	0.0000 ± 0.0060	0.0000 ± 0.0493
NO3	34.28 ± 1.714	2.070 ± 0.0506	1.689 ± 0.1888
SO4	192.1 ± 9.606	11.60 ± 0.2809	9.464 ± 1.058
Na	93.08 ± 4.654	5.621 ± 0.1364	4.585 ± 0.5126
NH4	4.300 ± 0.2150	0.2597 ± 0.0069	0.2118 ± 0.0237
K	208.0 ± 10.40	12.56 ± 0.3040	10.25 ± 1.146
OC/EC			
OC	247.2 ± 14.76	14.93 ± 0.9615	12.18 ± 1.418
EC	41.40 ± 4.476	2.500 ± 0.2770	2.039 ± 0.3003
TC	288.0 ± 18.00	17.39 ± 1.165	14.19 ± 1.673

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U258
Client ID: 20090387
Site: Lindon (LN)
Sample Date: 3/ 4/09
Mass: 4258. +- 40. µg
Volume: 21.00 +- 2.100 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 202.8 +- 20.37 $\mu g/m^3$

Analyte	µg/filter	percent	µg/m³
XRF			
Al	60.94 ± 5.242	1.431 ± 0.1238	2.902 ± 0.3828
P	0.0000 ± 2.972	0.0000 ± 0.0698	0.0000 ± 0.1415
S	82.06 ± 6.294	1.927 ± 0.1489	3.907 ± 0.4925
Cl	43.22 ± 3.094	1.015 ± 0.0733	2.058 ± 0.2531
K	69.89 ± 4.354	1.641 ± 0.1034	3.328 ± 0.3921
Ca	551.6 ± 32.96	12.96 ± 0.7837	26.27 ± 3.060
Ti	6.890 ± 0.4656	0.1618 ± 0.0110	0.3281 ± 0.0396
V	0.0000 ± 0.1296	0.0000 ± 0.0030	0.0000 ± 0.0062
Cr	1.710 ± 0.1284	0.0402 ± 0.0030	0.0814 ± 0.0102
Mn	2.218 ± 0.1524	0.0521 ± 0.0036	0.1056 ± 0.0128
Fe	99.43 ± 7.936	2.335 ± 0.1877	4.735 ± 0.6058
Co	0.0000 ± 0.0684	0.0000 ± 0.0016	0.0000 ± 0.0033
Ni	0.3180 ± 0.0384	0.0075 ± 0.0009	0.0151 ± 0.0024
Cu	0.6960 ± 0.0480	0.0163 ± 0.0011	0.0331 ± 0.0040
Zn	2.184 ± 0.1980	0.0513 ± 0.0047	0.1040 ± 0.0140
Ga	0.1080 ± 0.0756	0.0025 ± 0.0018	0.0051 ± 0.0036
Ge	0.1428 ± 0.0660	0.0034 ± 0.0016	0.0068 ± 0.0032
As	0.1188 ± 0.0588	0.0028 ± 0.0014	0.0057 ± 0.0029
Se	0.1332 ± 0.0540	0.0031 ± 0.0013	0.0063 ± 0.0026
Br	0.1752 ± 0.0528	0.0041 ± 0.0012	0.0083 ± 0.0026
Rb	0.6444 ± 0.0756	0.0151 ± 0.0018	0.0307 ± 0.0047
Sr	7.352 ± 0.3828	0.1727 ± 0.0091	0.3501 ± 0.0395
Y	0.0732 ± 0.0864	0.0017 ± 0.0020	0.0035 ± 0.0041
Zr	1.189 ± 0.1260	0.0279 ± 0.0030	0.0566 ± 0.0083
Mo	1.087 ± 0.1536	0.0255 ± 0.0036	0.0518 ± 0.0090
Pd	0.0000 ± 0.0888	0.0000 ± 0.0021	0.0000 ± 0.0042
Ag	0.2856 ± 0.0876	0.0067 ± 0.0021	0.0136 ± 0.0044
Cd	0.1440 ± 0.0852	0.0034 ± 0.0020	0.0069 ± 0.0041
In	0.0576 ± 0.0864	0.0014 ± 0.0020	0.0027 ± 0.0041
Sn	0.8076 ± 0.1080	0.0190 ± 0.0025	0.0385 ± 0.0064
Sb	0.1152 ± 0.1272	0.0027 ± 0.0030	0.0055 ± 0.0061
Ba	5.932 ± 0.5976	0.1393 ± 0.0141	0.2825 ± 0.0401
La	2.130 ± 0.6360	0.0500 ± 0.0149	0.1014 ± 0.0319
Hg	0.0672 ± 0.1488	0.0016 ± 0.0035	0.0032 ± 0.0071
Pb	0.3972 ± 0.1464	0.0093 ± 0.0034	0.0189 ± 0.0072
IC			
Cl	165.1 ± 8.254	3.877 ± 0.0370	7.861 ± 0.8789
Br	0.0000 ± 1.000	0.0000 ± 0.0023	0.0000 ± 0.0476
NO3	21.04 ± 1.052	0.4941 ± 0.0052	1.002 ± 0.1120
SO4	338.6 ± 16.93	7.952 ± 0.0753	16.12 ± 1.803
Na	310.2 ± 15.51	7.285 ± 0.0691	14.77 ± 1.652
NH4	0.0000 ± 1.000	0.0000 ± 0.0023	0.0000 ± 0.0476
K	9.400 ± 0.4700	0.2208 ± 0.0026	0.4476 ± 0.0500
OC/EC			
OC	345.6 ± 19.68	8.116 ± 0.4684	16.46 ± 1.894
EC	4.824 ± 2.640	0.1133 ± 0.0620	0.2297 ± 0.1278
TC	350.4 ± 21.12	8.229 ± 0.5020	16.69 ± 1.948

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U259
Client ID: 2009B001
Deposit Area: 12.0 cm²
Size Fraction: PM10
Comments: Blank

Analyte	µg/filter
XRF	
Al	11.07 ± 3.764
P	0.0000 ± 2.396
S	1.050 ± 0.9636
Cl	0.0000 ± 0.5616
K	10.04 ± 1.055
Ca	61.33 ± 3.772
Ti	0.1776 ± 0.1524
V	0.0000 ± 0.0708
Cr	0.3660 ± 0.0480
Mn	0.2340 ± 0.0480
Fe	2.652 ± 0.1620
Co	0.0000 ± 0.0264
Ni	0.2604 ± 0.0288
Cu	0.3492 ± 0.0312
Zn	0.9468 ± 0.1212
Ga	0.1728 ± 0.0720
Ge	0.3072 ± 0.0648
As	0.0684 ± 0.0540
Se	0.0492 ± 0.0504
Br	0.0420 ± 0.0468
Rb	0.1908 ± 0.0624
Sr	0.2868 ± 0.0720
Y	0.0000 ± 0.0828
Zr	0.9276 ± 0.1140
Mo	1.286 ± 0.1536
Pd	0.0264 ± 0.0852
Ag	0.2292 ± 0.0816
Cd	0.2856 ± 0.0816
In	0.1320 ± 0.0828
Sn	0.6132 ± 0.1008
Sb	0.3324 ± 0.1236
Ba	2.825 ± 0.5172
La	1.295 ± 0.6156
Hg	0.0000 ± 0.1416
Pb	0.1092 ± 0.1392
IC	
Cl	3.560 ± 0.1780
Br	0.0000 ± 1.000
NO3	4.940 ± 0.2470
SO4	1.800 ± 0.0900
Na	34.92 ± 1.746
NH4	0.0000 ± 1.000
K	0.0000 ± 1.000
OC/EC	
OC	101.9 ± 7.500
EC	0.0000 ± 2.400
TC	101.9 ± 8.700

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X779
Client ID: 8131301
Site: Lindon (LN)
Sample Date: 4/15/08
Mass: 589. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 24.54 +- 2.49 $\mu g/m^3$

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	3.923 ± 1.412	0.6661 ± 0.2401	0.1635 ± 0.0611
Mg	19.06 ± 1.504	3.237 ± 0.2612	0.7943 ± 0.1012
Al	31.09 ± 1.984	5.278 ± 0.3486	1.295 ± 0.1537
Si	87.33 ± 4.677	14.83 ± 0.8330	3.639 ± 0.4128
P	0.0068 ± 0.0463	0.0012 ± 0.0079	0.0003 ± 0.0019
S	5.571 ± 0.3153	0.9458 ± 0.0559	0.2321 ± 0.0267
Cl	4.736 ± 0.2622	0.8040 ± 0.0466	0.1973 ± 0.0226
K	11.64 ± 0.5989	1.976 ± 0.1071	0.4850 ± 0.0545
Ca	33.50 ± 1.698	5.688 ± 0.3041	1.396 ± 0.1565
Ti	1.449 ± 0.0757	0.2460 ± 0.0135	0.0604 ± 0.0068
V	0.0316 ± 0.0113	0.0054 ± 0.0019	0.0013 ± 0.0005
Cr	0.0226 ± 0.0090	0.0038 ± 0.0015	0.0009 ± 0.0004
Mn	0.3458 ± 0.0452	0.0587 ± 0.0077	0.0144 ± 0.0024
Fe	16.05 ± 0.8057	2.724 ± 0.1444	0.6686 ± 0.0748
Co	0.0000 ± 0.0271	0.0000 ± 0.0046	0.0000 ± 0.0011
Ni	0.0396 ± 0.0158	0.0067 ± 0.0027	0.0016 ± 0.0007
Cu	0.0282 ± 0.0147	0.0048 ± 0.0025	0.0012 ± 0.0006
Zn	0.1808 ± 0.0170	0.0307 ± 0.0029	0.0075 ± 0.0010
Ga	0.0170 ± 0.0102	0.0029 ± 0.0017	0.0007 ± 0.0004
Ge	0.0023 ± 0.0090	0.0004 ± 0.0015	0.0001 ± 0.0004
As	0.0000 ± 0.0124	0.0000 ± 0.0021	0.0000 ± 0.0005
Se	0.0011 ± 0.0068	0.0002 ± 0.0012	0.0000 ± 0.0003
Br	0.0599 ± 0.0068	0.0102 ± 0.0012	0.0025 ± 0.0004
Rb	0.0655 ± 0.0079	0.0111 ± 0.0014	0.0027 ± 0.0004
Sr	0.2396 ± 0.0158	0.0407 ± 0.0028	0.0100 ± 0.0012
Y	0.0147 ± 0.0090	0.0025 ± 0.0015	0.0006 ± 0.0004
Zr	0.0396 ± 0.0124	0.0067 ± 0.0021	0.0016 ± 0.0005
Mo	0.0000 ± 0.0170	0.0000 ± 0.0029	0.0000 ± 0.0007
Pd	0.0034 ± 0.0497	0.0006 ± 0.0084	0.0001 ± 0.0021
Ag	0.0441 ± 0.0520	0.0075 ± 0.0088	0.0018 ± 0.0022
Cd	0.0294 ± 0.0565	0.0050 ± 0.0096	0.0012 ± 0.0024
In	0.0011 ± 0.0622	0.0002 ± 0.0106	0.0000 ± 0.0026
Sn	0.0000 ± 0.0723	0.0000 ± 0.0123	0.0000 ± 0.0030
Sb	0.2260 ± 0.1480	0.0384 ± 0.0251	0.0094 ± 0.0062
Ba	0.1322 ± 0.0588	0.0224 ± 0.0100	0.0055 ± 0.0025
La	0.0282 ± 0.0441	0.0048 ± 0.0075	0.0012 ± 0.0018
Hg	0.0000 ± 0.0181	0.0000 ± 0.0031	0.0000 ± 0.0008
Pb	0.0158 ± 0.0181	0.0027 ± 0.0031	0.0007 ± 0.0008
IC			
Cl	6.270 ± 0.3135	1.065 ± 0.0204	0.2612 ± 0.0292
Br	0.0000 ± 0.5000	0.0000 ± 0.0120	0.0000 ± 0.0208
NO3	9.890 ± 0.4945	1.679 ± 0.0309	0.4121 ± 0.0461
SO4	21.62 ± 1.081	3.671 ± 0.0648	0.9008 ± 0.1007
Na	8.300 ± 0.4150	1.409 ± 0.0263	0.3458 ± 0.0387
NH4	4.330 ± 0.2165	0.7351 ± 0.0148	0.1804 ± 0.0202
K	2.090 ± 0.1045	0.3548 ± 0.0081	0.0871 ± 0.0097

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X780
Client ID: 8131368
Site: Lindon (LN)
Sample Date: 4/19/08
Mass: 754. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 31.42 +- 3.17 $\mu g/m^3$
Comments: NUD-Mn

Analyte	µg/filter	percent	$\mu g/m^3$
XRF			
Na	0.5435 ± 0.7017	0.0721 ± 0.0931	0.0226 ± 0.0293
Mg	30.80 ± 2.368	4.085 ± 0.3188	1.283 ± 0.1619
Al	40.19 ± 2.598	5.331 ± 0.3517	1.675 ± 0.1994
Si	111.2 ± 6.035	14.75 ± 0.8240	4.635 ± 0.5273
P	0.0000 ± 0.0565	0.0000 ± 0.0075	0.0000 ± 0.0024
S	8.003 ± 0.4441	1.061 ± 0.0606	0.3334 ± 0.0381
Cl	4.013 ± 0.2305	0.5322 ± 0.0314	0.1672 ± 0.0193
K	14.78 ± 0.7605	1.960 ± 0.1042	0.6158 ± 0.0693
Ca	67.02 ± 3.397	8.889 ± 0.4657	2.793 ± 0.3131
Ti	1.850 ± 0.0960	0.2453 ± 0.0131	0.0771 ± 0.0087
V	0.0328 ± 0.0124	0.0043 ± 0.0016	0.0014 ± 0.0005
Cr	0.0350 ± 0.0113	0.0046 ± 0.0015	0.0015 ± 0.0005
Mn	0.4870 ± 0.0712	0.0646 ± 0.0095	0.0203 ± 0.0036
Fe	19.61 ± 0.9831	2.600 ± 0.1349	0.8169 ± 0.0914
Co	0.0000 ± 0.0294	0.0000 ± 0.0039	0.0000 ± 0.0012
Ni	0.0362 ± 0.0181	0.0048 ± 0.0024	0.0015 ± 0.0008
Cu	0.0667 ± 0.0158	0.0088 ± 0.0021	0.0028 ± 0.0007
Zn	0.1209 ± 0.0147	0.0160 ± 0.0020	0.0050 ± 0.0008
Ga	0.0237 ± 0.0113	0.0031 ± 0.0015	0.0010 ± 0.0005
Ge	0.0090 ± 0.0102	0.0012 ± 0.0013	0.0004 ± 0.0004
As	0.0000 ± 0.0147	0.0000 ± 0.0019	0.0000 ± 0.0006
Se	0.0000 ± 0.0079	0.0000 ± 0.0010	0.0000 ± 0.0003
Br	0.0836 ± 0.0090	0.0111 ± 0.0012	0.0035 ± 0.0005
Rb	0.0836 ± 0.0090	0.0111 ± 0.0012	0.0035 ± 0.0005
Sr	0.4791 ± 0.0271	0.0635 ± 0.0037	0.0200 ± 0.0023
Y	0.0124 ± 0.0113	0.0016 ± 0.0015	0.0005 ± 0.0005
Zr	0.0362 ± 0.0136	0.0048 ± 0.0018	0.0015 ± 0.0006
Mo	0.0124 ± 0.0192	0.0016 ± 0.0025	0.0005 ± 0.0008
Pd	0.0000 ± 0.0520	0.0000 ± 0.0069	0.0000 ± 0.0022
Ag	0.0045 ± 0.0542	0.0006 ± 0.0072	0.0002 ± 0.0023
Cd	0.0655 ± 0.0599	0.0087 ± 0.0079	0.0027 ± 0.0025
In	0.1085 ± 0.0678	0.0144 ± 0.0090	0.0045 ± 0.0029
Sn	0.0520 ± 0.0791	0.0069 ± 0.0105	0.0022 ± 0.0033
Sb	0.2215 ± 0.1582	0.0294 ± 0.0210	0.0092 ± 0.0067
Ba	0.0881 ± 0.0712	0.0117 ± 0.0094	0.0037 ± 0.0030
La	0.0000 ± 0.0531	0.0000 ± 0.0070	0.0000 ± 0.0022
Hg	0.0000 ± 0.0203	0.0000 ± 0.0027	0.0000 ± 0.0008
Pb	0.0102 ± 0.0203	0.0013 ± 0.0027	0.0004 ± 0.0008
IC			
Cl	5.080 ± 0.2540	0.6737 ± 0.0112	0.2117 ± 0.0237
Br	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
NO3	10.67 ± 0.5335	1.415 ± 0.0211	0.4446 ± 0.0497
SO4	29.00 ± 1.450	3.846 ± 0.0535	1.208 ± 0.1351
Na	7.250 ± 0.3625	0.9615 ± 0.0150	0.3021 ± 0.0338
NH4	5.120 ± 0.2560	0.6790 ± 0.0112	0.2133 ± 0.0239
K	2.150 ± 0.1075	0.2851 ± 0.0058	0.0896 ± 0.0100

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X781
Client ID: 8131360
Site: Hawthorn (HW)
Sample Date: 4/19/08
Mass: 752. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 31.33 +- 3.16 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	15.91 ± 2.319	2.116 ± 0.3096	0.6629 ± 0.1172
Mg	40.30 ± 3.037	5.358 ± 0.4102	1.679 ± 0.2103
Al	25.02 ± 1.638	3.327 ± 0.2223	1.042 ± 0.1246
Si	76.98 ± 4.173	10.24 ± 0.5714	3.207 ± 0.3648
P	0.0000 ± 0.0554	0.0000 ± 0.0074	0.0000 ± 0.0023
S	16.40 ± 0.8690	2.180 ± 0.1191	0.6832 ± 0.0773
Cl	10.22 ± 0.5413	1.359 ± 0.0742	0.4257 ± 0.0482
K	10.23 ± 0.5300	1.360 ± 0.0728	0.4262 ± 0.0480
Ca	64.66 ± 3.275	8.598 ± 0.4502	2.694 ± 0.3020
Ti	1.248 ± 0.0667	0.1659 ± 0.0091	0.0520 ± 0.0059
V	0.0508 ± 0.0113	0.0068 ± 0.0015	0.0021 ± 0.0005
Cr	0.0192 ± 0.0102	0.0026 ± 0.0014	0.0008 ± 0.0004
Mn	0.2090 ± 0.0158	0.0278 ± 0.0021	0.0087 ± 0.0011
Fe	13.01 ± 0.6531	1.730 ± 0.0898	0.5419 ± 0.0606
Co	0.0000 ± 0.0260	0.0000 ± 0.0035	0.0000 ± 0.0011
Ni	0.0237 ± 0.0158	0.0032 ± 0.0021	0.0010 ± 0.0007
Cu	0.0497 ± 0.0147	0.0066 ± 0.0020	0.0021 ± 0.0006
Zn	0.0994 ± 0.0136	0.0132 ± 0.0018	0.0041 ± 0.0007
Ga	0.0000 ± 0.0102	0.0000 ± 0.0014	0.0000 ± 0.0004
Ge	0.0000 ± 0.0090	0.0000 ± 0.0012	0.0000 ± 0.0004
As	0.0000 ± 0.0136	0.0000 ± 0.0018	0.0000 ± 0.0006
Se	0.0045 ± 0.0068	0.0006 ± 0.0009	0.0002 ± 0.0003
Br	0.0870 ± 0.0079	0.0116 ± 0.0011	0.0036 ± 0.0005
Rb	0.0441 ± 0.0079	0.0059 ± 0.0011	0.0018 ± 0.0004
Sr	3.083 ± 0.1559	0.4099 ± 0.0214	0.1284 ± 0.0144
Y	0.0102 ± 0.0102	0.0014 ± 0.0014	0.0004 ± 0.0004
Zr	0.0441 ± 0.0136	0.0059 ± 0.0018	0.0018 ± 0.0006
Mo	0.0000 ± 0.0170	0.0000 ± 0.0023	0.0000 ± 0.0007
Pd	0.0034 ± 0.0497	0.0005 ± 0.0066	0.0001 ± 0.0021
Ag	0.1209 ± 0.0542	0.0161 ± 0.0072	0.0050 ± 0.0023
Cd	0.1774 ± 0.0588	0.0236 ± 0.0078	0.0074 ± 0.0026
In	0.0102 ± 0.0633	0.0014 ± 0.0084	0.0004 ± 0.0026
Sn	0.0226 ± 0.0746	0.0030 ± 0.0099	0.0009 ± 0.0031
Sb	0.1831 ± 0.1514	0.0243 ± 0.0201	0.0076 ± 0.0064
Ba	0.0520 ± 0.0576	0.0069 ± 0.0077	0.0022 ± 0.0024
La	0.0000 ± 0.0508	0.0000 ± 0.0068	0.0000 ± 0.0021
Hg	0.0000 ± 0.0158	0.0000 ± 0.0021	0.0000 ± 0.0007
Pb	0.0576 ± 0.0192	0.0077 ± 0.0026	0.0024 ± 0.0008
IC			
Cl	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
Br	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
NO3	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
SO4	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
Na	23.60 ± 1.180	3.138 ± 0.0442	0.9833 ± 0.1099
NH4	4.460 ± 0.2230	0.5931 ± 0.0101	0.1858 ± 0.0208
K	2.480 ± 0.1240	0.3298 ± 0.0064	0.1033 ± 0.0116

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X782
Client ID: 8131377
Site: North Provo (NP)
Sample Date: 4/19/08
Mass: 1199. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 49.96 +- 5.01 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.0000 ± 0.8837	0.0000 ± 0.0737	0.0000 ± 0.0368
Mg	39.08 ± 3.138	3.259 ± 0.2631	1.628 ± 0.2088
Al	64.76 ± 4.325	5.401 ± 0.3635	2.698 ± 0.3245
Si	173.1 ± 9.682	14.44 ± 0.8164	7.213 ± 0.8265
P	0.5673 ± 0.0757	0.0473 ± 0.0063	0.0236 ± 0.0039
S	8.115 ± 0.4599	0.6768 ± 0.0388	0.3381 ± 0.0389
Cl	2.730 ± 0.1729	0.2277 ± 0.0145	0.1138 ± 0.0135
K	23.46 ± 1.209	1.957 ± 0.1022	0.9774 ± 0.1100
Ca	102.6 ± 5.226	8.558 ± 0.4417	4.276 ± 0.4798
Ti	3.051 ± 0.1559	0.2545 ± 0.0132	0.1271 ± 0.0143
V	0.0689 ± 0.0158	0.0057 ± 0.0013	0.0029 ± 0.0007
Cr	0.0644 ± 0.0124	0.0054 ± 0.0010	0.0027 ± 0.0006
Mn	0.8113 ± 0.0723	0.0677 ± 0.0061	0.0338 ± 0.0045
Fe	32.71 ± 1.638	2.728 ± 0.1385	1.363 ± 0.1524
Co	0.0565 ± 0.0328	0.0047 ± 0.0027	0.0024 ± 0.0014
Ni	0.0701 ± 0.0170	0.0058 ± 0.0014	0.0029 ± 0.0008
Cu	0.1062 ± 0.0170	0.0089 ± 0.0014	0.0044 ± 0.0008
Zn	0.2170 ± 0.0181	0.0181 ± 0.0015	0.0090 ± 0.0012
Ga	0.0090 ± 0.0102	0.0008 ± 0.0008	0.0004 ± 0.0004
Ge	0.0000 ± 0.0102	0.0000 ± 0.0008	0.0000 ± 0.0004
As	0.0000 ± 0.0136	0.0000 ± 0.0011	0.0000 ± 0.0006
Se	0.0068 ± 0.0068	0.0006 ± 0.0006	0.0003 ± 0.0003
Br	0.0927 ± 0.0079	0.0077 ± 0.0007	0.0039 ± 0.0005
Rb	0.1243 ± 0.0102	0.0104 ± 0.0009	0.0052 ± 0.0007
Sr	0.5921 ± 0.0316	0.0494 ± 0.0027	0.0247 ± 0.0028
Y	0.0000 ± 0.0102	0.0000 ± 0.0008	0.0000 ± 0.0004
Zr	0.1424 ± 0.0147	0.0119 ± 0.0012	0.0059 ± 0.0009
Mo	0.0328 ± 0.0181	0.0027 ± 0.0015	0.0014 ± 0.0008
Pd	0.0757 ± 0.0542	0.0063 ± 0.0045	0.0032 ± 0.0023
Ag	0.0000 ± 0.0565	0.0000 ± 0.0047	0.0000 ± 0.0024
Cd	0.1322 ± 0.0622	0.0110 ± 0.0052	0.0055 ± 0.0026
In	0.0090 ± 0.0678	0.0008 ± 0.0057	0.0004 ± 0.0028
Sn	0.1277 ± 0.0791	0.0106 ± 0.0066	0.0053 ± 0.0033
Sb	0.2893 ± 0.1593	0.0241 ± 0.0133	0.0121 ± 0.0067
Ba	0.2384 ± 0.1028	0.0199 ± 0.0086	0.0099 ± 0.0044
La	0.0147 ± 0.0734	0.0012 ± 0.0061	0.0006 ± 0.0031
Hg	0.0181 ± 0.0170	0.0015 ± 0.0014	0.0008 ± 0.0007
Pb	0.0904 ± 0.0203	0.0075 ± 0.0017	0.0038 ± 0.0009
IC			
Cl	13.60 ± 0.6800	1.134 ± 0.0117	0.5667 ± 0.0634
Br	0.0000 ± 0.5000	0.0000 ± 0.0059	0.0000 ± 0.0208
NO3	12.46 ± 0.6230	1.039 ± 0.0109	0.5192 ± 0.0580
SO4	58.75 ± 2.938	4.900 ± 0.0433	2.448 ± 0.2737
Na	6.720 ± 0.3360	0.5605 ± 0.0067	0.2800 ± 0.0313
NH4	5.000 ± 0.2500	0.4170 ± 0.0054	0.2083 ± 0.0233
K	2.980 ± 0.1490	0.2485 ± 0.0038	0.1242 ± 0.0139

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X783
Client ID: 8131629
Site: Lindon (LN)
Sample Date: 5/20/08
Mass: 877. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 36.54 +- 3.68 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.0000 ± 0.6983	0.0000 ± 0.0796	0.0000 ± 0.0291
Mg	24.25 ± 1.936	2.765 ± 0.2230	1.010 ± 0.1293
Al	41.57 ± 2.704	4.740 ± 0.3130	1.732 ± 0.2066
Si	113.8 ± 6.203	12.98 ± 0.7226	4.741 ± 0.5400
P	0.6147 ± 0.0644	0.0701 ± 0.0074	0.0256 ± 0.0037
S	4.557 ± 0.2712	0.5196 ± 0.0315	0.1899 ± 0.0221
Cl	0.7661 ± 0.0836	0.0874 ± 0.0096	0.0319 ± 0.0047
K	16.23 ± 0.8339	1.850 ± 0.0974	0.6761 ± 0.0760
Ca	79.30 ± 4.021	9.043 ± 0.4699	3.304 ± 0.3705
Ti	1.991 ± 0.1040	0.2270 ± 0.0121	0.0830 ± 0.0094
V	0.0429 ± 0.0124	0.0049 ± 0.0014	0.0018 ± 0.0005
Cr	0.0181 ± 0.0113	0.0021 ± 0.0013	0.0008 ± 0.0005
Mn	0.5311 ± 0.0554	0.0606 ± 0.0064	0.0221 ± 0.0032
Fe	21.09 ± 1.058	2.404 ± 0.1237	0.8786 ± 0.0983
Co	0.0000 ± 0.0294	0.0000 ± 0.0034	0.0000 ± 0.0012
Ni	0.0418 ± 0.0170	0.0048 ± 0.0019	0.0017 ± 0.0007
Cu	0.0475 ± 0.0147	0.0054 ± 0.0017	0.0020 ± 0.0006
Zn	0.2565 ± 0.0192	0.0292 ± 0.0022	0.0107 ± 0.0013
Ga	0.0079 ± 0.0102	0.0009 ± 0.0012	0.0003 ± 0.0004
Ge	0.0124 ± 0.0090	0.0014 ± 0.0010	0.0005 ± 0.0004
As	0.0000 ± 0.0124	0.0000 ± 0.0014	0.0000 ± 0.0005
Se	0.0102 ± 0.0068	0.0012 ± 0.0008	0.0004 ± 0.0003
Br	0.1186 ± 0.0090	0.0135 ± 0.0010	0.0049 ± 0.0006
Rb	0.0791 ± 0.0090	0.0090 ± 0.0010	0.0033 ± 0.0005
Sr	0.3548 ± 0.0203	0.0405 ± 0.0024	0.0148 ± 0.0017
Y	0.0090 ± 0.0102	0.0010 ± 0.0012	0.0004 ± 0.0004
Zr	0.0633 ± 0.0124	0.0072 ± 0.0014	0.0026 ± 0.0006
Mo	0.0090 ± 0.0181	0.0010 ± 0.0021	0.0004 ± 0.0008
Pd	0.0000 ± 0.0508	0.0000 ± 0.0058	0.0000 ± 0.0021
Ag	0.1345 ± 0.0542	0.0153 ± 0.0062	0.0056 ± 0.0023
Cd	0.0407 ± 0.0588	0.0046 ± 0.0067	0.0017 ± 0.0025
In	0.0655 ± 0.0667	0.0075 ± 0.0076	0.0027 ± 0.0028
Sn	0.0554 ± 0.0757	0.0063 ± 0.0086	0.0023 ± 0.0032
Sb	0.0000 ± 0.1503	0.0000 ± 0.0171	0.0000 ± 0.0063
Ba	0.1695 ± 0.0746	0.0193 ± 0.0085	0.0071 ± 0.0032
La	0.0000 ± 0.0542	0.0000 ± 0.0062	0.0000 ± 0.0023
Hg	0.0000 ± 0.0192	0.0000 ± 0.0022	0.0000 ± 0.0008
Pb	0.0701 ± 0.0192	0.0080 ± 0.0022	0.0029 ± 0.0009
IC			
Cl	1.920 ± 0.0960	0.2189 ± 0.0043	0.0800 ± 0.0089
Br	0.0000 ± 0.5000	0.0000 ± 0.0081	0.0000 ± 0.0208
NO3	9.990 ± 0.4995	1.139 ± 0.0153	0.4162 ± 0.0465
SO4	16.77 ± 0.8385	1.912 ± 0.0242	0.6988 ± 0.0781
Na	2.070 ± 0.1035	0.2360 ± 0.0045	0.0862 ± 0.0096
NH4	4.150 ± 0.2075	0.4732 ± 0.0075	0.1729 ± 0.0193
K	2.480 ± 0.1240	0.2828 ± 0.0051	0.1033 ± 0.0116

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X784
Client ID: 8132053
Site: Brigham City (BR)
Sample Date: 6/26/08
Mass: 1026. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 42.75 +- 4.30 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.3865 ± 0.5345	0.0377 ± 0.0521	0.0161 ± 0.0223
Mg	3.445 ± 0.5062	0.3358 ± 0.0494	0.1436 ± 0.0255
Al	8.667 ± 0.6068	0.8447 ± 0.0597	0.3611 ± 0.0441
Si	35.73 ± 1.947	3.483 ± 0.1928	1.489 ± 0.1695
P	0.0000 ± 0.0384	0.0000 ± 0.0037	0.0000 ± 0.0016
S	7.094 ± 0.3887	0.6914 ± 0.0385	0.2956 ± 0.0337
Cl	2.907 ± 0.1695	0.2834 ± 0.0167	0.1211 ± 0.0140
K	7.734 ± 0.6803	0.7538 ± 0.0667	0.3222 ± 0.0429
Ca	18.51 ± 0.9402	1.804 ± 0.0933	0.7712 ± 0.0865
Ti	0.8611 ± 0.0475	0.0839 ± 0.0047	0.0359 ± 0.0041
V	0.0215 ± 0.0090	0.0021 ± 0.0009	0.0009 ± 0.0004
Cr	0.0090 ± 0.0079	0.0009 ± 0.0008	0.0004 ± 0.0003
Mn	0.2011 ± 0.0147	0.0196 ± 0.0014	0.0084 ± 0.0010
Fe	10.71 ± 0.5390	1.044 ± 0.0535	0.4464 ± 0.0500
Co	0.0000 ± 0.0237	0.0000 ± 0.0023	0.0000 ± 0.0010
Ni	0.0475 ± 0.0158	0.0046 ± 0.0015	0.0020 ± 0.0007
Cu	0.1322 ± 0.0170	0.0129 ± 0.0017	0.0055 ± 0.0009
Zn	0.2656 ± 0.0192	0.0259 ± 0.0019	0.0111 ± 0.0014
Ga	0.0000 ± 0.0090	0.0000 ± 0.0009	0.0000 ± 0.0004
Ge	0.0000 ± 0.0079	0.0000 ± 0.0008	0.0000 ± 0.0003
As	0.0000 ± 0.0124	0.0000 ± 0.0012	0.0000 ± 0.0005
Se	0.0000 ± 0.0068	0.0000 ± 0.0007	0.0000 ± 0.0003
Br	0.2712 ± 0.0158	0.0264 ± 0.0016	0.0113 ± 0.0013
Rb	0.0181 ± 0.0068	0.0018 ± 0.0007	0.0008 ± 0.0003
Sr	0.0983 ± 0.0090	0.0096 ± 0.0009	0.0041 ± 0.0006
Y	0.0124 ± 0.0090	0.0012 ± 0.0009	0.0005 ± 0.0004
Zr	0.0667 ± 0.0124	0.0065 ± 0.0012	0.0028 ± 0.0006
Mo	0.0079 ± 0.0158	0.0008 ± 0.0015	0.0003 ± 0.0007
Pd	0.1130 ± 0.0475	0.0110 ± 0.0046	0.0047 ± 0.0020
Ag	0.0588 ± 0.0497	0.0057 ± 0.0048	0.0024 ± 0.0021
Cd	0.0678 ± 0.0531	0.0066 ± 0.0052	0.0028 ± 0.0022
In	0.0429 ± 0.0588	0.0042 ± 0.0057	0.0018 ± 0.0025
Sn	0.0678 ± 0.0701	0.0066 ± 0.0068	0.0028 ± 0.0029
Sb	0.0271 ± 0.1379	0.0026 ± 0.0134	0.0011 ± 0.0057
Ba	0.1446 ± 0.0475	0.0141 ± 0.0046	0.0060 ± 0.0021
La	0.0000 ± 0.0373	0.0000 ± 0.0036	0.0000 ± 0.0016
Hg	0.0000 ± 0.0170	0.0000 ± 0.0017	0.0000 ± 0.0007
Pb	0.0599 ± 0.0181	0.0058 ± 0.0018	0.0025 ± 0.0008
IC			
Cl	4.070 ± 0.2035	0.3967 ± 0.0059	0.1696 ± 0.0190
Br	0.0000 ± 0.5000	0.0000 ± 0.0069	0.0000 ± 0.0208
NO3	7.400 ± 0.3700	0.7212 ± 0.0092	0.3083 ± 0.0345
SO4	23.13 ± 1.156	2.254 ± 0.0243	0.9638 ± 0.1078
Na	4.570 ± 0.2285	0.4454 ± 0.0064	0.1904 ± 0.0213
NH4	7.250 ± 0.3625	0.7066 ± 0.0090	0.3021 ± 0.0338
K	3.060 ± 0.1530	0.2982 ± 0.0048	0.1275 ± 0.0143

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X785
Client ID: 8132188
Site: Ogden (O2)
Sample Date: 7/ 4/08
Mass: 1027. +- 10. µg
Volume: 24.00 +- 2.400 m³
Deposit Area: 11.3 cm²
Size Fraction: PM2.5
Suspended
Particulates: 42.79 +- 4.30 µg/m³
Comments: Bismuth

Analyte	µg/filter	percent	µg/m³
XRF			
Na	0.0000 ± 0.9537	0.0000 ± 0.0929	0.0000 ± 0.0397
Mg	33.06 ± 2.641	3.219 ± 0.2590	1.378 ± 0.1763
Al	23.98 ± 1.609	2.335 ± 0.1583	0.9991 ± 0.1203
Si	32.34 ± 1.803	3.149 ± 0.1783	1.348 ± 0.1543
P	0.0000 ± 0.0746	0.0000 ± 0.0073	0.0000 ± 0.0031
S	63.52 ± 3.300	6.185 ± 0.3269	2.647 ± 0.2982
Cl	42.05 ± 2.184	4.094 ± 0.2164	1.752 ± 0.1974
K	199.1 ± 10.16	19.39 ± 1.008	8.296 ± 0.9315
Ca	11.46 ± 0.6012	1.116 ± 0.0595	0.4774 ± 0.0539
Ti	0.7266 ± 0.5028	0.0707 ± 0.0490	0.0303 ± 0.0212
V	0.0000 ± 0.1785	0.0000 ± 0.0174	0.0000 ± 0.0074
Cr	0.0475 ± 0.0226	0.0046 ± 0.0022	0.0020 ± 0.0010
Mn	0.4599 ± 0.0282	0.0448 ± 0.0028	0.0192 ± 0.0022
Fe	10.78 ± 0.5424	1.050 ± 0.0538	0.4493 ± 0.0503
Co	0.0271 ± 0.0271	0.0026 ± 0.0026	0.0011 ± 0.0011
Ni	0.0396 ± 0.0181	0.0039 ± 0.0018	0.0016 ± 0.0008
Cu	6.523 ± 0.3322	0.6352 ± 0.0329	0.2718 ± 0.0305
Zn	1.105 ± 0.0949	0.1076 ± 0.0093	0.0460 ± 0.0061
Ga	0.0226 ± 0.0113	0.0022 ± 0.0011	0.0009 ± 0.0005
Ge	0.0000 ± 0.0102	0.0000 ± 0.0010	0.0000 ± 0.0004
As	0.0497 ± 0.0181	0.0048 ± 0.0018	0.0021 ± 0.0008
Se	0.0023 ± 0.0079	0.0002 ± 0.0008	0.0001 ± 0.0003
Br	0.1345 ± 0.0102	0.0131 ± 0.0010	0.0056 ± 0.0007
Rb	0.0531 ± 0.0090	0.0052 ± 0.0009	0.0022 ± 0.0004
Sr	3.894 ± 0.1966	0.3792 ± 0.0195	0.1622 ± 0.0182
Y	0.0000 ± 0.0102	0.0000 ± 0.0010	0.0000 ± 0.0004
Zr	0.0497 ± 0.0147	0.0048 ± 0.0014	0.0021 ± 0.0006
Mo	0.0486 ± 0.0181	0.0047 ± 0.0018	0.0020 ± 0.0008
Pd	0.0000 ± 0.0576	0.0000 ± 0.0056	0.0000 ± 0.0024
Ag	0.1300 ± 0.0610	0.0127 ± 0.0059	0.0054 ± 0.0026
Cd	0.0881 ± 0.0655	0.0086 ± 0.0064	0.0037 ± 0.0028
In	0.0588 ± 0.0723	0.0057 ± 0.0070	0.0024 ± 0.0030
Sn	0.0000 ± 0.0836	0.0000 ± 0.0081	0.0000 ± 0.0035
Sb	1.420 ± 0.1944	0.1383 ± 0.0190	0.0592 ± 0.0100
Ba	11.15 ± 0.6701	1.085 ± 0.0661	0.4644 ± 0.0542
La	0.3345 ± 0.1966	0.0326 ± 0.0191	0.0139 ± 0.0083
Hg	0.0000 ± 0.0203	0.0000 ± 0.0020	0.0000 ± 0.0008
Pb	0.3774 ± 0.0316	0.0367 ± 0.0031	0.0157 ± 0.0021
Bi	0.1932 ± 0.0339	0.0188 ± 0.0033	0.0081 ± 0.0016
IC			
Cl	48.74 ± 2.437	4.746 ± 0.0486	2.031 ± 0.2271
Br	0.0000 ± 0.5000	0.0000 ± 0.0069	0.0000 ± 0.0208
NO3	21.27 ± 1.064	2.071 ± 0.0225	0.8862 ± 0.0991
SO4	182.5 ± 9.125	17.77 ± 0.1755	7.604 ± 0.8502
Na	6.310 ± 0.3155	0.6144 ± 0.0081	0.2629 ± 0.0294
NH4	3.090 ± 0.1545	0.3009 ± 0.0048	0.1288 ± 0.0144
K	203.2 ± 10.16	19.79 ± 0.1951	8.467 ± 0.9466

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X786
Client ID: 9516469
Site: Lindon (LN)
Sample Date: 3/ 4/09
Mass: 550. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 22.92 +- 2.33 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	10.75 ± 1.728	1.955 ± 0.3161	0.4480 ± 0.0848
Mg	27.65 ± 2.076	5.027 ± 0.3883	1.152 ± 0.1441
Al	17.97 ± 1.167	3.267 ± 0.2204	0.7486 ± 0.0893
Si	57.27 ± 3.066	10.41 ± 0.5887	2.386 ± 0.2707
P	0.0000 ± 0.0441	0.0000 ± 0.0080	0.0000 ± 0.0018
S	9.698 ± 0.5209	1.763 ± 0.1000	0.4041 ± 0.0459
Cl	10.20 ± 0.5368	1.854 ± 0.1032	0.4249 ± 0.0480
K	7.738 ± 0.4023	1.407 ± 0.0775	0.3224 ± 0.0363
Ca	52.24 ± 2.640	9.498 ± 0.5101	2.177 ± 0.2439
Ti	0.9436 ± 0.0508	0.1716 ± 0.0098	0.0393 ± 0.0045
V	0.0373 ± 0.0102	0.0068 ± 0.0019	0.0016 ± 0.0005
Cr	0.0136 ± 0.0090	0.0025 ± 0.0016	0.0006 ± 0.0004
Mn	0.1808 ± 0.0147	0.0329 ± 0.0027	0.0075 ± 0.0010
Fe	9.996 ± 0.5028	1.817 ± 0.0972	0.4165 ± 0.0466
Co	0.0260 ± 0.0226	0.0047 ± 0.0041	0.0011 ± 0.0009
Ni	0.0508 ± 0.0147	0.0092 ± 0.0027	0.0021 ± 0.0006
Cu	0.0090 ± 0.0124	0.0016 ± 0.0023	0.0004 ± 0.0005
Zn	0.1130 ± 0.0136	0.0205 ± 0.0025	0.0047 ± 0.0007
Ga	0.0068 ± 0.0090	0.0012 ± 0.0016	0.0003 ± 0.0004
Ge	0.0000 ± 0.0079	0.0000 ± 0.0014	0.0000 ± 0.0003
As	0.0000 ± 0.0113	0.0000 ± 0.0021	0.0000 ± 0.0005
Se	0.0045 ± 0.0056	0.0008 ± 0.0010	0.0002 ± 0.0002
Br	0.0576 ± 0.0068	0.0105 ± 0.0012	0.0024 ± 0.0004
Rb	0.0271 ± 0.0068	0.0049 ± 0.0012	0.0011 ± 0.0003
Sr	0.7616 ± 0.0396	0.1385 ± 0.0076	0.0317 ± 0.0036
Y	0.0000 ± 0.0090	0.0000 ± 0.0016	0.0000 ± 0.0004
Zr	0.0090 ± 0.0113	0.0016 ± 0.0021	0.0004 ± 0.0005
Mo	0.0215 ± 0.0147	0.0039 ± 0.0027	0.0009 ± 0.0006
Pd	0.0215 ± 0.0475	0.0039 ± 0.0086	0.0009 ± 0.0020
Ag	0.1119 ± 0.0508	0.0203 ± 0.0093	0.0047 ± 0.0022
Cd	0.0848 ± 0.0542	0.0154 ± 0.0099	0.0035 ± 0.0023
In	0.1062 ± 0.0599	0.0193 ± 0.0109	0.0044 ± 0.0025
Sn	0.0859 ± 0.0701	0.0156 ± 0.0127	0.0036 ± 0.0029
Sb	0.1797 ± 0.1390	0.0327 ± 0.0253	0.0075 ± 0.0058
Ba	0.0508 ± 0.0486	0.0092 ± 0.0088	0.0021 ± 0.0020
La	0.0000 ± 0.0429	0.0000 ± 0.0078	0.0000 ± 0.0018
Hg	0.0000 ± 0.0158	0.0000 ± 0.0029	0.0000 ± 0.0007
Pb	0.0463 ± 0.0170	0.0084 ± 0.0031	0.0019 ± 0.0007
IC			
Cl	12.94 ± 0.6470	2.353 ± 0.0452	0.5392 ± 0.0603
Br	0.0000 ± 0.5000	0.0000 ± 0.0129	0.0000 ± 0.0208
NO3	5.940 ± 0.2970	1.080 ± 0.0220	0.2475 ± 0.0277
SO4	35.74 ± 1.787	6.498 ± 0.1206	1.489 ± 0.1665
Na	18.24 ± 0.9120	3.316 ± 0.0627	0.7600 ± 0.0850
NH4	2.330 ± 0.1165	0.4236 ± 0.0099	0.0971 ± 0.0109
K	1.860 ± 0.0930	0.3382 ± 0.0083	0.0775 ± 0.0087

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X787
Client ID: 8131370
Site: Lindon (LN)
Sample Date: 4/21/08
Deposit Area: 11.3 cm²
Size Fraction: PM2.5
Comments: Blank

Analyte	µg/filter
XRF	
Na	0.3480 ± 0.2938
Mg	0.0000 ± 0.1232
Al	0.0000 ± 0.0531
Si	0.0000 ± 0.0441
P	0.0000 ± 0.0215
S	0.0000 ± 0.0192
Cl	0.0000 ± 0.0339
K	0.0000 ± 0.0192
Ca	0.0531 ± 0.0147
Ti	0.0000 ± 0.0079
V	0.0000 ± 0.0068
Cr	0.0000 ± 0.0079
Mn	0.0000 ± 0.0102
Fe	0.0000 ± 0.0158
Co	0.0192 ± 0.0203
Ni	0.0565 ± 0.0158
Cu	0.0056 ± 0.0136
Zn	0.0056 ± 0.0113
Ga	0.0090 ± 0.0102
Ge	0.0000 ± 0.0090
As	0.0000 ± 0.0124
Se	0.0045 ± 0.0068
Br	0.0034 ± 0.0056
Rb	0.0079 ± 0.0068
Sr	0.0000 ± 0.0079
Y	0.0079 ± 0.0090
Zr	0.0000 ± 0.0113
Mo	0.0023 ± 0.0170
Pd	0.0780 ± 0.0475
Ag	0.0610 ± 0.0497
Cd	0.0000 ± 0.0531
In	0.0915 ± 0.0610
Sn	0.1232 ± 0.0723
Sb	0.1220 ± 0.1424
Ba	0.0396 ± 0.0271
La	0.0203 ± 0.0147
Hg	0.0000 ± 0.0158
Pb	0.0339 ± 0.0181
IC	
Cl	0.0000 ± 0.5000
Br	0.0000 ± 0.5000
NO3	0.5100 ± 0.0255
SO4	0.0000 ± 0.5000
Na	0.0000 ± 1.000
NH4	0.0000 ± 0.5000
K	0.0000 ± 0.5000

Chester LabNet - Portland

XRF-772 **XRF Analytical Quality Assurance Report**

Client: Utah DEQ
Report: 09-089
Analysis Period: April 2, 2009
Number of Samples: 7

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Ti(0)	1	287.42	288.90	na	na	0.52
Fe(1)	1	325.13	330.34	na	na	1.60
Se(2)	1	68.70	71.42	na	na	3.96
Pb(2)	1	83.76	87.62	na	na	4.61
Cd(3)	1	79.25	85.48	na	na	7.86

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)					% Rec.
			High	Low	Average			
Al 1832	4	14.6 +/- .97	15.17	14.01	14.68	+/-	0.42	100.6
Si 1832	4	34.0 +/- 1.1	35.24	33.76	34.59	+/-	0.54	101.7
Si 1833	4	31.5 +/- 2.1	31.69	31.03	31.37	+/-	0.24	99.6
S 2708	4	2.46 +/- .25	2.35	2.21	2.28	+/-	0.06	92.7
K 1833	4	16.4 +/- 1.64	16.88	16.55	16.67	+/-	0.13	101.6
Ca 1832	4	1.32 +/- 0.17	1.32	1.27	1.30	+/-	0.02	98.2
Ti 1833	4	12.1 +/- 1.79	11.88	11.50	11.63	+/-	0.15	96.1
V 1832	4	4.70 +/- .49	4.97	4.77	4.85	+/-	0.08	103.2
Mn 1832	4	4.54 +/- .49	4.87	4.79	4.82	+/-	0.03	106.2
Fe 1833	4	13.6 +/- .45	13.29	13.00	13.14	+/-	0.10	96.6
Cu 1832	4	2.43 +/- .16	2.77	2.25	2.57	+/-	0.19	105.6
Zn 1833	4	3.88 +/- .30	4.10	3.93	4.01	+/-	0.07	103.4
Pb 1833	4	16.1 +/- .75	17.01	16.03	16.55	+/-	0.41	102.8

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-772 REPLICATE REPORT

3.71

Original ID: 09-U257

Replicate ID: RU257

Filter Lot:

Deposit Mass: 309 µg

Deposit Area: 1.0 cm^2

Particle Size: T

Element	Original ug/cm2	Replicate ug/cm2	Difference ug/cm2		RPD
Al	3.7024 +- 0.3813	3.8940 +- 0.4332	-0.1916 +- 0.5771	+	-5.0 +- 15.2
P	0.0000 +- 0.1708	0.0000 +- 0.2175	0.0000 +- 0.2765		
S	6.6853 +- 0.5339	6.8057 +- 0.5614	-0.1205 +- 0.7748	+	-1.8 +- 11.5
Cl	5.3724 +- 0.3877	5.2391 +- 0.3899	0.1333 +- 0.5499	+	2.5 +- 10.4
K	23.0788 +- 1.4446	23.0994 +- 1.4494	-0.0206 +- 2.0464	+	-0.1 +- 8.9
Ca	10.3786 +- 0.6329	10.4685 +- 0.6416	-0.0899 +- 0.9012	+	-0.9 +- 8.6
Ti	0.2295 +- 0.0233	0.2587 +- 0.0308	-0.0291 +- 0.0386	+	-11.9 +- 15.8
V	0.0115 +- 0.0108	0.0312 +- 0.0154	-0.0197 +- 0.0188		
Cr	0.0446 +- 0.0063	0.0495 +- 0.0085	-0.0049 +- 0.0106	+	-10.4 +- 22.5
Mn	0.1182 +- 0.0090	0.1290 +- 0.0113	-0.0108 +- 0.0144	+	-8.7 +- 11.7
Fe	2.9190 +- 0.2343	2.9296 +- 0.2386	-0.0106 +- 0.3344	+	-0.4 +- 11.4
Co	0.0000 +- 0.0038	0.0000 +- 0.0053	0.0000 +- 0.0065		
Ni	0.0232 +- 0.0027	0.0296 +- 0.0038	-0.0064 +- 0.0047	0	-24.2 +- 17.7
Cu	0.7157 +- 0.0363	0.7500 +- 0.0568	-0.0343 +- 0.0674	+	-4.7 +- 9.2
Zn	0.2047 +- 0.0180	0.2085 +- 0.0208	-0.0038 +- 0.0275	+	-1.8 +- 13.3
Ga	0.0000 +- 0.0061	0.0000 +- 0.0090	0.0000 +- 0.0108		
Ge	0.0014 +- 0.0054	0.0042 +- 0.0075	-0.0028 +- 0.0092		
As	0.0159 +- 0.0080	0.0286 +- 0.0071	-0.0126 +- 0.0107		
Se	0.0074 +- 0.0043	0.0000 +- 0.0060	0.0074 +- 0.0073		
Br	0.0230 +- 0.0043	0.0250 +- 0.0060	-0.0020 +- 0.0074	+	-8.3 +- 30.9
Rb	0.0154 +- 0.0052	0.0303 +- 0.0075	-0.0149 +- 0.0092		
Sr	0.4957 +- 0.0261	0.5065 +- 0.0278	-0.0108 +- 0.0381	+	-2.2 +- 7.6
Y	0.0020 +- 0.0066	0.0220 +- 0.0096	-0.0200 +- 0.0117		
Zr	0.0669 +- 0.0092	0.0898 +- 0.0130	-0.0229 +- 0.0159	0	-29.3 +- 20.3
Mo	0.0921 +- 0.0121	0.1028 +- 0.0168	-0.0107 +- 0.0207	+	-11.0 +- 21.3
Pd	0.0098 +- 0.0073	0.0227 +- 0.0103	-0.0129 +- 0.0126		
Ag	0.0228 +- 0.0070	0.0231 +- 0.0098	-0.0003 +- 0.0120	+	-1.5 +- 52.5
Cd	0.0259 +- 0.0069	0.0000 +- 0.0096	0.0259 +- 0.0118		
In	0.0251 +- 0.0070	0.0000 +- 0.0099	0.0251 +- 0.0121		
Sn	0.0646 +- 0.0086	0.0513 +- 0.0118	0.0133 +- 0.0146	+	23.0 +- 25.2
Sb	0.1047 +- 0.0118	0.0797 +- 0.0154	0.0250 +- 0.0194	0	27.2 +- 21.0
Ba	2.1959 +- 0.1187	2.0758 +- 0.1216	0.1201 +- 0.1699	+	5.6 +- 8.0
La	0.1871 +- 0.0511	0.1693 +- 0.0716	0.0178 +- 0.0880	+	10.0 +- 49.4
Hg	0.0007 +- 0.0121	0.0020 +- 0.0170	-0.0013 +- 0.0209		
Pb	0.0488 +- 0.0123	0.0139 +- 0.0166	0.0350 +- 0.0206		

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

Blank Data

Analyte	Sample ID	Measured Conc. mg/L	MDL Conc. mg/L
Cl	ICB	< MDL	0.050
Cl	Prep_Blk	< MDL	0.050
Cl	*Meth_Blk**	*< MDL*	*1.00*
Cl	CCB	< MDL	0.050
Cl	CCB	< MDL	0.050
Br	ICB	< MDL	0.050
Br	Prep_Blk	< MDL	0.050
Br	*Meth_Blk**	*< MDL*	*1.00*
Br	CCB	< MDL	0.050
Br	CCB	< MDL	0.050
NO3	ICB	< MDL	0.050
NO3	Prep_Blk	< MDL	0.050
NO3	*Meth_Blk**	*< MDL*	*1.00*
NO3	CCB	< MDL	0.050
NO3	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	Prep_Blk	< MDL	0.050
SO4	*Meth_Blk**	*1.66*	*1.00*
SO4	CCB	< MDL	0.050
SO4	CCB	< MDL	0.050
Na	ICB	< MDL	0.100
Na	Prep_Blk	< MDL	0.100
Na	*Meth_Blk**	*39.3*	*2.00*
Na	CCB	< MDL	0.100
Na	CCB	< MDL	0.100
Na	ICB	< MDL	0.100
Na	CCB	< MDL	0.100
NH4	ICB	< MDL	0.050
NH4	Prep_Blk	< MDL	0.050
NH4	*Meth_Blk**	*< MDL*	*1.00*
NH4	CCB	< MDL	0.050
NH4	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	Prep_Blk	< MDL	0.050
K	*Meth_Blk**	*< MDL*	*1.00*
K	CCB	< MDL	0.050
K	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	CCB	< MDL	0.050

*: Method Blank concentration in µg/filter

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

Calibration QC

Analyte	Sample ID	Standard Conc. mg/L	Measured Conc. mg/L	Percent Recovery
Cl	ICV_LO	1.00	1.01	100.9
Cl	ICV_MID	10.0	9.79	97.9
Cl	CCV_LO	1.00	1.05	105.2
Cl	CCV_MID	10.0	9.85	98.5
Cl	CCV_LO	1.00	1.01	101.4
Cl	CCV_MID	10.0	9.80	98.0
Br	ICV_LO	1.00	0.98	97.7
Br	ICV_MID	10.0	9.29	92.9
Br	CCV_LO	1.00	0.98	98.4
Br	CCV_MID	10.0	9.35	93.5
Br	CCV_LO	1.00	0.98	97.9
Br	CCV_MID	10.0	9.29	92.9
NO3	ICV_LO	1.00	0.99	98.9
NO3	ICV_MID	10.0	9.69	96.9
NO3	CCV_LO	1.00	1.00	99.9
NO3	CCV_MID	10.0	9.74	97.4
NO3	CCV_LO	1.00	0.99	99.1
NO3	CCV_MID	10.0	9.67	96.7
SO4	ICV_LO	1.00	1.03	103.1
SO4	ICV_MID	10.0	9.89	98.9
SO4	CCV_LO	1.00	1.09	109.3
SO4	CCV_MID	10.0	9.95	99.5
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.89	98.9
Na	ICV_LO	0.500	0.51	102.2
Na	ICV_MID	5.00	5.16	103.3
Na	CCV_LO	0.500	0.51	101.8
Na	CCV_MID	5.00	5.16	103.1
Na	CCV_LO	0.500	0.51	102.0
Na	CCV_MID	5.00	5.12	102.3
Na	ICV_MID	5.00	5.10	102.0
Na	CCV_MID	5.00	5.10	102.1
NH4	ICV_LO	0.500	0.50	100.2
NH4	ICV_MID	5.00	4.96	99.2
NH4	CCV_LO	0.500	0.50	100.4
NH4	CCV_MID	5.00	4.98	99.6
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.92	98.5
K	ICV_LO	0.500	0.52	103.8
K	ICV_MID	5.00	5.15	103.0
K	CCV_LO	0.500	0.52	103.8
K	CCV_MID	5.00	5.14	102.9
K	CCV_LO	0.500	0.52	104.0
K	CCV_MID	5.00	5.10	102.0
K	ICV_MID	5.00	5.07	101.4
K	CCV_MID	5.00	5.08	101.6

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

Replicate Data

Analyte	Sample ID	Sample Conc. mg/L	Replicate Conc. mg/L	RPD
Cl	09-U253	2.55	2.54	0.24
Br	09-U253	< 0.05	< 0.05	N/C #
NO3	09-U253	1.33	1.32	0.75
SO4	09-U253	4.54	4.52	0.42
Na	09-U255	16.6	16.7	0.60
NH4	09-U255	0.284	0.285	0.35
K	09-U255	0.547	0.546	0.18

RPD = {(sample-replicate)/[(sample+replicate)/2]}x100
N/C: RPD is not calculated when sample or replicate is below detection limit
#: per EPA CLP protocol, control limits do not apply if sample and/or replicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Post Spike Analysis

Analyte	Sample ID	Sample Conc. mg/L	Spike Conc. mg/L	Spike Amount mg/L	Percent Recovery
Cl	LCS	< 0.05	9.49	10.0	94.9
Cl	09-U254	2.11	11.3	10.0	91.8
Br	LCS	< 0.05	9.00	10.0	90.0
Br	09-U254	< 0.05	9.06	10.0	90.6
NO3	LCS	< 0.05	9.35	10.0	93.5
NO3	09-U254	1.44	11.2	10.0	97.4
SO4	LCS	0.083	9.73	10.0	96.5
SO4	09-U254	6.34	16.3	10.0	99.2
Na	LCS	1.96	6.84	5.00	97.6
Na	09-U256	2.42	7.43	5.00	100.
NH4	LCS	< 0.05	4.78	5.00	95.6
NH4	09-U256	0.249	5.16	5.00	98.1
K	LCS	< 0.05	5.00	5.00	100.
K	09-U256	0.426	5.79	5.00	107.

*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: OC/EC
Sample Description: 47mm Quartz
Report Number: 09-089

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Calibration QC

Sucrose Standard

Sample ID	Sucrose Std. Conc. µg/cm²	Measured Conc. µg/cm²	Percent Recovery
Sucrose 10ul 4/8/09	28.06	28.4	101.2

OC/EC Split

Sample ID	%OC Given	%OC Measured	Percent Recovery
94-Q150 4/8/09	89.6	91	101.6

Blank Data

Sample ID	Analyte	Measured Conc. µg/cm²	MDL µg/cm²
4/8/09	OC	<MDL	0.2
	EC	<MDL	0.2

Duplicate Data

Sample ID	Analyte	Sample Conc. µg/cm²	Duplicate Conc. µg/cm²	RPD
09-U254	OC	26.6	26.13	1.8
	EC	0.12	0.13	8.0
	TC	26.72	26.26	1.7

RPD = [(sample - duplicate)/(sample + duplicate)/2] x 100

QA/QC Limits
Sucrose Standard: 90 - 115% Recovery *OC/EC Split: 80-120% Recovery*
Duplicate: ± 20% RPD

CHESTER LabNet

XRF-770 **XRF Analytical Quality Assurance Report**

Client: Utah DEQ
Report: 09-089
Analysis Period: April 3, 2009
Number of Samples: 9

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Si(0)	1	1785.92	1844.00	na	na	3.25
Ti(1)	1	591.36	576.76	na	na	-2.47
Fe(1)	1	1321.41	1294.08	na	na	-2.07
Se(3)	1	343.74	321.69	na	na	-6.41
Pb(3)	1	394.75	368.40	na	na	-6.68
Cd(4)	1	277.97	272.66	na	na	-1.91

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833, SRM 2783

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)					% Rec.
			High	Low	Average			
Al 1832	4	14.6 +/- .97	15.60	14.50	15.11	+/-	0.42	103.5
Si 1832	4	34.0 +/- 1.1	35.08	34.09	34.73	+/-	0.41	102.1
Si 1833	4	31.5 +/- 2.1	31.71	30.52	31.03	+/-	0.51	98.5
S 2708	4	2.46 +/- .25	2.43	2.38	2.40	+/-	0.02	97.4
K 1833	4	16.4 +/- 1.64	17.54	16.89	17.27	+/-	0.24	105.3
Ca 2783	4	1.33 +/- 0.17	1.31	1.28	1.29	+/-	0.01	97.7
Ti 1833	4	12.1 +/- 1.79	11.87	11.39	11.62	+/-	0.22	96.0
V 1832	4	4.70 +/- .49	4.73	4.38	4.51	+/-	0.13	95.9
Mn 1832	4	4.54 +/- .49	4.53	4.36	4.45	+/-	0.07	98.0
Fe 1833	4	13.6 +/- .45	13.47	13.39	13.42	+/-	0.03	98.7
Cu 1832	4	2.43 +/- .16	2.63	2.47	2.55	+/-	0.08	104.8
Zn 1833	4	3.88 +/- .30	3.97	3.59	3.79	+/-	0.14	97.6
Pb 1833	4	16.1 +/- .75	15.99	15.53	15.71	+/-	0.18	97.6

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-770 REPLICATE REPORT

3.49

Original ID: 09-X782

Replicate ID: RX782

Filter Lot:

Deposit Mass: 1199 µg

Deposit Area: 11.3 cm^2

Particle Size: F

Element	Original ug/cm2	Replicate ug/cm2	Difference ug/cm2	RPD
Na	0.0000 +- 0.0782	0.0000 +- 0.0875	0.0000 +- 0.1174	
Mg	3.4575 +- 0.2777	3.1481 +- 0.2592	0.3095 +- 0.3799	+ 9.4 +- 11.5
Al	5.7308 +- 0.3827	5.4823 +- 0.3671	0.2484 +- 0.5304	+ 4.4 +- 9.5
Si	15.3227 +- 0.8568	14.9105 +- 0.8334	0.4123 +- 1.1953	+ 2.7 +- 7.9
P	0.0502 +- 0.0067	0.0423 +- 0.0076	0.0079 +- 0.0102	+ 17.1 +- 22.0
S	0.7181 +- 0.0407	0.7319 +- 0.0434	-0.0138 +- 0.0595	+ -1.9 +- 8.2
Cl	0.2416 +- 0.0153	0.2548 +- 0.0178	-0.0132 +- 0.0235	+ -5.3 +- 9.5
K	2.0760 +- 0.1070	2.1142 +- 0.1095	-0.0382 +- 0.1531	+ -1.8 +- 7.3
Ca	9.0809 +- 0.4625	9.2507 +- 0.4715	-0.1699 +- 0.6604	+ -1.9 +- 7.2
Ti	0.2700 +- 0.0138	0.2745 +- 0.0144	-0.0045 +- 0.0199	+ -1.7 +- 7.3
V	0.0061 +- 0.0014	0.0080 +- 0.0020	-0.0019 +- 0.0024	+ -27.1 +- 35.0
Cr	0.0057 +- 0.0011	0.0073 +- 0.0016	-0.0016 +- 0.0019	+ -24.0 +- 29.6
Mn	0.0718 +- 0.0064	0.0719 +- 0.0089	-0.0001 +- 0.0110	+ -0.2 +- 15.3
Fe	2.8946 +- 0.1450	2.9315 +- 0.1470	-0.0369 +- 0.2065	+ -1.3 +- 7.1
Co	0.0050 +- 0.0029	0.0000 +- 0.0041	0.0050 +- 0.0051	
Ni	0.0062 +- 0.0015	0.0039 +- 0.0021	0.0023 +- 0.0026	+ 46.2 +- 51.4
Cu	0.0094 +- 0.0015	0.0091 +- 0.0020	0.0003 +- 0.0025	+ 3.0 +- 27.1
Zn	0.0192 +- 0.0016	0.0194 +- 0.0020	-0.0003 +- 0.0026	+ -1.4 +- 13.3
Ga	0.0008 +- 0.0009	0.0006 +- 0.0013	0.0002 +- 0.0016	
Ge	0.0000 +- 0.0009	0.0000 +- 0.0011	0.0000 +- 0.0015	
As	0.0000 +- 0.0012	0.0000 +- 0.0017	0.0000 +- 0.0020	
Se	0.0006 +- 0.0006	0.0010 +- 0.0009	-0.0004 +- 0.0011	
Br	0.0082 +- 0.0007	0.0080 +- 0.0009	0.0002 +- 0.0012	+ 2.4 +- 14.9
Rb	0.0110 +- 0.0009	0.0124 +- 0.0012	-0.0014 +- 0.0015	+ -12.1 +- 12.7
Sr	0.0524 +- 0.0028	0.0526 +- 0.0030	-0.0003 +- 0.0041	+ -0.5 +- 7.8
Y	0.0000 +- 0.0009	0.0027 +- 0.0013	-0.0027 +- 0.0015	
Zr	0.0126 +- 0.0013	0.0179 +- 0.0018	-0.0053 +- 0.0023	- -35.0 +- 14.8
Mo	0.0029 +- 0.0016	0.0000 +- 0.0021	0.0029 +- 0.0026	
Pd	0.0067 +- 0.0048	0.0001 +- 0.0067	0.0067 +- 0.0083	
Ag	0.0000 +- 0.0050	0.0038 +- 0.0070	-0.0038 +- 0.0086	
Cd	0.0117 +- 0.0055	0.0129 +- 0.0076	-0.0012 +- 0.0094	
In	0.0008 +- 0.0060	0.0203 +- 0.0085	-0.0196 +- 0.0104	
Sn	0.0113 +- 0.0070	0.0163 +- 0.0098	-0.0050 +- 0.0120	
Sb	0.0256 +- 0.0141	0.0318 +- 0.0199	-0.0062 +- 0.0244	
Ba	0.0211 +- 0.0091	0.0311 +- 0.0112	-0.0100 +- 0.0144	
La	0.0013 +- 0.0065	0.0000 +- 0.0092	0.0013 +- 0.0113	
Hg	0.0016 +- 0.0015	0.0003 +- 0.0021	0.0013 +- 0.0026	
Pb	0.0080 +- 0.0018	0.0105 +- 0.0024	-0.0024 +- 0.0030	+ -26.2 +- 32.5

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Blank Data

Analyte	Sample ID	Measured Conc. mg/L	MDL Conc. mg/L
Cl	ICB	< MDL	0.050
Cl	Prep_Blk	< MDL	0.050
Cl	*Meth_Blk**	*0.500*	*0.500*
Cl	CCB	< MDL	0.050
Cl	CCB	< MDL	0.050
Br	ICB	< MDL	0.050
Br	Prep_Blk	< MDL	0.050
Br	*Meth_Blk**	< *MDL*	*0.500*
Br	CCB	< MDL	0.050
Br	CCB	< MDL	0.050
NO3	ICB	< MDL	0.050
NO3	Prep_Blk	< MDL	0.050
NO3	*Meth_Blk**	*0.700*	*0.500*
NO3	CCB	< MDL	0.050
NO3	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	Prep_Blk	< MDL	0.050
SO4	*Meth_Blk**	< *MDL*	*0.500*
SO4	CCB	< MDL	0.050
SO4	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	CCB	< MDL	0.050
Na	ICB	< MDL	0.100
Na	Prep_Blk	< MDL	0.100
Na	*Meth_Blk**	*1.10*	*1.00*
Na	CCB	< MDL	0.100
Na	CCB	< MDL	0.100
NH4	ICB	< MDL	0.050
NH4	Prep_Blk	< MDL	0.050
NH4	*Meth_Blk**	< *MDL*	*0.500*
NH4	CCB	< MDL	0.050
NH4	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	Prep_Blk	< MDL	0.050
K	*Meth_Blk**	< *MDL*	*0.500*
K	CCB	< MDL	0.050
K	CCB	< MDL	0.050
K	ICB	< MDL	0.050

*: Method Blank concentration in µg/filter

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Calibration QC

Analyte	Sample ID	Standard Conc. mg/L	Measured Conc. mg/L	Percent Recovery
Cl	ICV_LO	1.00	1.05	105.2
Cl	ICV_MID	10.0	9.85	98.5
Cl	CCV_LO	1.00	1.01	101.4
Cl	CCV_MID	10.0	9.80	98.0
Cl	CCV_LO	1.00	1.01	100.9
Cl	CCV_MID	10.0	9.72	97.2
Br	ICV_LO	1.00	0.98	98.4
Br	ICV_MID	10.0	9.35	93.5
Br	CCV_LO	1.00	0.98	97.9
Br	CCV_MID	10.0	9.29	92.9
Br	CCV_LO	1.00	0.97	97.4
Br	CCV_MID	10.0	9.21	92.1
NO3	ICV_LO	1.00	1.00	99.9
NO3	ICV_MID	10.0	9.74	97.4
NO3	CCV_LO	1.00	0.99	99.1
NO3	CCV_MID	10.0	9.67	96.7
NO3	CCV_LO	1.00	0.99	98.6
NO3	CCV_MID	10.0	9.59	95.9
SO4	ICV_LO	1.00	1.09	109.3
SO4	ICV_MID	10.0	9.95	99.5
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.89	98.9
SO4	CCV_LO	1.00	1.03	103.4
SO4	CCV_MID	10.0	9.81	98.1
SO4	ICV_LO	1.00	1.02	101.8
SO4	ICV_MID	10.0	9.87	98.7
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.96	99.6
Na	ICV_LO	0.500	0.51	101.8
Na	ICV_MID	5.00	5.16	103.1
Na	CCV_LO	0.500	0.51	102.0
Na	CCV_MID	5.00	5.12	102.3
Na	CCV_LO	0.500	0.50	100.8
Na	CCV_MID	5.00	5.06	101.2
NH4	ICV_LO	0.500	0.50	100.4
NH4	ICV_MID	5.00	4.98	99.6
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.92	98.5
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.86	97.1
K	ICV_LO	0.500	0.52	103.8
K	ICV_MID	5.00	5.14	102.9
K	CCV_LO	0.500	0.52	104.0
K	CCV_MID	5.00	5.10	102.0
K	CCV_LO	0.500	0.52	103.4
K	CCV_MID	5.00	5.05	101.0
K	ICV_MID	5.00	5.07	101.4
K	CCV_MID	5.00	5.08	101.6

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Replicate Data

Analyte	Sample ID	Sample Conc. mg/L	Replicate Conc. mg/L	RPD
Cl	09-X779	0.627	0.623	0.64
Br	09-X779	< 0.05	< 0.05	N/C #
NO3	09-X779	0.989	0.991	0.20
SO4	09-X779	2.16	2.17	0.23
Na	09-X781	2.36	2.36	0.13
NH4	09-X781	0.446	0.446	0.00
K	09-X781	0.248	0.248	0.00 #

RPD = {(sample-replicate)/[(sample+replicate)/2]}x100
N/C: RPD is not calculated when sample or replicate is below detection limit
#: per EPA CLP protocol, control limits do not apply if sample and/or replicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Post Spike Analysis

Analyte	Sample ID	Sample Conc. mg/L	Spike Conc. mg/L	Spike Amount mg/L	Percent Recovery
Cl	LCS	0.050	9.32	10.0	92.8
Cl	09-X780	0.508	9.98	10.0	94.7
Br	LCS	< 0.05	8.64	10.0	86.4
Br	09-X780	< 0.05	9.15	10.0	91.5
NO3	LCS	0.070	9.04	10.0	89.7
NO3	09-X780	1.07	10.5	10.0	93.9
SO4	LCS	< 0.05	9.24	10.0	92.4
SO4	09-X780	2.90	12.4	10.0	94.5
Na	LCS	0.110	4.83	5.00	94.4
Na	09-X782	0.672	6.12	5.00	109.
NH4	LCS	< 0.05	4.67	5.00	93.4
NH4	09-X782	0.500	5.32	5.00	96.3
K	LCS	< 0.05	4.80	5.00	96.0
K	09-X782	0.298	5.39	5.00	102.

*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

CHAIN-OF-CUSTODY FORM (March.2009)

ANALYSIS REQUESTED BY:	
Company:	Utah Division of Air Quality Air Monitoring Center
Address:	2861 West Parkway Blvd., West Valley City, Utah 84119
phone:	801.887.0760
fax:	801.972.6164
contact:	Andy Hale, 801.887.0771, andyhale@utah.gov Ken Symons, 801.887.0773, ksymons@utah.gov
Project Name	
Contract Number	076206

TESTING LABORATORY	
Company:	CHESTER LabNet
Address:	12242 SW Garden Place, Tigard, OR 97223
phone:	503.624.2183
fax:	503.624.2653
contact:	Paul Duda, pduda@chesterlab.net Lisa Ball, lball@chesterlab.net

SHIPPING CARRIER	
Company:	FedEx
Tracking Number:	7974 6806 1788
Shipping Date:	April.1.2009
Delivery Type:	Standard Overnight

#	Filter		Sampling						Sampler		Blank	Type of Analysis Needed				Lab Number
	Number	Type	Location	Date	Type	Length (hr)	Volume (m^3)	Mass Wt (mg)	Type	Size		XRF	IC	OC/EC		
1	20080488	Quartz	Lindon (LN)	April.15.2008	Ambient	24:00	21.2	3.487	Low Vol	PM10	no	yes	yes	yes		09-U253
2	20080492	Quartz	Lindon (LN)	April.19.2008	Ambient	23:59	20.5	3.717	Low Vol	PM10	no	yes	yes	yes		09-U254
3	20080609	Quartz	Hawthorn (HW)	April.19.2008	Ambient	23:59	20.7	3.960	Low Vol	PM10	no	yes	yes	yes		09-U255
4	20080727	Quartz	Lindon (LN)	May.20.2008	Ambient	24:00	20.3	3.584	Low Vol	PM10	no	yes	yes	yes		09-U256
5	20081074	Quartz	Ogden (O2)	July.4.2008	Ambient	23:59	20.3	1.656	Low Vol	PM10	no	yes	yes	yes		09-U257
6	20090387	Quartz	Lindon (LN)	March.4.2009	Ambient	24:00	21.0	4.258	Low Vol	PM10	no	yes	yes	yes		09-U258
7	8131301	Teflon	Lindon (LN)	April.15.2008	Ambient	23:59	24.0	0.589	Low Vol	PM2.5	no	yes	yes			09-X779
8	8131368	Teflon	Lindon (LN)	April.19.2008	Ambient	23:59	24.0	0.754	Low Vol	PM2.5	no	yes	yes			09-X780
9	8131360	Teflon	Hawthorn (HW)	April.19.2008	Ambient	24:00	24.0	0.752	Low Vol	PM2.5	no	yes	yes			09-X781
10	8131377	Teflon	North Provo (NP)	April.19.2008	Ambient	24:00	24.0	1.199	Low Vol	PM2.5	no	yes	yes			09-X782
11	8131629	Teflon	Lindon (LN)	May.20.2008	Ambient	23:59	24.0	0.877	Low Vol	PM2.5	no	yes	yes			09-X783
12	8132053	Teflon	Brigham City (BR)	June.26.2008	Ambient	24:00	24.0	1.026	Low Vol	PM2.5	no	yes	yes			09-X784
13	8132188	Teflon	Ogden (O2)	July.4.2008	Ambient	23:59	24.0	1.027	Low Vol	PM2.5	no	yes	yes			09-X785
14	9516469	Teflon	Lindon (LN)	March.4.2009	Ambient	24:00	24.0	0.550	Low Vol	PM2.5	no	yes	yes			09-X786
15	8131370	Teflon	Lindon (LN)	April.21.2008						PM2.5	yes	yes	yes			09-X787

Relinquished by:		Comments:	Received by:		Comments:
Date:	April.1.2009	Price Quote Number: B0903261	Date:	4/2/09	
Time:	10:50		Time:	9:40	
Name:	Andy Hale		Name:	Paul Duda	
Signature:	Andy Hale		Signature:	Paul Duda	

PL 101

CHAIN-OF-CUSTODY FORM (March.2009)

ANALYSIS REQUESTED BY:	
Company:	Utah Division of Air Quality Air Monitoring Center
Address:	2861 West Parkway Blvd., West Valley City, Utah 84119
phone:	801.887.0760
fax:	801.972.6164
contact:	Andy Hale, 801.887.0771, andyhale@utah.gov Ken Symons, 801.887.0773, ksymons@utah.gov
Project Name	
Contract Number	076206

TESTING LABORATORY	
Company:	CHESTER LabNet
Address:	12242 SW Garden Place, Tigard, OR 97223
phone:	503.624.2183
fax:	503.624.2653
contact:	Paul Duda, pduda@chesterlab.net Lisa Ball, lball@chesterlab.net

SHIPPING CARRIER	
Company:	FedEx
Tracking Number:	7974 6806 1788
Shipping Date:	April.1.2009
Delivery Type:	Standard Overnight

#	Filter		Sampling						Sampler		Blank	Type of Analysis Needed				Lab Number
	Number	Type	Location	Date	Type	Length (hr)	Volume (m^3)	Mass Wt (mg)	Type	Size		XRF	IC	OC/EC		
16	2009B001	Quartz								PM10	yes	yes	yes	yes		09-0259
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																

Relinquished by:		Comments:	Received by:		Comments:
Date:	April.1.2009	Price Quote Number: B0903261	Date:	4/2/09	
Time:	10:50		Time:	9:40	
Name:	Andy Hale		Name:	Paul Duda	
Signature:	Andy Hale		Signature:	Paul Duda	

P-102

RAW DATA

Available upon request

Notice

Public Comment (Preamble V.G.)

The DEQ established a 30-day comment period from June 1, 2010 through June 30, 2010. The announcement of the comment period was published eight times in the Salt Lake Tribune between May 17 and June 1, 2010. Below are comments that where received during the comment period and our response to them.

Response to Comments

Commenter 1
The commenter mistakenly believed that the mitigation portion of the report dealing with agricultural land preservation was supporting exceptional event waiver for livestock grazing. Since this is not the case, no response is necessary.

Commenter 2
This commenter offered complementary comments and suggestions. The responses to the suggestions follow:

> **Comment:** "It would be helpful if a way could be found to bifurcate the PM10 & 2.5 SIP processes into the separate problems of wintertime inversions & high wind/fireworks/fire events. The solutions to the causes of these various exceedances are very different, and present difficulties in completing work on the wintertime cool pool events, when staff time is necessary to address other exceedances.
>
> Such a bifurcation would require some creativity as the problems are linked by exceedances of the same NAAQS, while the cause & solutions of the problems are different.
>
> **Response:** This comment is directed at SIP issues which are being addressed by DEQ in the SIP design process.
>
> **Comment: "**Control Measures Demonstration Case Study - Kennecott Mine Tailing Impoundments This demonstration clearly shows that attention to disturbed areas results in a reduction of fugitive dust despite high wind events. Continued attention to methods of reducing & mitigating disturbance across the state would reduce the impact of high winds. "
>
> **Response:** DEQ appreciates the comment and will continue to enforce the fugitive dust rules requiring the development and implementation of dust control plans that define control mitigation methods.
>
> **Comment:** This section would be much improved with a discussion of Utah County's dust control program. It is the only county covered by this Exceptional Event demonstration that is not discussed in this section.
>
> **Response:** DEQ handles fugitive dust issues in Utah County.

4770 S. 5600 W.
P.O. POX 704005
WEST VALLEY CITY, UTAH 84170
FED.TAX I.D.# 87-0217663

The Salt Lake Tribune MEDIAOne A NEWSPAPER AGENCY COMPANY Morning News

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ACCOUNT NAME	
UT ST DEPT OF ENV QUALITY,	
TELEPHONE	ADORDER# / INVOICE NUMBER
8015364000	0000575972 / I00575972-05172010
SCHEDULE	
Start 05/17/2010	End 06/01/2010
CUST. REF. NO.	
DAQPN-006-10	
CAPTION	
Notice of Public Comment Period High Wir	
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Notice of Public Comment Period
High Wind Exceptional Event - Event Date April 15, 2008

Federal regulations, 40 Code of Federal Regulations (CFR) Part 50, allow states to exclude air quality data that exceed or violate a National Ambient Air Quality Standard (NAAQS) if they can demonstrate that an "exceptional event" has caused the exceedance or violation. Exceptional events are unusual or naturally occurring events that can affect air quality but are not reasonably controllable or preventable using techniques implemented to attain and maintain the NAAQS.

Exceptional events may be caused by human activity that is unlikely to recur at a particular location, or may be due to a natural event. The Environmental Protection agency (EPA) defines a "natural event" as an event in which human activity plays little or no direct causal role to the event in question. For example, a natural event could include such things as high winds, wild fires, and seismic/volcanic activity. In addition, the EPA will allow states to exclude data from regulatory determinations on a case-by-case basis for monitoring stations that measure values that exceed or violate the NAAQS due to emissions from fireworks displays from cultural events.

Federal regulations (40 CFR Part 50.14 (c) (3)(i)) require that all relevant flagged data, the reasons for the data being flagged, and a demonstration that the flagged data are caused by exceptional events be made available by the State for 30 days of public review and comment. These comments will be considered in the final demonstration of the event that is submitted to EPA. The following monitored values have been attributed to a high wind exceptional event:

- April 15, 2008, North Salt Lake Monitoring Station, 188 µg/m^3 PM10
- April 15, 2008, North Salt Lake Co-monitoring Station, 220 PM10
- April 15, 2008, Hawthorne Monitoring Station, 166 µg/m^3 PM10
- April 15, 2008, Cottonwood Monitoring Station, 177 µg/m^3 PM10
- April 15, 2008, Lindon Monitoring Station, 164 µg/m^3 PM10

The documentation to support removing these data from use in regulatory determinations wil be available beginning June 1, 2010 (for public review and comment) at the following www.airquality.utah.gov\Public-Interest\Public-Commen-Hearings\Exceptional_Events\Exceptional_Events.htm or at the Multi Agency State Govern ment Office Building, 195 North 1950 West in Salt Lake City. In compliance with the Ameri can with Disabilities Act, individuals with special needs (including auxiliary communicative aid and services) should contact Brooke Baker, Office of Human Resources at (801) 536-441 (TDD 536-4414).

The comment period will close at 5:00 p.m. on June 30, 2010. Comments postmarked on o before that date will be accepted. Comments may be submitted by electronic mail t jkarmazyn@utah.gov or may be mailed to:

M. Cheryl Heying, Director
ATTN: High Wind Exceptional Events
Utah Division of Air Quality
PO Box 144820
Salt Lake City, UT 84114-3097

575972 UPAXL

AFFIDAVIT OF PUBLICATION

AS NEWSPAPER AGENCY CORPORATION LEGAL BOOKER, I CERTIFY THAT THE ATTACHED ADVERTISEMENT OF **Notice of Public Comment Period High Win** FOR **UT ST DEPT OF ENV QUALITY,** WAS PUBLISHED BY THE NEWSPAPER AGENCY CORPORATION, AGENT FOR THE SALT LAKE TRIBUNE AND DESERET NEWS, DAILY NEWSPAPERS PRINTED IN THE ENGLISH LANGUAGE WITH GENERAL CIRCULATION IN UTAH, AND PUBLISHED IN SALT LAKE CITY, SALT LAKE COUNTY IN THE STATE OF UTAH. NOTICE IS ALSO POSTED ON UTAHLEGALS.COM ON THE SAME DAY AS THE FIRST NEWSPAPER PUBLICATION DATE AND REMAINS ON UTAHLEGALS.COM INDEFINATELY.

PUBLISHED ON Start 05/17/2010 End 06/01/2010

SIGNATURE Linda L Stone

VIRGINIA CRAFT
Notary Public, State of Utah
Commission # 581469
My Commission Expires
January 12, 2014

DATE 6/2/2010

Virginia Craft

THIS IS NOT A STATEMENT BUT A "PROOF OF PUBLICATION"
PLEASE PAY FROM BILLING STATEMENT

H-2

Final

Utah Division of Air Quality

PM10 Exceptional Wind Event

Cottonwood, Hawthorne, Lindon & North Salt Lake

Event Date – April 15, 2008

EPA Submission Date – July 12, 2010

Millard County, Utah
Taken By Don Halterman June 2009

Table of Contents

Definition of Event (40 CFR 50.1(j)) and Introduction

The Code of Federal Regulations (CFR) provides the definition and criteria for determining whether air quality data is impacted by an exceptional event. The 40 CFR 50.1 (j) definition states that "exceptional event means an event that affects air quality, is not reasonably controllable or preventable, is an event caused by human activity that is unlikely to recur at a particular location or a natural event, and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event." The demonstration to justify data exclusion as outlined in 40 CFR 50.14(c)(3)(iv-v) specifies that evidence must be provided that:

1. The event meets the definition of an exceptional event;
2. The event is associated with a measured concentration in excess of normal historical fluctuations, including background;
3. There is a clear causal relationship between the measurements under consideration and the event that is claimed to have affected air quality in the area;
4. There would have been no exceedance or violation but for the event; and
5. The demonstration must include a public comment process and documentation of such to the Environmental Protection Agency (EPA).

This report documents that the event meets the above criteria and provides analyses to demonstrate that:

I. The dust event was not reasonably controllable or preventable because a significant portion of the PM10 (approximately 80 -100 $\mu g/m^3$) originated from desert playa, a non-anthropogenic source. Further, reasonable controls, based on EPA guidance, are in place for anthropogenic sources through regulatory structures and programs sponsored by state, federal and local agencies as described in the Mitigation Section;

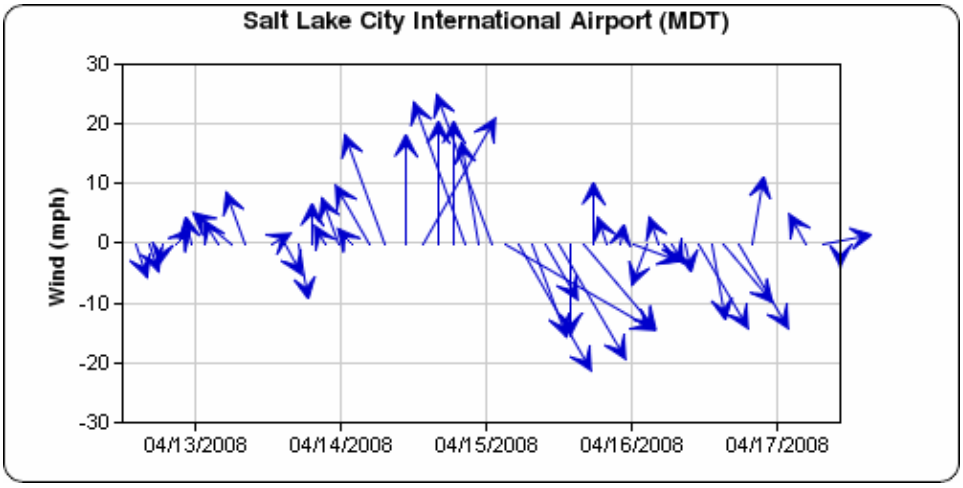
II. There is a clear-causal connection between the high wind event and the exceedances at the Wasatch Front monitoring stations;

III. The measured PM10 concentrations and high winds were beyond normal historical levels; and

IV. The exceedances would not have occurred "but for" the high winds.

On April 15, 2008, Utah experienced a natural high wind meteorological event associated with the passage of a storm pattern. Meteorological parameters for this storm event include:

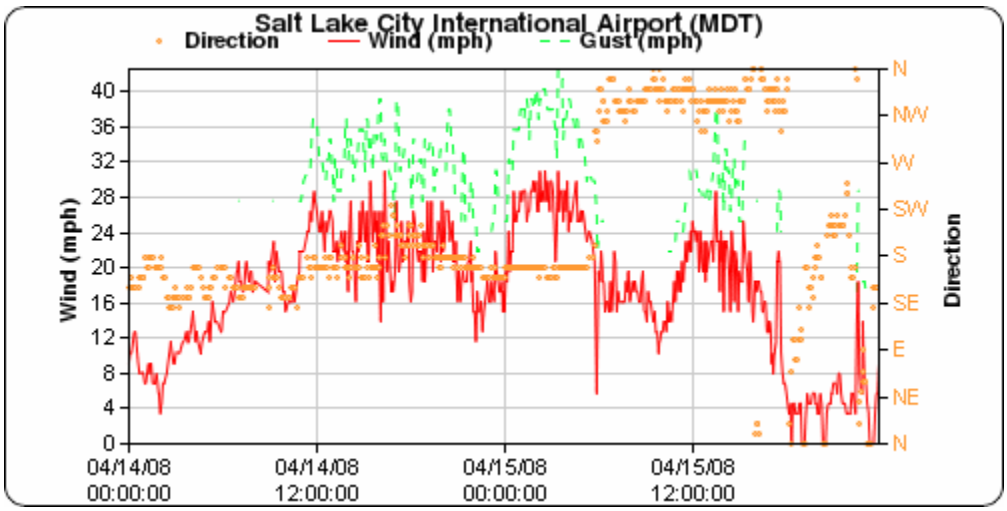
a. Wind direction changed 90° (Source: MesoWest).



b. Temperatures dropped 18°F within three hours, from 4 a.m. to 7 a.m. MDT on April 15, 2008. By 4 p.m. MDT, the temperature dropped to 37.4°F (Source: MesoWest, SLC airport).

04/15/08 04:00	66.2°F
04/15/08 06:00	59°F
04/15/08 07:00	48.2°F
04/15/08 16:00	37.4°F

c. Average maximum wind velocity measured at the SLC airport was 31 mph at 03:25 p.m. MDT, gusting to a maximum of 43 mph (Source: MesoWest).



This exceptional natural event entrained particulates into the air by high winds through a mechanism of surface erosion occurring in various locations up-wind and southwest of the Wasatch Front monitoring network.

The Salt Lake Tribune carried a full feature article on April 16, 2008 on the wind storm. The article included interviews with Division of Environmental Quality (DEQ), Utah State University, and Utah Farm Bureau personnel who were asked to explain the event. Possible contributing factors that were cited included drought conditions and the Milford Flats fire of 2007 that exposed 329,000 acres of soil subject to wind erosion, especially under gusting winds of 40-50 mph.

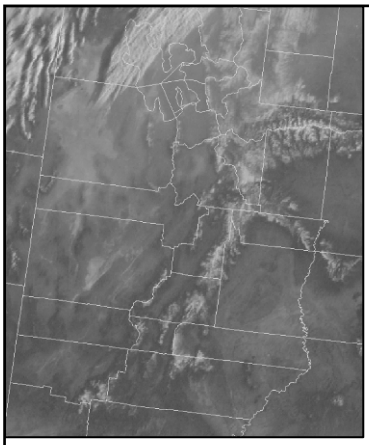
Dust storm blows through, temporarily muddles air
By Judy Fahys
The Salt Lake Tribune
Article Last Updated: 04/16/2008 01:04:57 AM MDT

Wind pumped thick dust clouds into northern Utah early Tuesday ahead of a cold, rainy front that rolled in at midday. It was a sharp contrast to Monday's balmy, bluebird skies. Gusts swept in tiny dirt particles from the Sevier Dry Lake and the Sevier Desert on Tuesday morning, then began lifting dust from the salt flats west of the Great Salt Lake by afternoon, according to National Weather Service satellites.

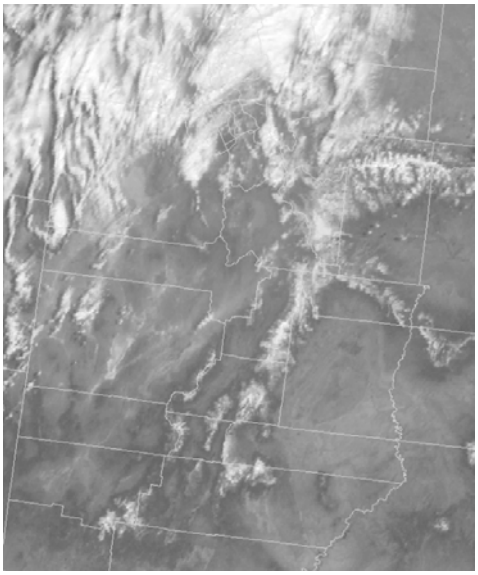
The heavy plumes - along with high readings for PM 10 early Tuesday morning - prompted state air-quality officials to issue a health advisory for people in sensitive groups. The very old, the very young and people with heart and lung trouble needed to avoid exerting themselves in the dust, the advisory said. "This is a fairly typical dust storm that we have" in spring, said Bob Dalley, who oversees air monitoring for the state. Wind storms kick up the dust this way two or three times a year, he noted. But Bryce Bird, planning branch manager for the state Division of Air Quality, pointed out: "We're seeing some of the highest [PM 10] levels we've seen in a long time." Could last summer's wildfires and years of drought be partly to blame? It's too soon to tell for sure, said Bird. State air-quality experts will study the weather maps and wind patterns. They might need the data connecting Tuesday's storms to the northern Utah dust spikes to convince the U.S. Environmental Protection Agency that man-made pollution wasn't responsible for the high air-pollution readings. Alan Moller, a meteorologist with the Utah Climate Center at Utah State University, said the Milford Flats fire last summer and the drought "could be a factor." Hot temperatures over the weekend and on Monday might have left the top layers of soil vulnerable to widespread winds that gusted at around 50 mph in much of the state, he said. The winds came from the south, the direction of the fires, he added. "There's another clue the fires were contributing to the dust." It's a connection Randy Parker of the Utah Farm Bureau is also making. He was in Washington, D.C., with the Utah Partners for Conservation on Tuesday to make a pitch to Congress for mounting a war on cheatgrass, which is making Western landscapes susceptible to wildfire. He watched the dust blow into the Salt Lake Valley on Monday night during a son's soccer game. "You could probably assume that some of those areas - not just in last summer's fires in Milford Flats, but from the drought in the last decade - are part of it," he said of the dust. By Tuesday afternoon, snow was falling in valleys that had seen 70-degree temperatures the previous day, and air monitoring officials had called off the health alert in Utah, Salt Lake, Davis and Weber counties. The cold set in and promised to stick around through the night and into today, according to the weather service. Temperatures nearing freezing were expected overnight and daytime highs were expected to be in the mid-40s - about 10 degrees below normal - under partly cloudy skies. Snow showers were expected in the mountains. But things will warm up and the skies will clear beginning Thursday, the weather service said.

Mr. Randy Graham of the National Weather Service confirmed the source of the dust cited in the Tribune, “one plume was from the Sevier Lake bed and the other was from the Milford Flat burn scar. By mid-morning a plume is clearly visible all the way into Utah County, but the impact of the plume extended all the way in the Salt Lake Valley.”

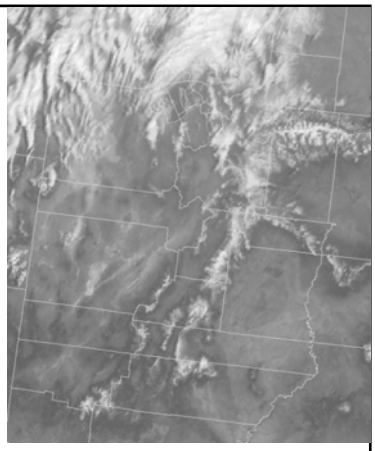
Satellite Images Provided by the National Weather Service Showing Dust Storm Sources



4-15-08 1500 Z



4-15-08 1730 Z



4-15-08 1700 Z

Study Area Background

Soil Resources

Soil resources within the study area have formed within one Major Land Resource Area (MLRA); MLRA 28A – The Great Salt Lake Area (USDA 2006).

MLRA 28A consists of the following soil orders: Aridisols, Entisols, and Mollisols. Aridisols are soils that develop in dry arid ecosystems. Entisols lack soil development and typically are shallow or sandy. Mollisols have a thick, dark, fertile surface layer (USDA 2006).

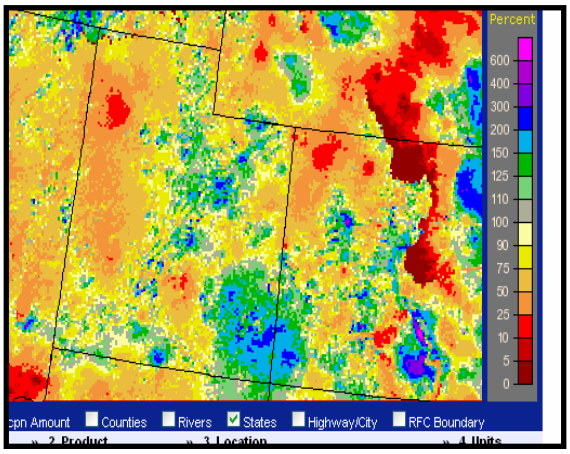
The Great Salt Lake Area is comprised of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes, and are not well dissected because of low rainfall. **A large salt desert playa is located south and west of Great Salt Lake** (prone to erosion). **Most of the valleys are closed basins containing sinks or playa lakes**. The soils in this area

generally are well drained or somewhat excessively drained, loamy or loamy skeletal (lacking soil horizons and rocky), and very deep. Soils in this area commonly contain high calcium carbonate contents. Alkalinity commonly increases with depth. Soils along alluvial fans, lake plains, and flats often have high concentrations of salts and sodium (USDA 2006).

Climate

The average annual precipitation is 5 to 12 inches in the valleys. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The driest period is from midsummer to early autumn. Precipitation in winter typically occurs as snow (USDA 2006).

The Delta weather station is located near the Sevier Lake bed, a region that contributed dust to the storm (based on National Weather Service information, back trajectory and surface wind directions during a segment of the event). Precipitation at Delta for March and April of 2008 was: March 2008 0.51 in., 60% of normal; and April 2008 0.10 in., 12% of normal (NOAA). Similarly, below normal precipitation occurred in February and January as well (NOAA). This data corroborates the drought conditions cited by Mr. Moller in the Salt Lake City Tribune article (page 3). Dry conditions enhance wind erosion conditions.

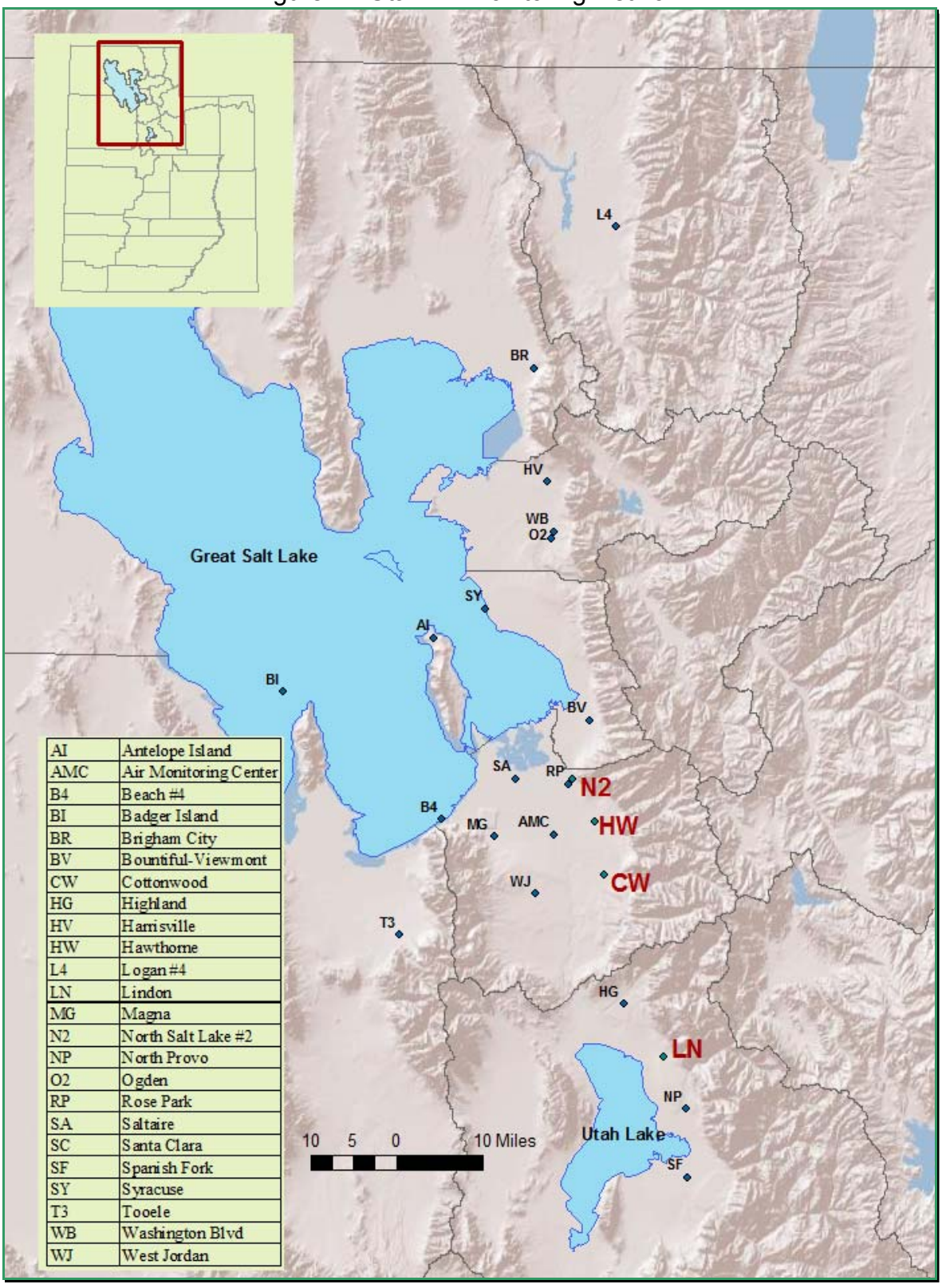


Utah Precipitation from Norm – February 2008
NOAA Advanced Hydrologic Prediction Service

Affect Air Quality

The Wasatch Front experienced an overnight dust storm resulting in PM10 levels in excess of the 24-hour standard (affecting the 95th percentile (%ile) values at some locations) and elevated PM2.5 levels. PM10 exceedances were measured at the North Salt Lake, Hawthorne, Cottonwood, and Lindon air monitoring stations. Figure 1 shows the locations of these monitoring stations, as well as the entire Utah monitoring network.

Figure 1 - Utah Air Monitoring Network



AI	Antelope Island
AMC	Air Monitoring Center
B4	Beach #4
BI	Badger Island
BR	Brigham City
BV	Bountiful-Viewmont
CW	Cottonwood
HG	Highland
HV	Harrisville
HW	Hawthorne
L4	Logan #4
LN	Lindon
MG	Magna
N2	North Salt Lake #2
NP	North Provo
O2	Ogden
RP	Rose Park
SA	Saltaire
SC	Santa Clara
SF	Spanish Fork
SY	Syracuse
T3	Tooele
WB	Washington Blvd
WJ	West Jordan

The National Ambient Air Quality Standards (NAAQS) exceedances for PM10 on April 15, 2008, are shown in Table 1 and Figure 2. Figure 2 also shows that the entire PM10 monitoring network measured greatly elevated values (including Logan, Ogden, Magna and North Provo).

Table 1 – PM10 Exceedances

Monitor	µg/m^3	AQS Mon. #	Lat.	Long.
Lindon	164	49-049-4001	40.33952	-111.71344
Cottonwood	177	49-035-0003	40.64405	-111.84976
Hawthorne	166	49-035-3006	40.73436	-111.87201
North Salt Lake	188	49-035-0012	40.80536	-111.92101
North Salt Lake – Co Located	220	49-035-0012	40.80536	-111.92101

Figure 2 – PM10 24-hr Values

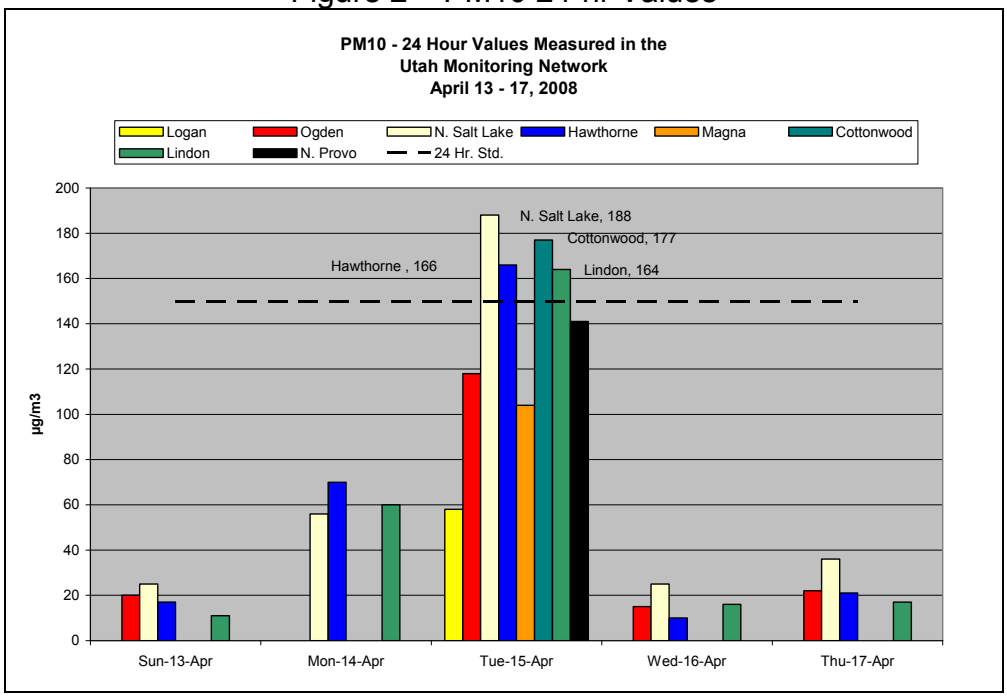


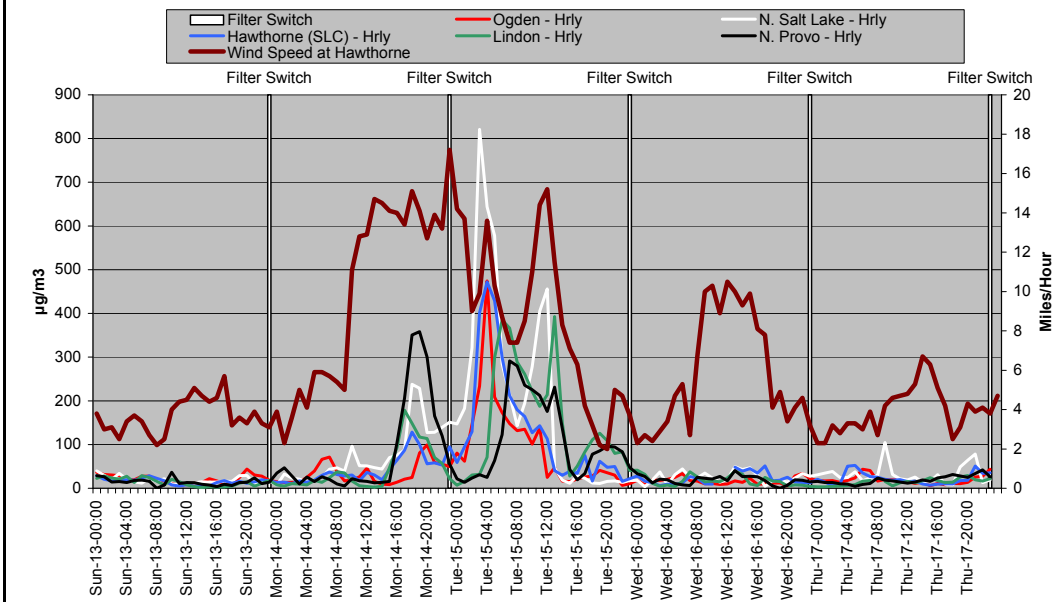
Image 1 presents an aerial view of monitoring sites in the valley, along with the PM10 24-hr concentrations. Higher PM10 levels were measured along the west side of the Wasatch Mountain range, than along the east side of the Oquirrh Mountains (Magna station location). When winds are from the south-southwest, there is a wind over flow component that occurs over the Oquirrh Mountains because they are only 3,000 ft. above the valley's base elevation. Winds on the eastern side of the valley tend to hug the Wasatch Front because these mountains are much higher at 5,000 ft above the valley's base elevation. These effects can cause higher PM10 levels on the eastern than western regions of the valley, which contributes to the lower PM10 at the Magna station.

Image 1 – Aerial View of Select PM10 Levels

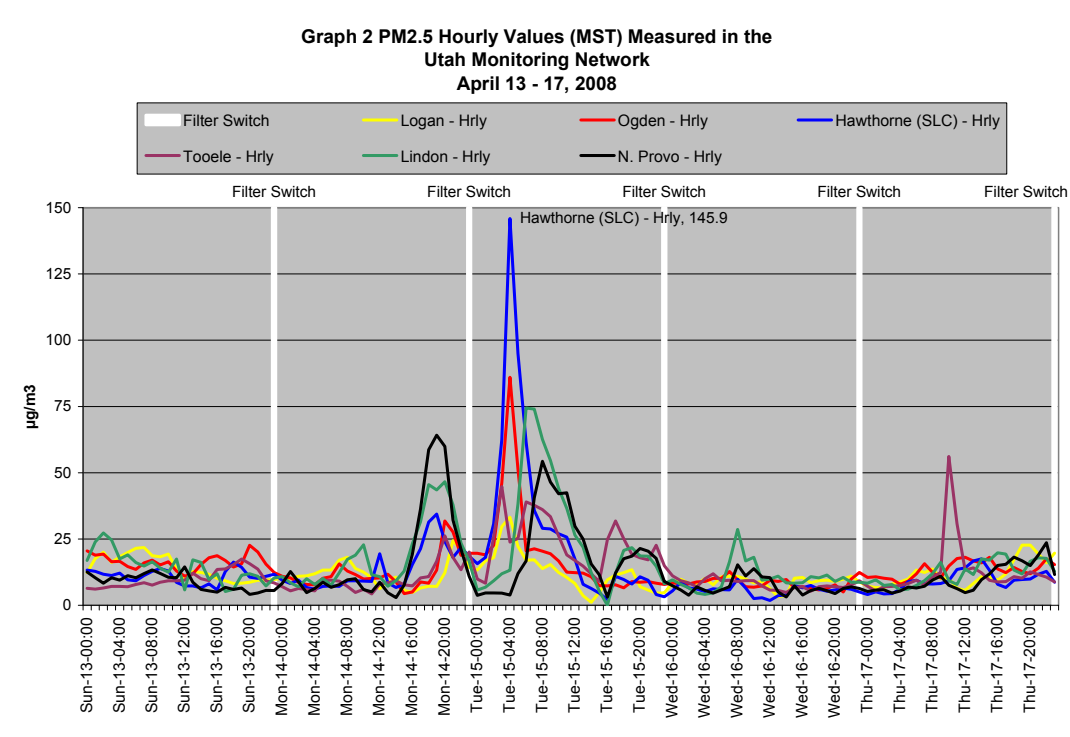
Graph 1 shows the hourly measurements for PM10, at available TEIOM monitors, and wind speed, measured at the Hawthorne station, beginning on Sunday 13, 2008, through Thursday 17, 2008. Graph 2 presents the measurements for PM2.5 for the same timeframe. It is evident from both graphs that particulate matter levels were stable from Sunday to Monday 16:00 MST, than were significantly elevated after 16:00 MST, peaking at around 20:00 MST on Monday. The wind speed shown in Graph 1 represents an excellent relationship between wind speed and PM10 levels. As the winds increased from 2-4 mph on Sunday and Monday to 15 mph and beyond, PM10 levels increased dramatically. High winds preceding and following the passage of a cold front caused the NAAQS exceedances.

Precipitation from the cold front kept PM10 at normal levels despite increased winds on Wednesday.

Graph 1 PM10 Hourly Values (MST) Measured in the Utah Monitoring Network April 13 - 17, 2008



Graph 2 PM2.5 Hourly Values (MST) Measured in the Utah Monitoring Network April 13 - 17, 2008

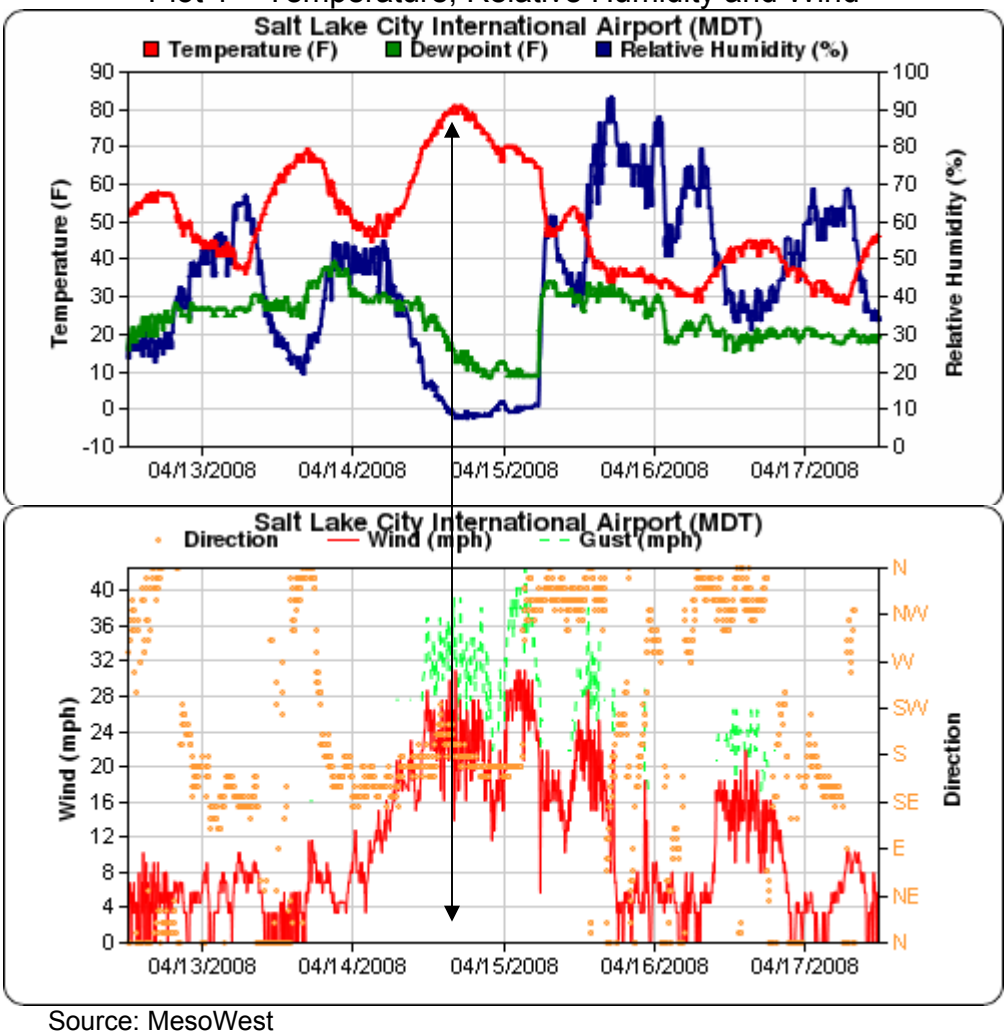


Not Reasonably Controllable or Preventable & Natural Event

Rapidly developed cold fronts produce strong winds and dramatic temperature gradients over the Intermountain West (Shafer and Steenburgh 2008). As such, these storms are natural events. This seasonal spring occurrence creates the potential for wind eroded surface soils in the deserts of western Utah and eastern Nevada. Soil particles are susceptible to erosion when rapid heating releases it's adhesion to the strata and surface wind velocities are sufficient to suspend them into the air mass.

Plot 1 presents the 5-day temperature-relative humidity-dew point profile for the Salt Lake City airport for April 13-17, 2008. Plot 1 depicts the rapid temperature increase on the 14th with normal night time cooling. At the same time, the relative humidity and dew points plunged, indicating the passage of the dry line. This phenomenon is in fact the definition of a dry line, i.e., rising temperatures with sharp drop in dew point. Blowing dust and rising temperatures are characteristic effects during dry line fronts. As the cold front approached the Wasatch Front, the relative humidity dramatically increased.

Plot 1 – Temperature, Relative Humidity and Wind



Source: MesoWest

Aligning the 5-day temperature profile with the 5-day wind profile for the same period shows the increased wind associated with the dry line and subsequent cold front. The wind speed before the dry line passage on the 14th was below 10 mph. During the dry line, the wind increased from about 11-30 mph on the 15th (the day of the event), with winds gusting as high as 42 mph on the 15th.

As the relative humidity increased on the 15th, the temperature rapidly decreased and it began to rain. By the afternoon of the 15th, the rain changed to snow (refer to Plot 2). The airborne particulate levels also quickly receded, as shown on graphs 1 and 2 around 08:00 (MDT) on the 15th.

Plot 2 – Event Precipitation

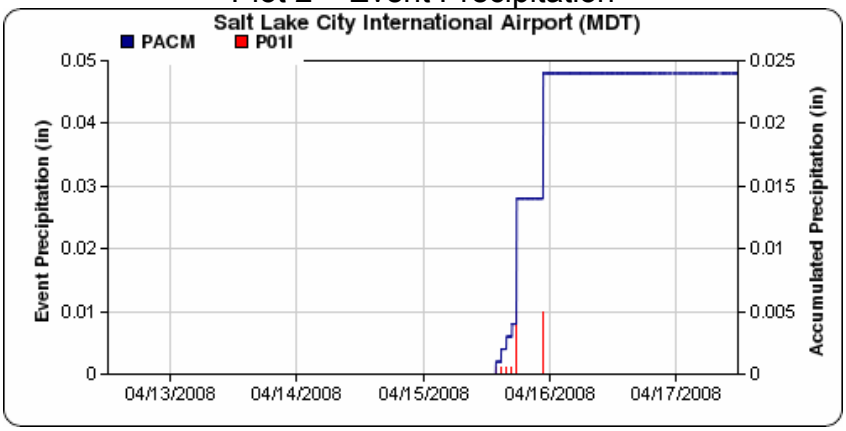
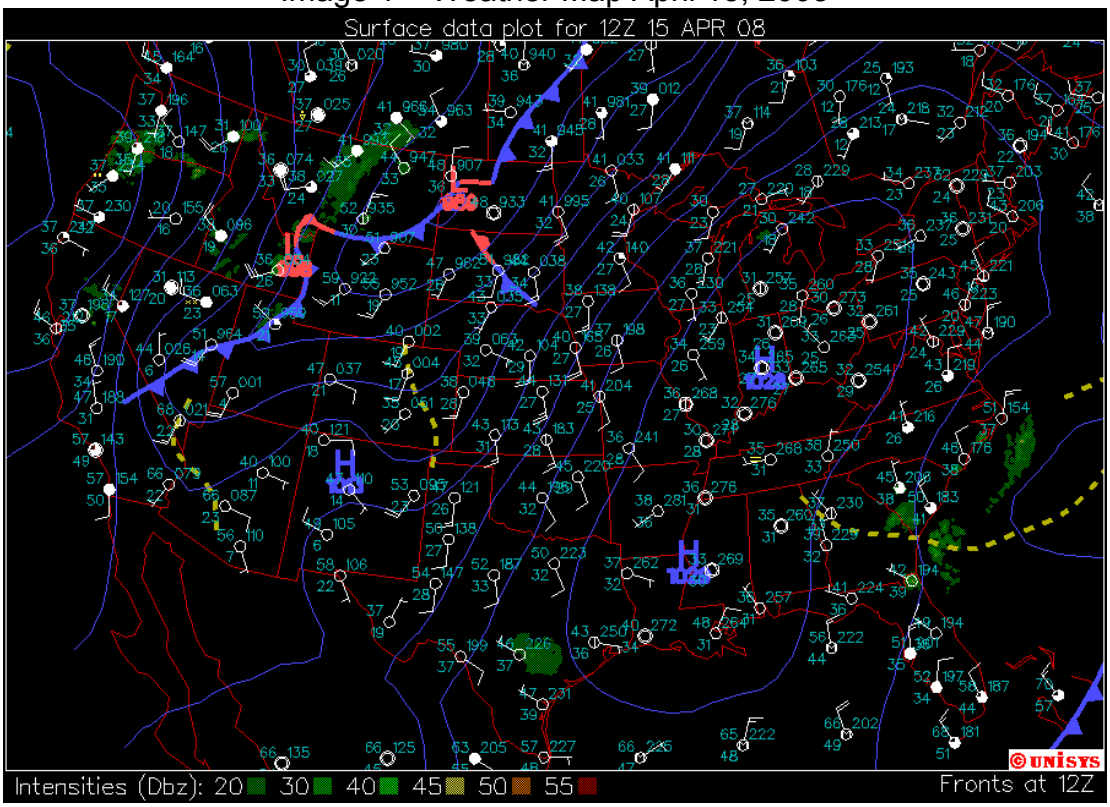


Image 1 – Weather Map April 15, 2008



The Unisys composite surface map (Image 1) for April 15, 2008, at 6 a.m., shows the cold front moving into the Salt Lake Valley. The winds at this point were out of the south at 20.7-25.3 mph. This natural event could not be reasonably controllable or preventable.

Image 2 – Salt Lake Valley on April 15

Image 2 of the Salt lake Valley was taken by the Meteorological Solutions Incorporated. This image was taken at 7 a.m. on April 15, 2008. The Hawthorne monitoring station is located within the view to the lower right of the image.

Image 3 – Salt Lake Valley on April 15 Mid-afternoon

By mid-afternoon, the temperature was near freezing, as the cold front captured the valley. The storm initially brought rain that quickly turned to snow (Image 3).

Normal Historical Fluctuation (40 CFR 50.14)

Utah experiences naturally occurring wind storms, predominantly in the spring. These storms are typically caused by the passage of a cold front resulting in high winds passing over desert playa soils that are entrained in the wind and transported into the Salt Lake City valley causing elevated particulate levels. These natural events are included in the Exceptional Event rule even though they are recurring because they generate **unpreventable** and **uncontrollable** high wind.

PM10

Normal historical fluctuation for PM10 was computed in a three-step process in order to assess whether an observed value is in excess.

First, all historical PM10 values from each monitoring station were aligned from least to greatest. The location of the effected value in relation to the rest of the historically values is expressed as a %ile.

Second, a box plot analysis was preformed on the historical data. The interquartile range (IQR) was calculated. This was then compared to the event value.

Third, a lognormal distribution analysis was preformed on the historical data. The geometric mean, geometric standard deviation, and the 1st, 2nd, and 3rd geomantic standard deviations above the geometric mean where calculated. These where then compared to the event value.

In addition, an analysis is included showing that winds speeds during this event are not the norm.

Ranking

Guidance found at 72 Federal Register 55 March 22, 2007, pages 13560-81, states that a lesser amount of documentation would likely be necessary for “extremely high” concentrations (e.g. > 95th%ile) than for concentrations that were closer to “typical levels” (e.g. < 75th%ile.).

Lindon - LN - 49-049-4001

The data ranking described above for the Lindon monitoring station data collected from 1993 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The data ranking for the Cottonwood monitoring station data collected from 1993 through verifies that the PM10 concentration on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The data ranking for the Hawthorne monitoring station data collected from 1997 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 95th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The data ranking for the North Salt Lake monitoring station data collected from 1993 through 2008 verifies that the PM10 concentration on April 15, 2008, is above the 95th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

The co-located monitor at North Salt Lake was also elevated for PM10 on April 15, 2008. Monitoring at this station for PM10 began in January 2008; thus, insufficient data is presently available to conduct a detailed analysis but, of the 52 available data points, the measured value of 220 µg/m^3 is the highest value recorded for the monitor. Further more, it is the only exceedance recorded at the monitor.

Interquartile Range

The IQR is a measure of statistical dispersion, and is a "robust statistic." Robust statistics seek to provide methods that emulate classical methods, but which are not unduly affected by outliers or other small departures from model assumptions. The IQR was calculated on a quarterly basis and on a yearly basis.

Lindon - LN - 49-049-4001

The following is the IQR for all Lindon data:

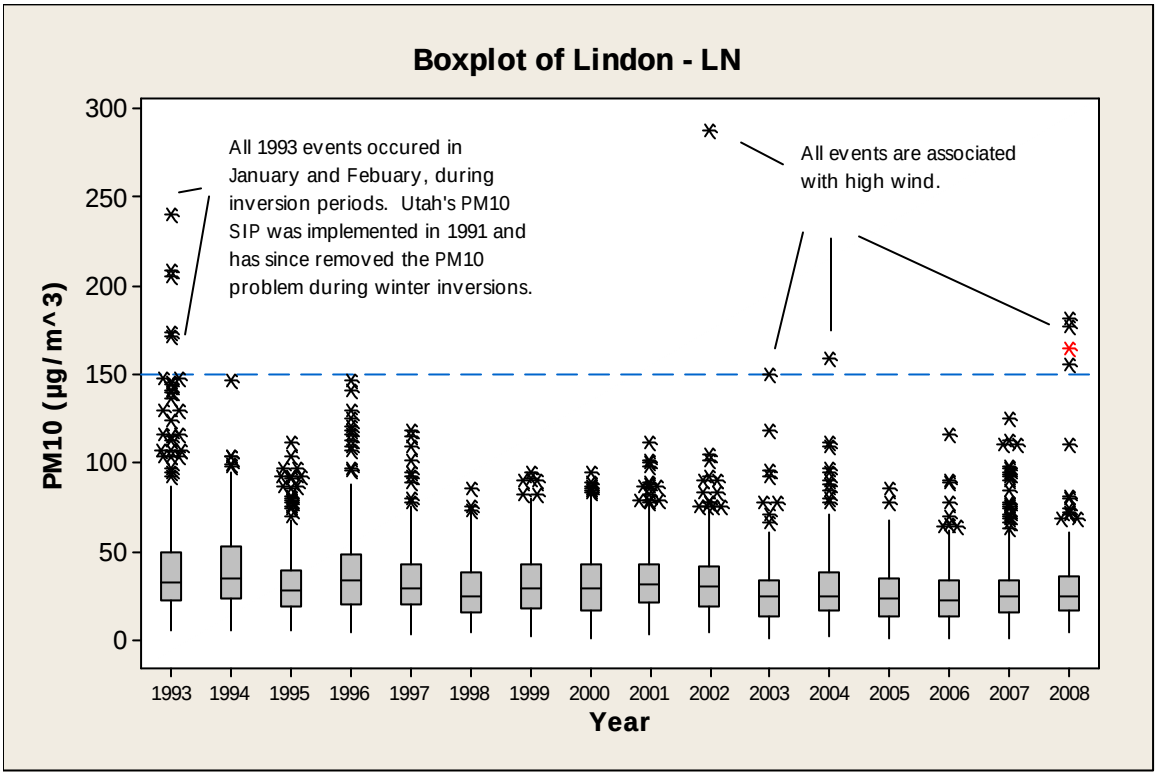
First Quartile (Q1): 17 µg/m^3
Median (Q2): 27 µg/m^3
Third Quartile (Q3): 40 µg/m^3
IQR: 23 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 2) along with the annual.

Table – 2 Lindon Interquartile (µg/m^3)

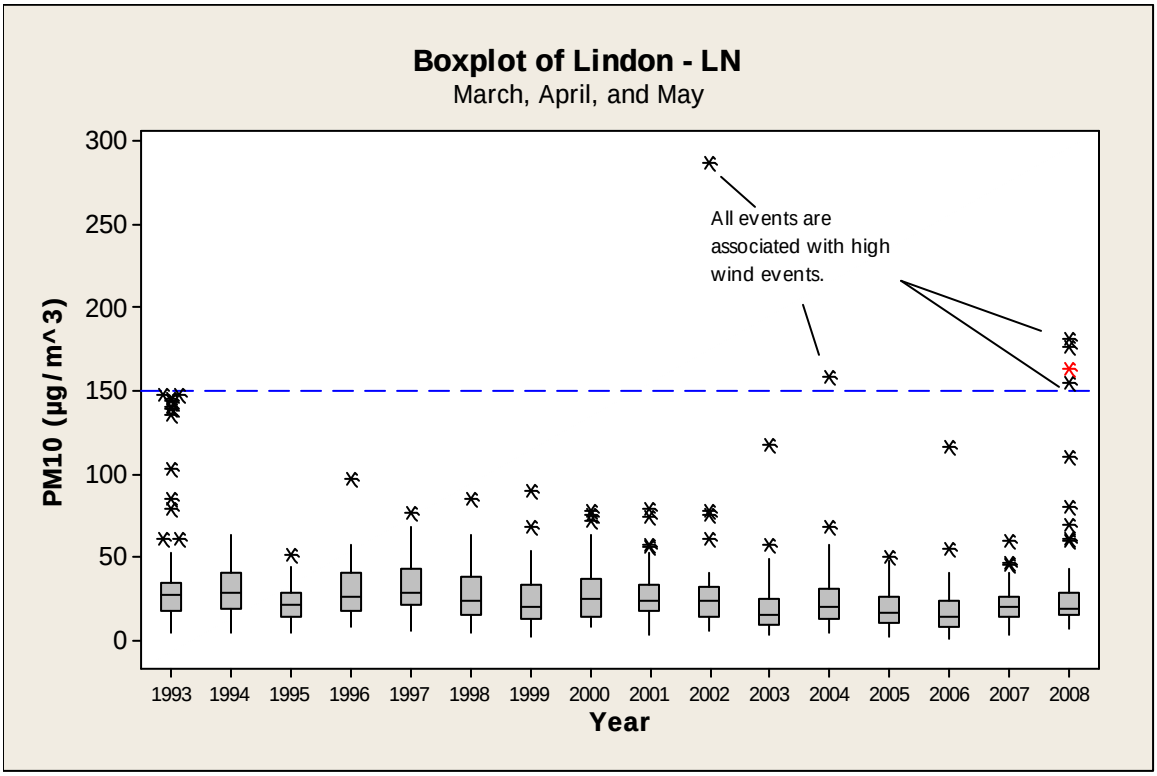
Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	1366	15	27	49	34
2	1423	14	22	32	18
3	1357	25	33	43	18
4	1300	17	26	38	21
All	5446	17	27	40	23

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



The boxplot whiskers extend to points (events) that are statistically considered to be outliers from the sample population, typically 1.5 times the IQR above the third quartile (Q3). All outliers that exceed the 24hr PM10 standard since 1994 are associated with high winds.

Because this event occurred during the second quarter, it maybe more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, all events that exceed the current PM10 standard are associated with high wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Cottonwood - CW - 49-035-0003

The following is the IQR for all Cottonwood data:

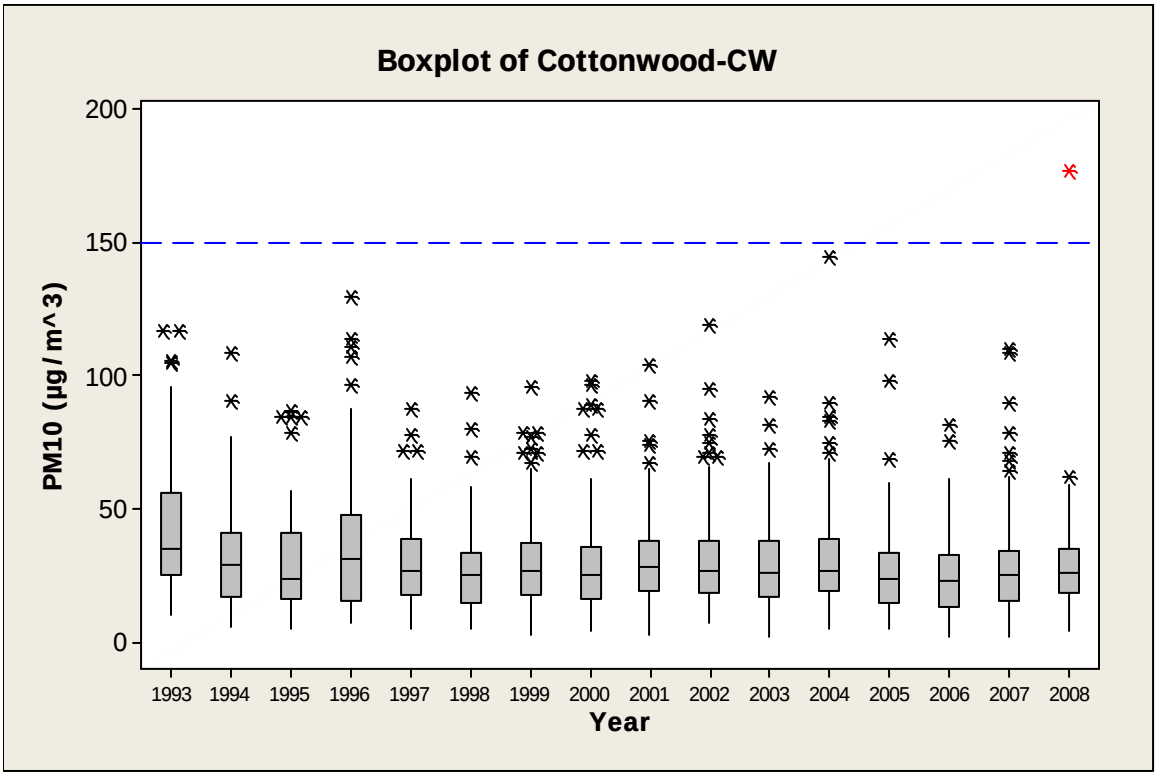
Q1: 17 µg/m^3
Q2: 26 µg/m^3
Q3: 38 µg/m^3
IQR: 21 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 3) along with the annual.

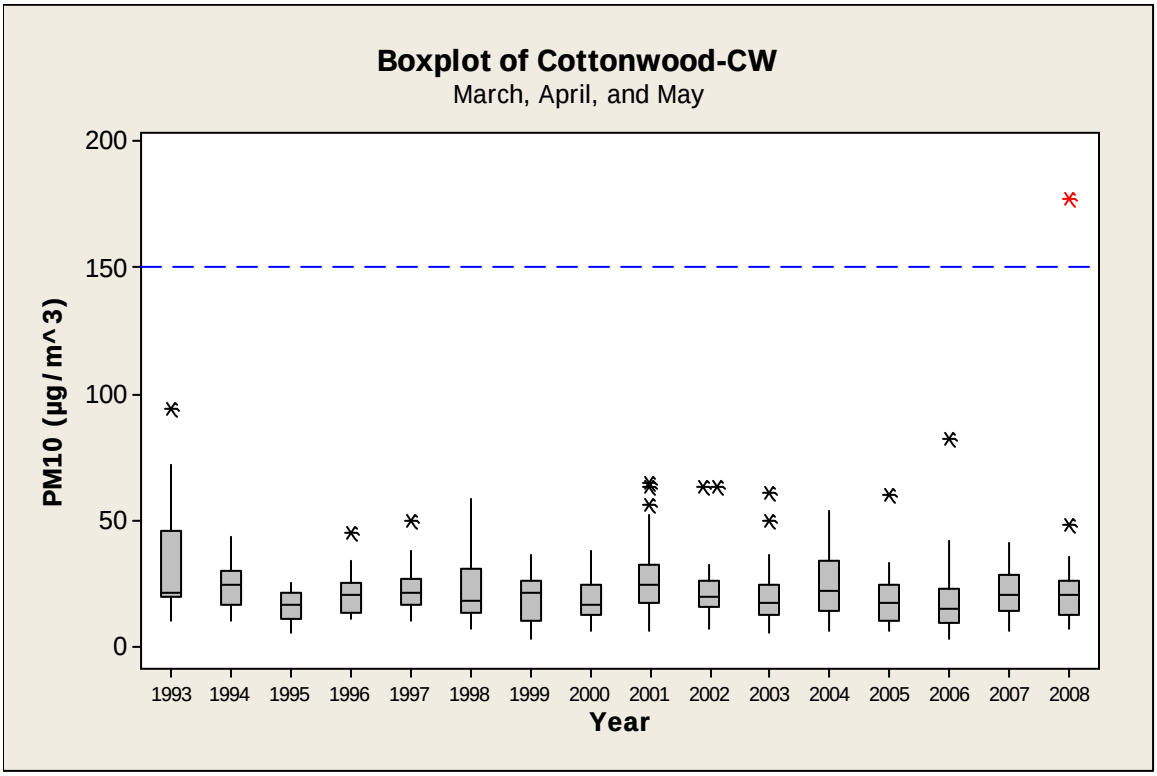
Table – 3 Cottonwood Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	564	16	28.5	48.75	32
2	385	13	19	26	13
3	382	25	32	40	15
4	396	18	27	34	16
All	1727	17	26	38	21

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



The only exceedance of the standard is the April 15, 2008, wind event. Because this event occurred during the second quarter, it maybe more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, the only event that exceeds the current PM10 standard is the April 15, 2008, event.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Hawthorne - HW - 49-035-3006

The following is the IQR for all Hawthorne data:

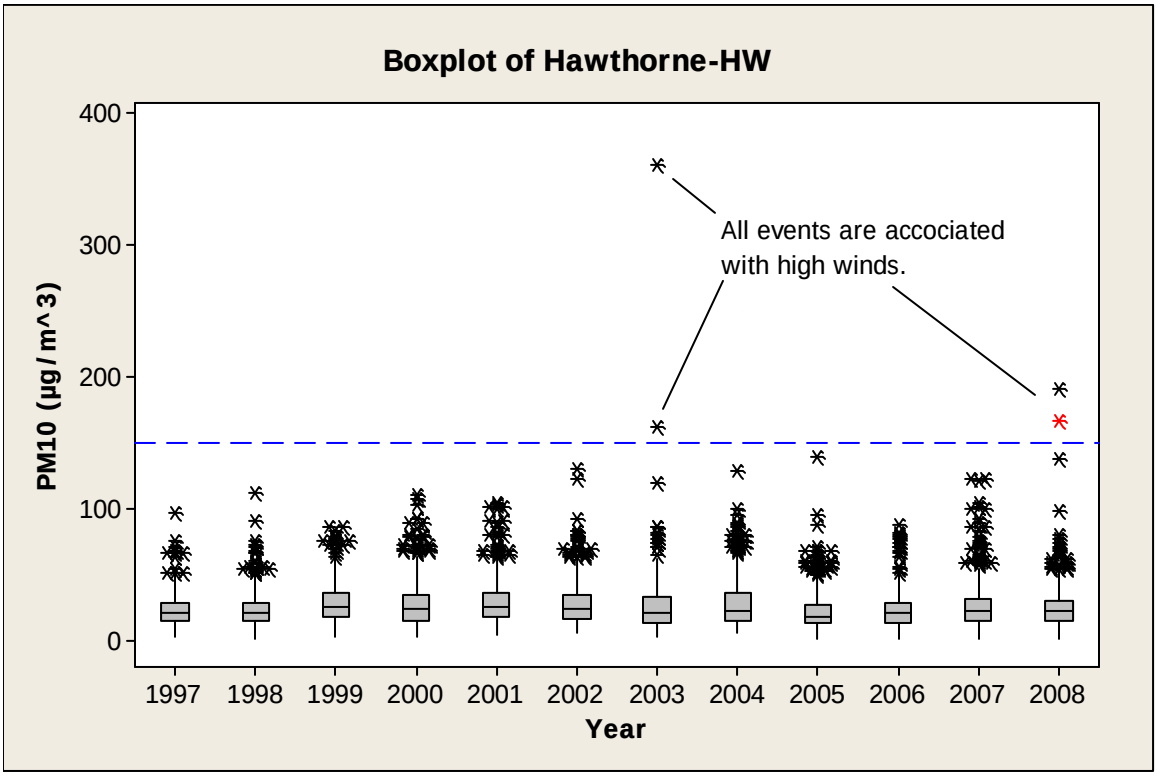
Q1: 16 µg/m^3
Q2: 23 µg/m^3
Q3: 32 µg/m^3
IQR: 16 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 4) along with the annual.

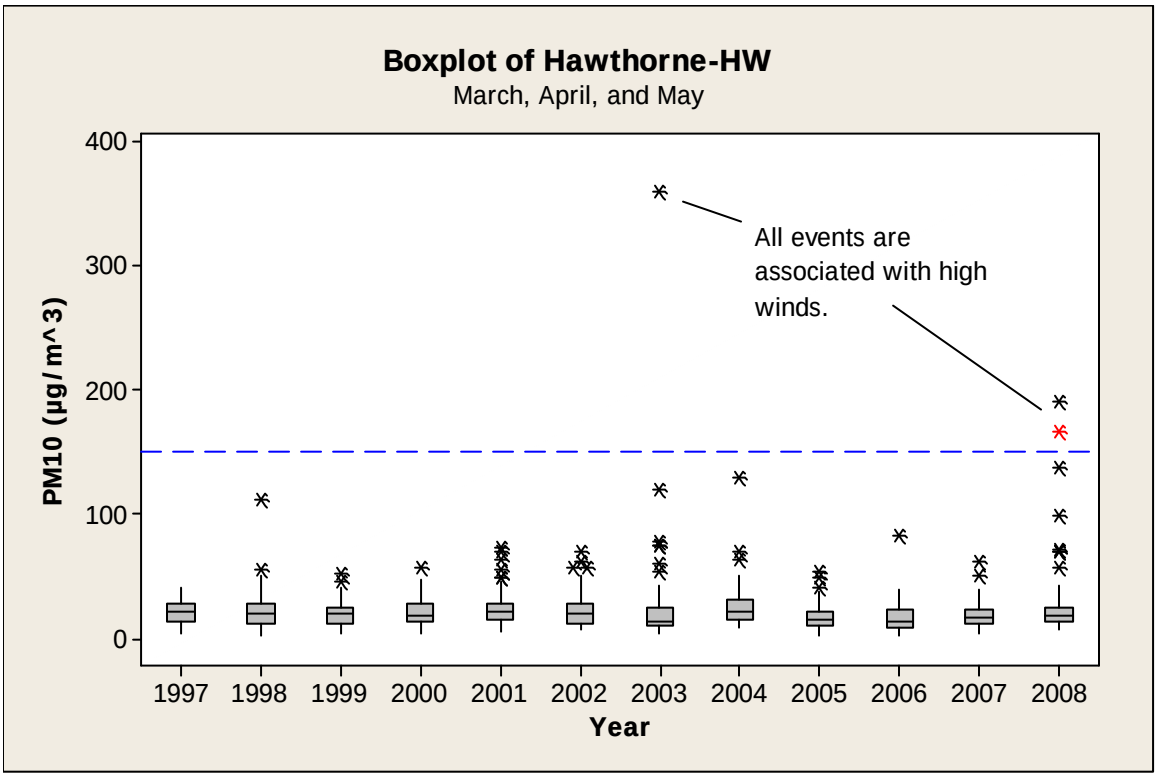
Table – 4 Hawthorne Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	954	17	29	51	34
2	1034	12	18	26	14
3	1039	18	23	30	12
4	1012	16	24	32	16
All	4039	16	23	32	16

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



All outliers that exceed the 24hr PM10 standard are associated with high winds. Because this event occurred during the second quarter, it maybe more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



Again, all events that exceed the current PM10 standard are associated with high wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

North Salt Lake - N2 - 49-035-0012

The following is the IQR for all North Salt Lake data:

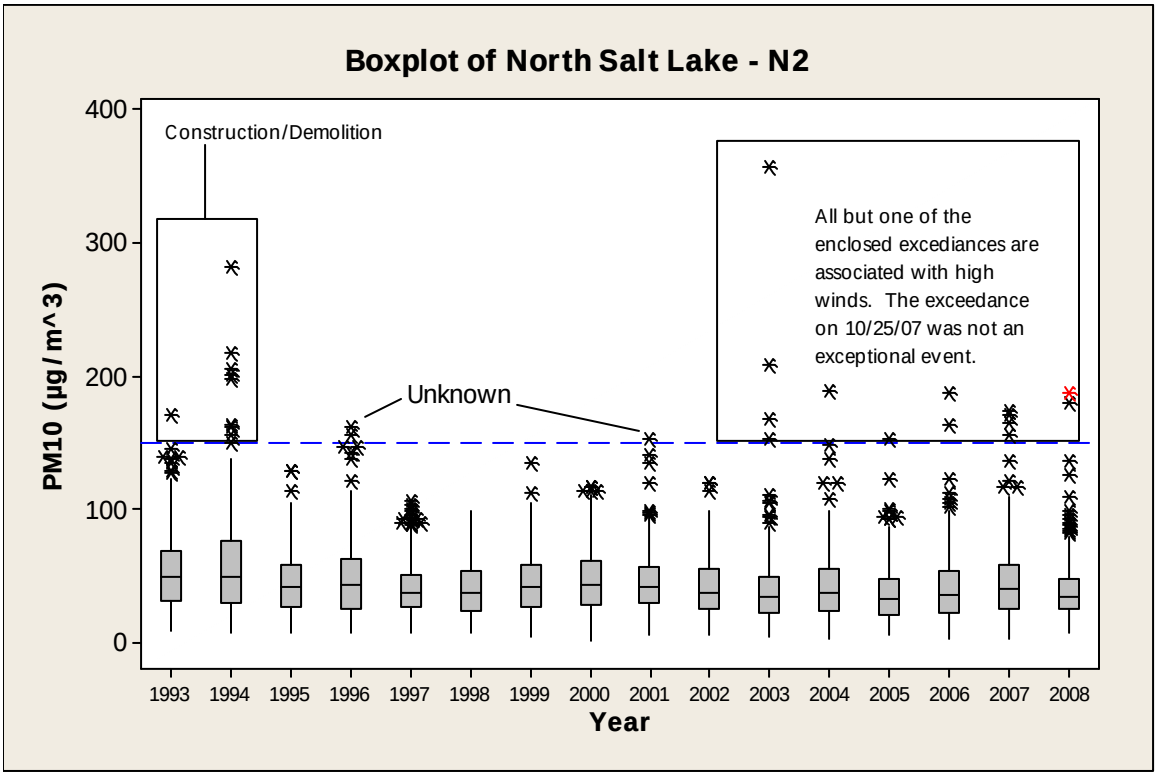
Q1: 25 µg/m^3
Q2: 40 µg/m^3
Q3: 57 µg/m^3
IQR: 32 µg/m^3

The IQR was calculated on a quarterly basis (shown in Table 5) along with the annual.

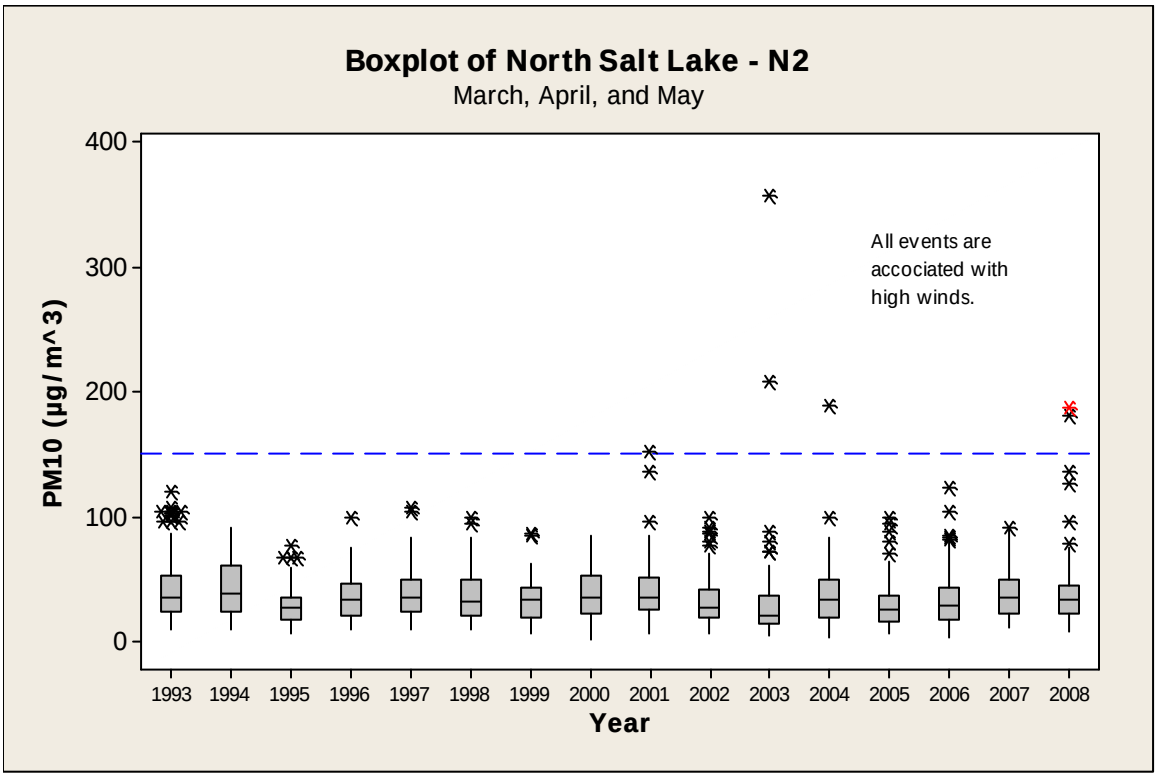
Table – 5 North Salt Lake Interquartile (µg/m^3)

Quarter	Sample Size (N)	Q1	Q2	Q3	IQR
1	1295	23	37	59	36
2	1408	20	32	47	27
3	1380	34	46	62	28
4	1349	26	42	62	36
All	5432	25	40	57	16

The boxplot presents the historical PM10 values, by year; the event value is marked in red. The blue dashed line represents the current PM10 standard.



All but one exceedances of the 24hr PM10 standard since 2002 are associated with high winds. Because this event occurred during the second quarter, it maybe more valuable to only focus on other PM10 values during the same time of the year, March-May. The revised boxplot presents the historical PM10 values, by year, during the 2nd quarter (March-May) of each year. The event value is marked in red. The blue dashed line represents the current PM10 standard.



All exceedances of the current PM10 standard since 2002 are associated with High Wind events.

Analysis of the boxplot graphs permit us to conclude that the event concentration is outside of normal historical variation.

Lognormal Distribution

Lognormal distribution analysis was conducted to establish the normal historical fluctuations for the four subject stations (inclusive of exceptional event results). Lognormal distribution was selected because of its ability to accurately describe the distribution of measured concentrations of PM10. The geometric mean (µgeo) was calculated on a quarterly basis (shown in Table 6) and on an annual basis. The annual basis provides the greatest number of data points and is sufficiently similar to the spring quarterly value; thus, the annual geometric mean is used to reflect the normal historical values for the four stations.

Table 6 – Geometric Mean of PM10

Location	Quarter	N Quarterly	µgeo (µg/m^3)	Annual µgeo (µg/m^3)
Lindon 01/01/1993 to 12/31/2008	1	1366	26.00	25.38
	2	1423	20.72	
	3	1357	31.72	
	4	1300	24.53	
Cottonwood 01/01/1993 to 12/31/2008	1	564	27.30	25.10
	2	385	18.62	
	3	382	30.69	
	4	396	24.58	
Hawthorne 03/01/1997 to 12/31/2008	1	954	28.62	22.48
	2	1034	17.57	
	3	1039	22.87	
	4	1012	22.67	
North Salt Lake 01/01/1993 to 12/31/2008	1	1295	35.87	37.42
	2	1408	30.72	
	3	1380	45.24	
	4	1349	39.37	

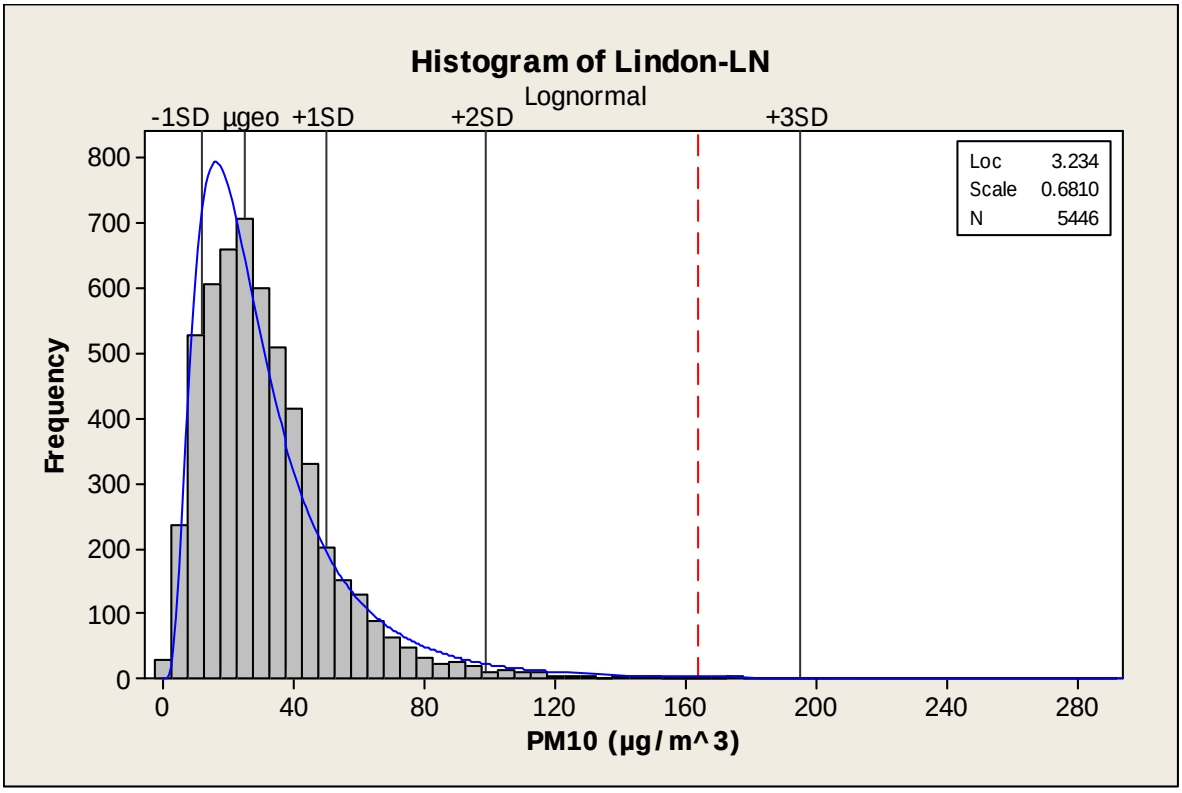
The annual values are far below the April 15th event, which ranged from 164-220 µg/m^3.

Lindon - LN - 49-049-4001

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

Geometric Mean (µgeo): Exp(Loc)=25.38 µg/m^3
Geometric Standard Deviation (σgeo): Exp(Scale)= 1.9758
+1 Standard Deviation (+1SD): Exp(Loc +Scale)= µgeo* σgeo= 50.14 µg/m^3
+2 Standard Deviation (+2SD): Exp(Loc +2*Scale)= µgeo* (σgeo)^2= 99.08 µg/m^3
+3 Standard Deviation (+3SD): Exp(Loc +3*Scale)= µgeo* (σgeo)^3= 195.78 µg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



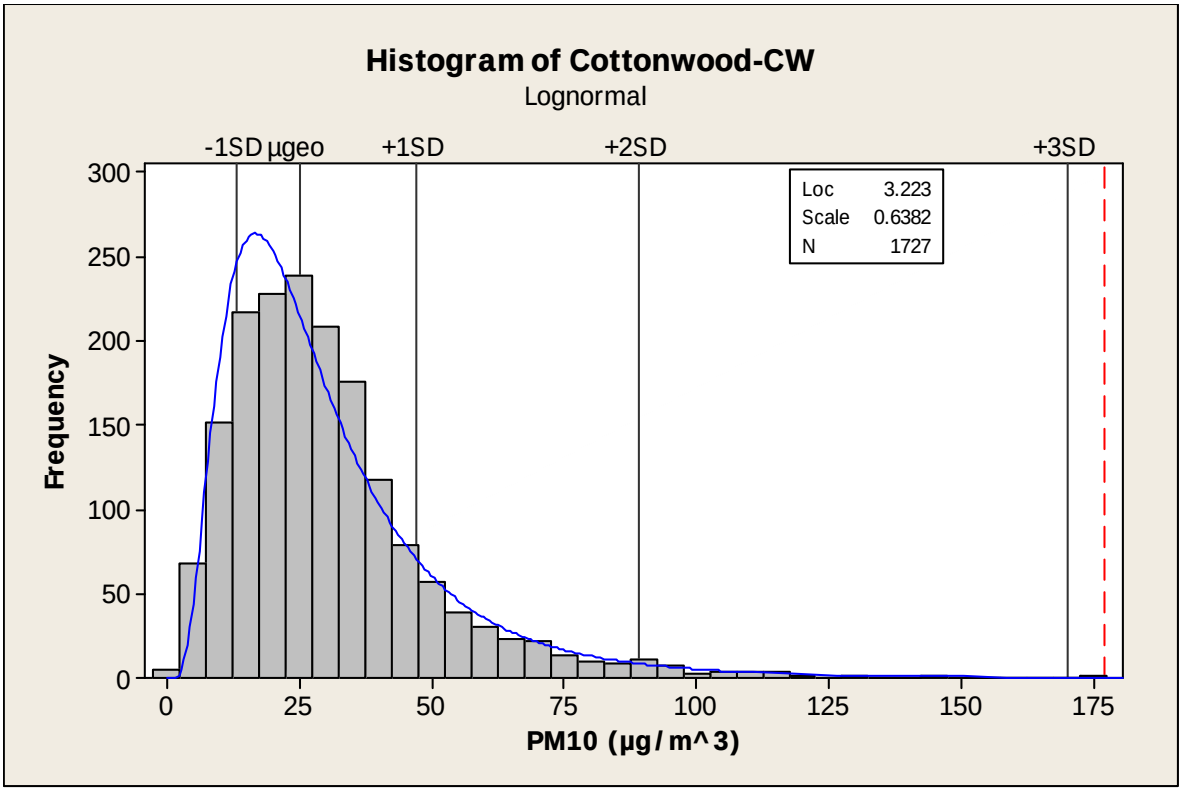
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **approaches 3SD.** The event value is clearly outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
μgeo = 25.10 μg/m^3
σgeo = 1.893
+1SD = 47.52 μg/m^3
+2SD = 89.96 μg/m^3
+3SD = 170.30 μg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



Because this station samples every 6-day's instead of daily, as in the case at Lindon, there is less than half the amount of data points at Cottonwood resulting in a larger data distribution.

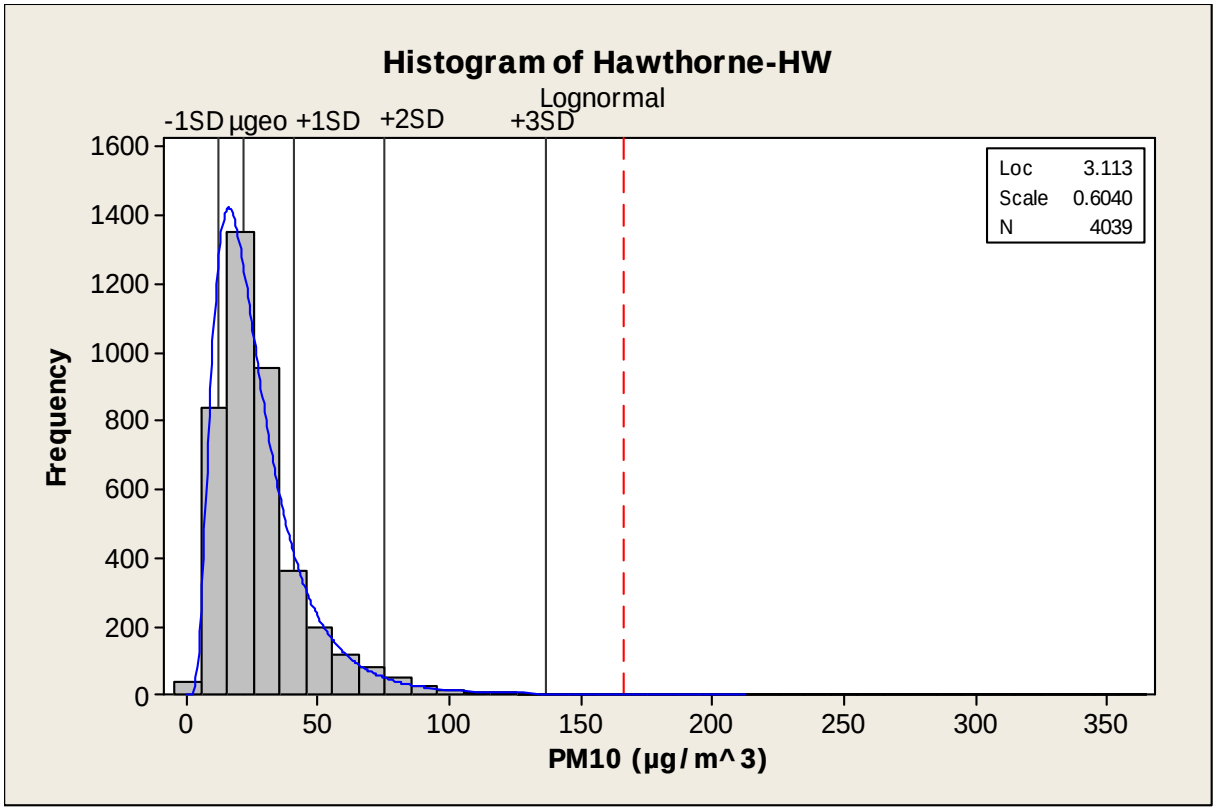
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **exceeds 3SD.** The event value is clearly outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
µgeo = 22.48 µg/m^3
σgeo = 1.829
+1SD = 41.14 µg/m^3
+2SD = 75.26 µg/m^3
+3SD = 137.68 µg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



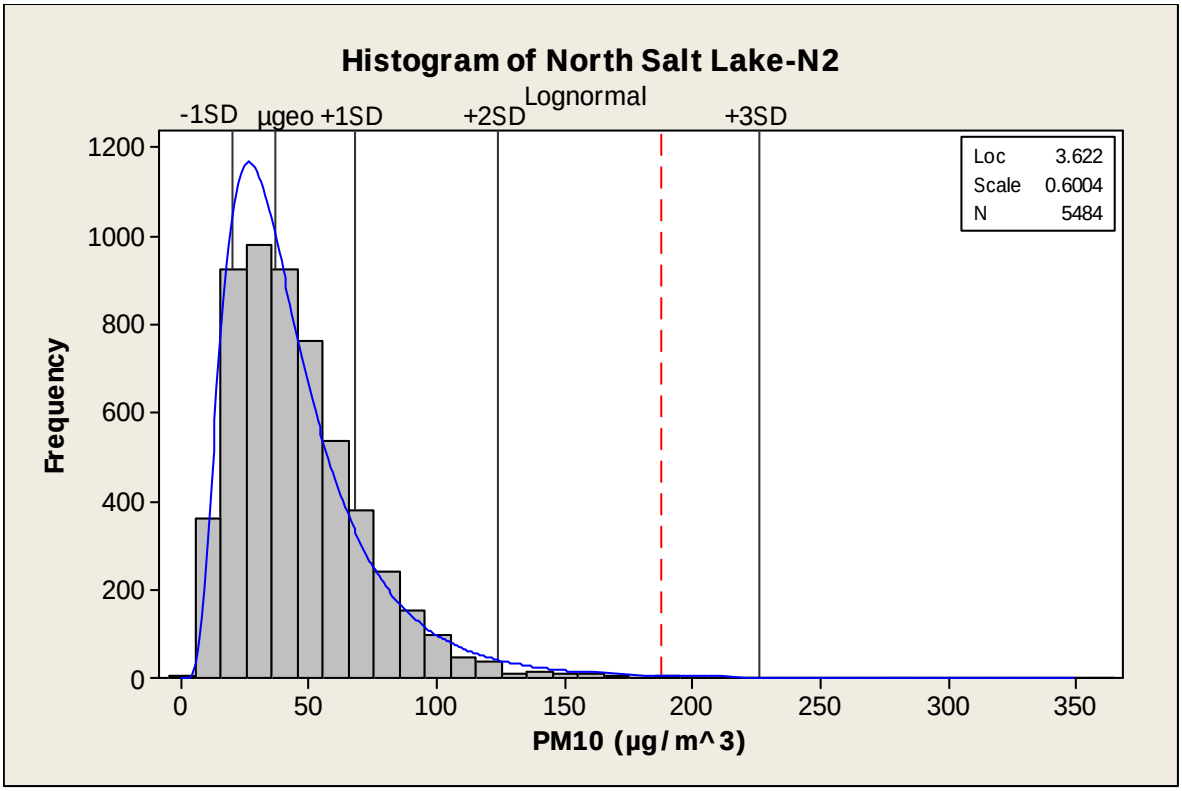
Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **exceeds 3SD.** The event value is clearly outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The following are the calculations for the geometric mean, geometric standard deviation, and the upper boundary of the 1st, 2nd, and 3rd standard deviations from the geometric mean.

The following are the statistical values:
µgeo = 37.42 µg/m^3
σgeo = 1.822
+1SD = 68.19 µg/m^3
+2SD = 124.33 µg/m^3
+3SD = 226.60 µg/m^3

The histogram presents the historical values and the event value with a red dashed line. The blue line is a fitted line overlay of a lognormal distribution.



Noting that the normal historical values fall within the lognormal distribution, it is reasonable to utilize plus or minus 2SD above or below the geometric mean as the bounds of normal PM10 values. The event value **approaches 3SD**. The event value is clearly outside the normal historical fluctuation.

A co-located monitor also recorded an elevated level of PM10 at 220 µg/m^3, on April 15, 2008. Monitoring at this station for PM10 began in January 2008 thus, insufficient data is presently available to conduct a detailed analysis but, of the 52 available data points, the measured value of 220 µg/m^3 is the highest value recorded for the monitor. Further more, it is the only exceedance recorded at the monitor.

Wind Speed

The Exceptional Event Rule requires states to include "a historical typical wind speed levels for the season of the year that the event is claimed" (Federal Register Vol. 71, No. 55, Page 13566).

Regional Airport Data

Table 7 - Average Wind Speed in mph for 1996-2006

Station	Jan	Feb	Mar	Apr	May	Jun	Annual	MesoWest Hourly Average on 4-15-0-8
Provo	4.9	6.0	7.2	7.9	7.4	7.3	6.3	17.5
Salt Lake City	6.9	7.6	8.9	9.8	9.2	9.6	8.6	16.5

Data Source: Western Regional Climate Center

Weather measurements for April 15, 2008, at the Salt Lake City International Airport (KSLC) by the National Weather service as reported by MesoWest.

24 hr. maximum wind speed: 21 mph
24 hr. maximum wind gust: 32 mph

Ranking

A Ranked method was used to determine if the wind speed measured on April 15, 2008, was outside what is normally observed. All historical wind speeds from each monitoring station was aligned from least to greatest. The location of the effected value in relation to the rest of the historically values is expressed as a percentile (%ile). If we use the same format for wind as was used initially for PM10, it can be extrapolated that "extremely high" measurements are above the 95th%ile and that "typical levels" are closer to the 75th%ile.

Lindon - LN - 49-049-4001

The data ranking for the Lindon monitoring station for data collected since 1993 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 99th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Cottonwood - CW - 49-035-0003

The data ranking for the Cottonwood monitoring station for data collected since 1993 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 97th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Hawthorne - HW - 49-035-3006

The data ranking for the Hawthorne monitoring station for data collected since 1997 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 96th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

North Salt Lake - N2 - 49-035-0012

The data ranking for the North Salt Lake monitoring station for data collected since 2005 verifies that the daily maximum of the hourly wind speed measured on April 15, 2008, is above the 97th%ile. Consequently, we can conclude that the event day concentration is outside the normal historical fluctuation.

Clear Causal Relationship (40 CFR 50.14)

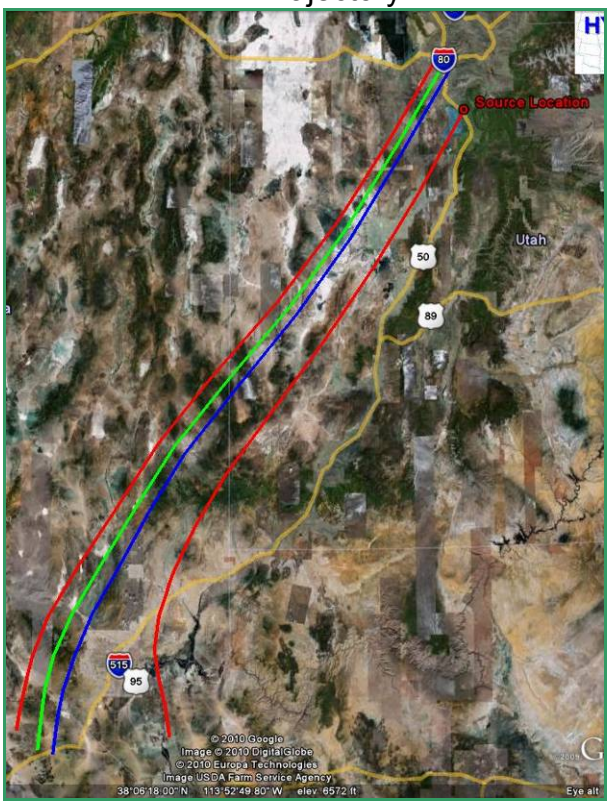
Trajectory and Impacted Area

Backwards trajectory analysis using the NOAA HYSPLIT model was used to project the winds before, during and after the storm event. The four stations were modeled (EDAS meteorological data) at 1000 meters, 12 hour back trajectory (MDT) and plotted onto Google Earth satellite images for visual enhancement of the salt desert playa described in the Soil Resources section. A height of 1000 meters was selected to represent the steering height of the air mass over the complex terrain.

The first wind trajectory is for the day before the storm on April 14, 2008, showing the winds from the south, crossing the Nevada-Utah desert regions and following the I-15 and Wasatch Front mountain range.

Trajectory 1

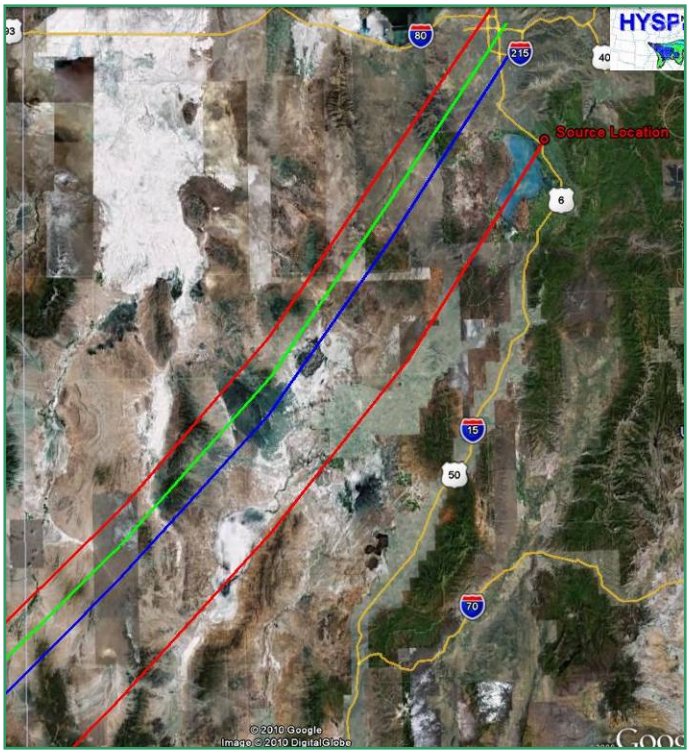
Trajectory 2



The second trajectory is at the beginning of the storm on April 15, 2008 at midnight. Note the shift to the north-west across the Sevier Desert.

Trajectory 3

Trajectory 4



Trajectory 3 is at 4 a.m. MDT on April 15, 2008, at the height of the storm, corresponding with the maximum hourly values shown on Graphs 1 and 2. The winds continued their passage over desert playa. Trajectory 4 is a close-up of Trajectory 3 clearly showing the desert regions.

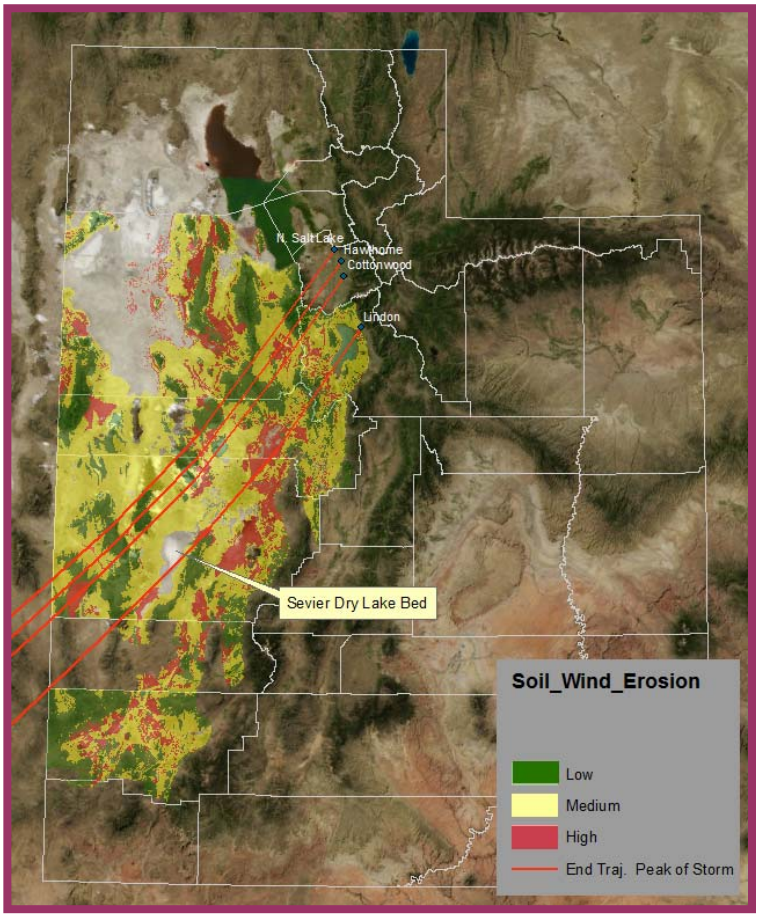
Trajectory 5

The final image is at 8 a.m. MDT on April 15, 2008, showing the wind shift as a result of the cold front with declining wind speed.

Wind Storm Passed Over Wind Erosion Prone Soils in Utah

The U. S. Department of Agriculture, Natural Resources Conservation Service (NRCS), developed a wind erosion GIS map of Major Land Resource Area 28A for the DEQ using the Wind Erodibility Index that assigns an erosion rate to soil.

The NRCS categorized soil wind erosion into three categories; low, medium and high erodibility. The HYSPLIT wind trajectory for the height of the storm event (same as Trajectory 3 above) has been layered on to the wind erosion GIS map. All four station trajectories, at this point of the storm, passed over salt desert playa regions consistent with the news report by the Salt Lake Tribute ("Gusts swept in tiny dirt particles from the Sevier Dry Lake and the Sevier Desert on Tuesday morning….)"



Speciation

Coarse Mass Composition

Studies conducted in national parks on coarse mass (2.5-10 um) indicates the composition of course mass consists of crustal minerals, carbonaceous material and salts. Sampling sites were selected to be representative of the continental United States and were operated according to IMPROVE protocol analytical procedures. Crustal minerals (soil) were reported to be the single largest contributor, followed by organic mass, nitrates and sulfates.

Crustal Minerals	34-74%
Organic Mass	20-59%
Nitrates	10-12%
Sulfates	≈ 5%

(Malm, et al, 2007).

Speciation samples of PM2.5 are collected at the Hawthorne monitoring station every third day and one was collected on April 15, 2008. DEQ also included a special speciation

request for the Lindon PM2.5 sample because of the exceedance on that day. The analytes were tabulated according to the classifications above (Table 8).

Crustal minerals – soil minerals SiO2, Al2O3, CaO, Fe2O3, K2O, MgO, FeO, Na2O, TiO2, SO2, P2O5, and Ba were tabulated using their elemental components (Pettijohn 1975).

Table 8 – Coarse Mass Analysis for Event Day

	Hawthorne %	Lindon %	Published Values
Crustal Minerals	28	36*	34-74%
Total Carbon	30^	No Analysis	20-59%
Nitrate	2	2	10-12%
Sulfate	4	4	≈ 5%

*Potassium value not available. Percentage is slightly under stated.
^Carbon data flagged for flow restriction, value likely under stated.

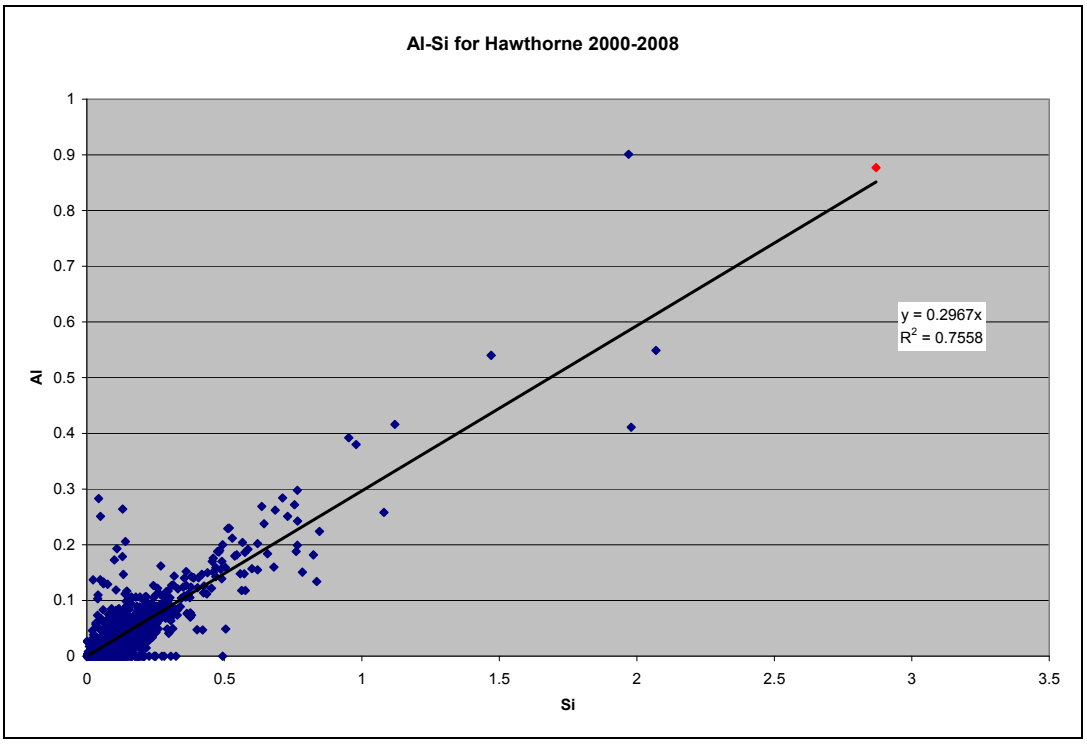
This analysis suggests that both dust samples collected during the exceptional event are consistent with coarse mass (soil).

Heterotrophic bacteria decompose organic matter, releasing ammonia, which can subsequently be nitrified to nitrate by nitrifying bacteria. Nitrate is poorly adsorbed to soils and is readily leached. Since organic matter is limited in arid regions and because nitrate levels in soil is normally low, one would expect that arid dust associated with high wind events would be low in nitrate level. Consequently, it is reasonable to conclude that these low nitrate levels support the premise that the sources of the windborne dust are primarily non-anthropogenic.

Soil Aluminum-Silica Ratio

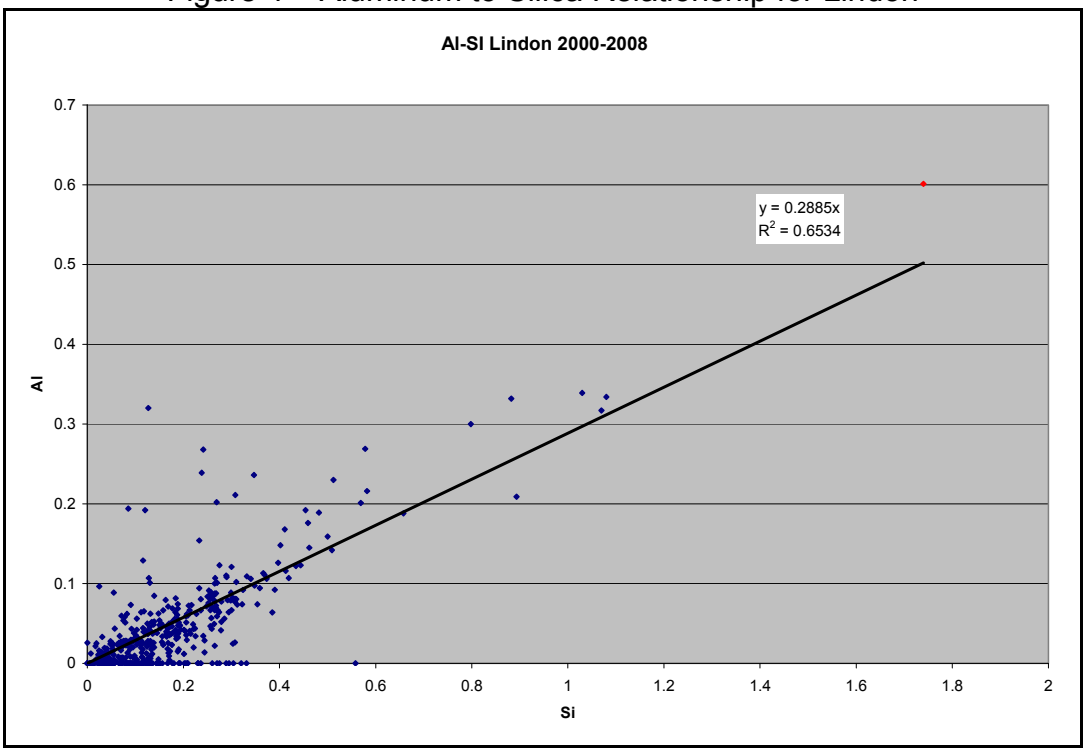
Aluminum is highly reactive and does not occur freely in nature. Instead, it is bound up as aluminum silicate in clay, minerals, and rocks. There is a strong observed relationship when aluminum is plotted against silica. An internal IMPROVE memo by Bob Eldred (June 20, 2003) described the relationship he observed when he plotted IMPROVE Al-Si data from December 1999 to November 2000. The plot was an excellent relationship with a slope of 0.46 with R^2=0.96. When Eldred plotted earlier data, he observed a slope of 0.60. Eldred attributed this difference to migration of Sahara dust to the continental U.S, influencing the natural Al-Si ratio common to North America. When we plot the Hawthorne Al-Si data from 2000-2008 (Figure 3), we observe a slope of 0.3. The red data point represents the exceptional event of April 15, 2008.

Figure 3 – Aluminum to Silica Relationship for Hawthorne



Plotting the Lindon data (Figure 4), we observe a slope of 0.29, essentially identical to the Hawthorne plot.

Figure 4 – Aluminum to Silica Relationship for Lindon



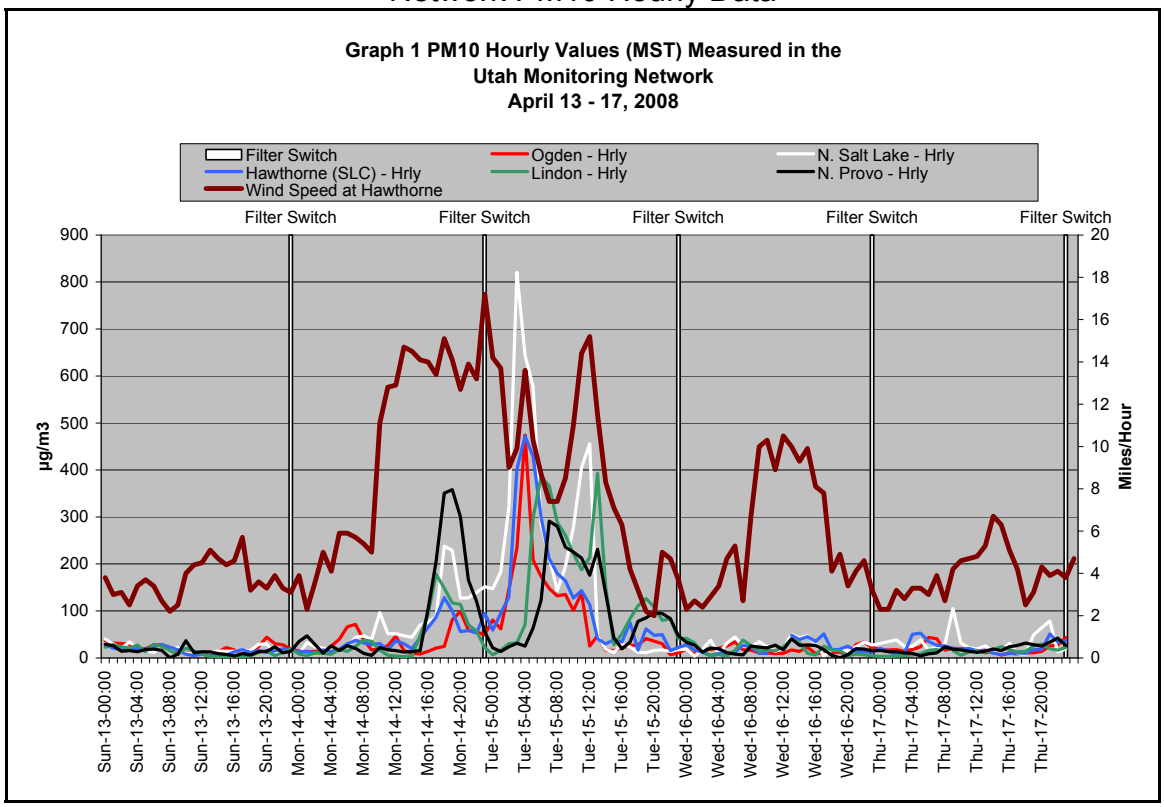
Aluminum's relationship to silica may be helpful in determining if soils have been anthropogenically enriched. We can infer from Eldred's research that we should be able to detect anthropogenic enrichment of soils when the Al-Si ratio deviates upward significantly from 0.46. Our lower slope **may** suggest that anthropogenic dust sources are not major components.

No Exceedance or Violation But For the Event

Wind Storm Event

There were no unusual local anthropogenic emissions reported before, during, and after the event. Figure 5 is a plot of the wind speed measured at the Hawthorne monitoring station along with the PM10 hourly values for the northern monitoring stations starting on April 13 through April 17, 2008. We have plotted PM10 levels before and after the event to demonstrate that PM10 levels at all of these stations were substantially below the 24-hr standard of 150 ug/m^3, even on Sunday the 13th, despite dry conditions and slight wind. The increased wind speed (and south-southeasterly direction), starting on April 14 at 1100, correspond accordingly with the PM10 peaks for all stations until April 16 at 2100. The cold front brought with it precipitation and wind but the wet conditions reduced wind blown dust on April 16 and 17. If not for the storm event and associated winds from the south-southeast, crossing the salt desert playa regions, PM10 values in the network would not have been elevated and PM10 levels would not have exceeded the 24-hr standard at North Salt Lake, Hawthorne, Cottonwood and Lindon.

Figure 5 – Hawthorne Station Wind Speed and Northern Monitoring Network PM10 Hourly Data



We substantiate the "but not for" wind storm position based on the demonstration made in the following Mitigation section, that the Utah Division of Air Quality, together with Utah counties and federal agencies, has established reasonably well-controlled dust programs, consistent with EPA guidance. Further, there were no smoke reports or other complaints at the time that would impact the network to this degree. Anthropogenic emissions remained constant before and after the event. Figure 5 shows that the PM10 levels averaged between 24-38 ug/m^3 for April 13, 14, 16, and 17, in comparison to event levels of 164-220 ug/m^3. This indicates that the significant increase was not due to anthropogenic emissions activity, but more related to high wind.

Coarse Mass Analysis

The same coarse mass analysis was conducted for the Hawthorne and Lindon stations for PM2.5, before and after the wind storm event.

Table 9 – Coarse Mass Analysis, Pre and During Event

	Hawthorne 3-days Before EE	Lindon 3-days Before EE	Published Values Malm et al 2007	Hawthorne EE Day	Lindon EE Day
Crustal Minerals	9%	9%	34-74%	28%	36*%
Total Carbon	73%	~~100~~#%	20-59%	30%	No Analysis
Nitrate	25%	37%	10-12%	2%	2%
Sulfate	12%	11%	≈ 5%	4%	4%

Notes: # error in TC analysis. *Potassium value not available, % slightly under stated.

The crustal mineral contents 3-days before the event were only 9%, than escalated to 28-36% the day of the event, clearly proving that the entrained dust was carried along from the salt desert playa regions as projected by the HYSPLIT model.

Kim (et al 2007) concluded that nitrate in PM2.5 is highly correlated with anthropogenic species such as ammonium [ammonium nitrate is the stable form]. Nitrate is often a major component of fine particles, especially in more polluted urban areas (Finlayson-Pitts and Pitts, 2000). The California Regional PM10 and PM2.5 Air Quality Study (CRPAQS), Factors Limiting the Formation of Secondary Nitrate and Sulfate, December 10, 2002, is a study of PM during winter pollution episodes. The report concluded that, "analysis of the chemical composition of PM during winter pollution episodes indicates high levels of nitrate, modest levels of sulfate, and levels of ammonium sufficient for these two anions to exist primarily as ammonium nitrate and ammonium sulfate in atmospheric aerosols. The nitrate and sulfate found in PM are believed to be secondary because there are no known primary emission sources with significant emission rates of these compounds and because there are known chemical reactions that lead to their formation in the atmosphere. "As a group, the secondary inorganic species (nitrate, sulfate, and ammonium) can account for up to

70% of PM2.5 mass and up to 50% of PM10 mass in extreme wintertime pollution events in California's San Joaquin Valley (SJV). These species represent such a large portion of the PM that it is essential to characterize the factors influencing and, especially, limiting their formation."

These studies support that PM nitrate and sulfate are primarily associated with anthropogenic emissions. The vast change in nitrate and sulfate levels in our data indicates anthropogenic sources before the event (nitrate 25-37%, sulfate 11-12%). While the total carbon data was not always reliable, it too provides a general indication supporting anthropogenic dominance before the storm, 73% at Hawthorn, than less so the day of the storm, 30%, which is in line with Malm's et al findings of soils in the rural U.S.

Statistical Analysis

A statistical analysis approach was taken to estimate the amount of PM10 contributed by the wind storm. The analysis calculated the difference between PM10 and PM2.5 measured at Hawthorne (HW), Cottonwood (CW), and Lindon (LN). A PM2.5 monitor is not located at N2; however, it can be assumed that the results would be similar. All coinciding data available for PM10 and PM2.5 at each monitoring location was used. This analysis is severely limited since it does not take into account the effect of the dust on PM2.5. The resultants over estimate the expected amount of PM10 had the event not occurred.

Table 10 – Lognormal Descriptive Statistics of the Difference between PM10 and PM2.5

Location	Loc	Scale	N	μgeo	σgeo	+1SD	+2SD
LN	2.639	0.9243	3290	14.00	2.5201	35.28	88.91
CW	2.610	0.7808	1112	13.60	2.1832	29.69	64.82
HW	2.573	0.7299	3224	13.11	2.0749	27.19	56.42

When the differences calculated in Table 10 are applied to the measured concentration of PM2.5 on April 15, 2008, several estimates for the expected PM10 value can be made.

Table 11 – Measured and Expected PM10 Values for April 15, 2008

	Measured		Expected		
Location	PM10	PM2.5	PM2.5 + μgeo	PM2.5 + 1SD	PM2.5 + 2SD
LN	164	24.5	38.50	41.02	76.30
CW	177	26	39.60	41.78	71.47
HW	166	26.8	39.91	41.98	69.17
N2	141				

Using the calculated expected PM10, PM2.5+2SD, we can attribute approximately **80-100 μg/m^3** of PM10 to the wind event. If it had not been for the wind event, PM10 would not have exceeded the standard.

Clear Causal Relationship and But For the Event Summary

A "clear and casual relationship" and "but for the event" demonstration has been made based on:

- The cold front produced storms with high winds and dust clouds that is a natural event;
- PM10 and PM2.5 concentration patterns correspond directly to the storm event, inclined due to high winds, than declined due to cold front precipitation, showing direct relationship;
- Backwards trajectory modeling is consistent with the National Weather Service report and images that dust sources included the Sevier Lake bed and Milford Flat burn scar. It also correlates with hourly PM increases;
- Speciation analysis for crustal matter (increase in crustal mass with reduction in nitrate and sulfate mass) and Al-Si ratio suggests that the source(s) of the PM samples are primarily non-anthropogenic;
- Wind speed and PM10 concentrations correlate well; and
- Statistical analysis attribute about **80-100 µg/m^3** of PM10 to the wind event.

Mitigation (40 CFR 51.930)

The Exceptional Events Rule requires states to "take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards." The intent of this section is to describe the State of Utah's dust control and public health protection programs.

Division of Air Quality State Implementation Plan

The Exceptional Events Rule Preamble states that, "where high wind events results in exceedances or violations of the particulate matter standards, EPA proposed that they be treated as natural events if…, and if anthropogenic activities which contribute to particulate matter emissions in conjunction with the high wind event are **reasonably well-controlled**."

The State of Utah has developed a comprehensive program of controls for airborne fugitive dust implemented through existing Utah Air Quality Rules, stationary source permitting, and State Implementation Plans (approved by EPA). This system of control techniques for fugitive dust has been in place since 1992 when the current Utah PM10 SIP was developed. The SIP requires control measures for both specific and general PM10 fugitive dust sources along the Wasatch Front. The SIP process introduced Reasonably Available Control Technology (RACT) and Best Available Control Measures (RACM) for sources that existed prior to the SIP process and required Best Available Control Technology (BACT) for new sources and modifications of existing sources. BACT requirements are enforced through Utah administrative rule R307-401. Since 1992, the state has implemented and continually updated two administrative rules that control fugitive dust throughout the state. R307-205 and R307-309 which, taken together, apply to all significant fugitive dust sources in the state. These rules require each significant fugitive dust source to develop and implement a site-specific fugitive dust control plan. In effect, an approved dust plan defines Best Available Control Measures (BACM) for a source, and provides a flexible mechanism

for controlling airborne dust. Under the Utah SIP requirements and the Air Quality Rules, all eligible sources in Utah are subject to emission controls defined by RACT, BACT or BACM.

Utah Air Rules, Permitting

R307-205: Fugitive Emissions and Fugitive Dust

This rule applies statewide to all sources of fugitive emissions and fugitive dust, except for agricultural or horticultural activities. Fugitive emissions may not exceed 20% opacity. The rule applies to construction activities that disturb an area greater than 1/4 acre in size. The rule also applies to roadway emission controls, mining activities and tailings piles and ponds. While a permit, known as an Approval Order, is not required from the Executive Secretary of the Air Quality Board, steps need to be taken to minimize fugitive dust. Control measures may include; watering, chemical stabilization, synthetic cover, vegetative cover, windbreaks, minimizing the area of disturbed tailings, restricting the speed of vehicles in and around operations and other techniques approvable by the executive secretary. These control measures are in keeping with the USEPA document titled *Fugitive Dust Background Document and Technical information Document for Best Available Control Measures*.

Treatment effectiveness is based on EPA's AP-42 Factors;

- Section 11.19.1.2 states:

"Wet suppression techniques include application of water, chemicals and/or foam, usually at crusher or conveyor feed and/or discharge points. Such spray systems at transfer points and on material handling operations have been estimated to reduce emissions 70 to 95 percent. Spray systems can also reduce loading and wind erosion emissions from storage piles of various materials 80 to 90 percent. Control efficiencies depend upon local climatic conditions, source properties and duration of control effectiveness. Wet suppression has a carryover effect downstream of the point of application of water or other wetting agents, as long as the surface moisture content is high enough to cause the fines to adhere to the larger rock particles."

- Section 13.2.4.4 "Controls", states:

"Watering and the use of chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent."

Table B.2-3

Particle Size:	0 - 2.5	2.5 - 6	6 - 10
Efficiency: Dust suppression by water sprays			
	40%	65%	90%
Efficiency: Dust suppression by chemical stabilizer or wetting agents			
	40%	65%	90%

R307-309: Nonattainment and Maintenance Areas for PM10: Fugitive Emissions and Fugitive Dust.
This rule establishes minimum work practices and emission standards for sources of fugitive emissions and fugitive dust for sources listed in the State SIP or located in a PM10 nonattainment and maintenance areas to meet the reasonably available control measures for PM10. A fugitive dust control plan must be submitted to the Executive Secretary at the Utah Division of Air Quality for review and approval prior to commencement of a project.

For temporary aggregate processing projects, portable permits are issued for the specific equipment. A permit application, known as a Notice of Intent must be submitted to the Executive Secretary at the Utah Division of Air Quality before project initiation and must include a dust control plan.

Fugitive emissions from stationary sources may not exceed 15%. Opacity caused by fugitive dust must not exceed 10% at a property boundary and 20% on site, with the exclusion when wind speed exceeds 25 mph and the owner/operator is taking appropriate actions to control fugitive dust. Appropriate measures include an approved dust control plan.

Any person owning or operating a new or existing source of fugitive dust, including storage, hauling or handling operations, or engaging in clearing or leveling of land one-quarter acre or greater in size, earthmoving, excavation, or movement of trucks or construction equipment over cleared land one-quarter acre or greater in size or access haul roads, or engaging in demolition activities including razing homes, buildings or other structures shall submit a plan to control fugitive dust to the executive secretary no later than 30 days after the source becomes subject to R307-309. The plan shall address fugitive dust control strategies for the following operations as applicable:

- Material Storage;
- Material handling and transfer;
- Material processing;
- Road ways and yard areas;
- Material loading and dumping;
- Hauling of materials;
- Drilling, blasting and pushing operations;
- Clearing and leveling;
- Earth moving and excavation;
- Exposed surfaces;
- Any other source of fugitive dust;
- Strategies to control fugitive dust may include;
- Wetting or watering;
- Chemical stabilization;
- Enclosing or covering operations;
- Planting vegetative cover;
- Providing synthetic cover;
- Wind breaks;
- Reducing vehicular traffic;

- Reducing vehicular speed;
- Cleaning haul trucks before leaving loading area;
- Limiting pushing operations to wet seasons;
- Paving or cleaning road ways;
- Covering loads;
- Conveyor systems;
- Boots on drop points;
- Reducing the height of drop areas;
- Using dust collectors;
- Reducing production;
- Mulching;
- Limiting the number and power of blasts;
- Limiting blasts to non-windy days and wet seasons;
- Hydro drilling;
- Wetting materials before processing;
- Using a cattle guard before entering a paved road;
- Washing haul trucks before leaving the loading site;
- Terracing; or
- Cleaning the materials that may create fugitive dust on a public or private paved road promptly; or Preventing, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site.

Each source must comply with all provisions of the fugitive dust control plan as approved by the executive secretary.

Any person owning, operating or maintaining a new or existing material storage, handling or hauling operation must prevent, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site. Any such person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Any person engaging in clearing or leveling of land with an area of one-quarter acre or more, earthmoving, excavating, construction, demolition, or moving trucks or construction equipment over cleared land or access haul roads must prevent, to the maximum extent possible, material from being deposited onto any paved road other than a designated deposit site. Any such person who deposits materials that may create fugitive dust on a public or private paved road shall clean the road promptly.

Any person responsible for construction or maintenance of any existing road or having right-of-way easement or possessing the right to use the same whose activities result in fugitive dust from the road must minimize fugitive dust to the maximum extent possible. Any such person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Unpaved Roads - any person responsible for construction or maintenance of any new or existing unpaved road must prevent, to the maximum extent possible, the deposit of material from the unpaved road onto any intersecting paved road during construction or

maintenance. Any person who deposits materials that may create fugitive dust on a public or private paved road must clean the road promptly.

Any person who owns or operates a mining operation shall minimize fugitive dust as an integral part of site preparation, mining activities, and reclamation operations. The fugitive dust control measures to be used may include:

- Periodic watering of unpaved roads;
- Chemical stabilization of unpaved roads;
- Paving of roads;
- Prompt removal of coal, rock minerals, soil, and other dust-forming debris from roads and frequent scraping and compaction of unpaved roads to stabilize the road surface;
- Restricting the speed of vehicles in and around the mining operation;
- Revegetating, mulching, or otherwise stabilizing the surface of all areas adjoining roads that are a source of fugitive dust;
- Restricting the travel of vehicles on other than established roads;
- Enclosing, covering, watering, or otherwise treating loaded haul trucks and railroad cars, to minimize loss of material to wind and spillage;
- Substitution of conveyor systems for haul trucks and covering of conveyor systems when conveyed loads are subject to wind erosion;
- Minimizing the area of disturbed land;
- Prompt revegetation of regraded lands;
- Planting of special windbreak vegetation at critical points in the permit area;
- Control of dust from drilling, using water sprays, hoods, dust collectors or other controls approved by the executive secretary;
- Restricting the areas to be blasted at any one time;
- Reducing the period of time between initially disturbing the soil and revegetating or other surface stabilization;
- Restricting fugitive dust at spoil and coal transfer and loading points; or
- Control of dust from storage piles through use of enclosures, covers, or stabilization and other equivalent methods or techniques as approved by the executive secretary, or Other techniques as determined necessary by the executive secretary.

Any person owning or operating an existing tailings operation where fugitive dust results from grading, excavating, depositing, or natural erosion or other causes in association with such operation must take steps to minimize fugitive dust from such activities. Such controls may include:

- Watering,
- Chemical stabilization,
- Synthetic covers,
- Vegetative covers,
- Wind breaks,
- Minimizing the area of disturbed tailings,
- Restricting the speed of vehicles in and around the tailings operation, or other equivalent methods or techniques which may be approvable by the executive secretary.

Utah R307-202-3
Prohibits burning of trash and other waste and salvage operations by open burning. Persons/agencies wishing to open burn tree cuttings, slash in forest areas etc., must seek a permit from DEQ that include control measures.

Compliance

The seven DEQ inspectors conduct daily surveillance inspections and have been advised to include in their routes dust prone areas and areas with particularly dust prone industries, such as aggregate industries (quarries, concrete manufacturing, etc.) during the dust season. Construction sites are also subject to inspection and verification.

A Compliance Advisory Notice is delivered to sources that appear to be out of compliance and provides an opportunity for DEQ and the regulated source to discuss the findings of the inspection. If a source is issued a Compliance Advisory Notice and responds by promptly returning to compliance, a reduced penalty may be offered for their expedient cooperation (fines are $2,000-7,000 for dust violations). Dust control violations are typically quickly resolved upon receipt of a Compliance Advisory Notice. However, the DEQ is able to proceed with Notices of Violation and Orders to Comply, if necessary.

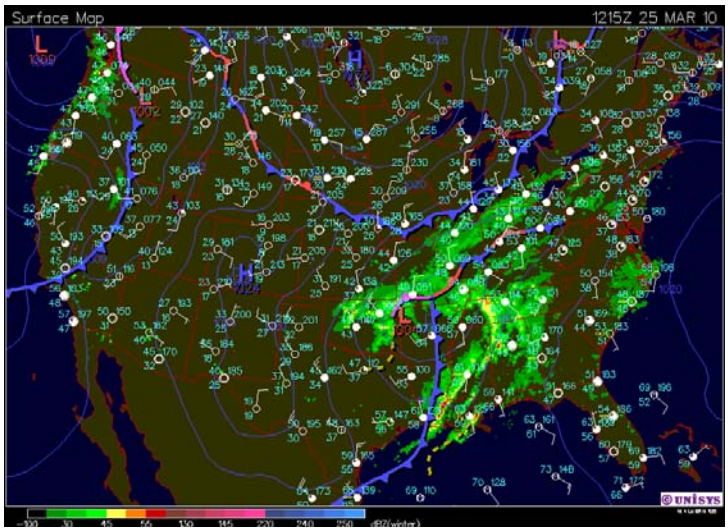
2009 DEQ Compliance Summary

TASK	2009
Annual Inspections Completed (19 inspectors)	978
Temporary Relocations Accepted	103
Fugitive Dust Control Plans Accepted, Mostly Construction	**57**
Complaints Received	149
VOC Inspections	73
Warning Letters	16
Notices of Violations	3
Compliance Advisories, 7 Directly Related to Dust	65
Settlements	43
Penalties Assessed	$569,543
85% Compliance measured via inspections, reports and stack testing	

Control Measures Demonstration Case Study - Kennecott Mine Tailing Impoundments

Successful implementation of Utah's PM10 SIP is perhaps best demonstrated by the lack of dust generated at the Kennecott Copper Mine tailing impoundments during a dust storm event that occurred on March 25, 2010.

A natural spring dust storm was generated on March 25 by an approaching cold front that arrived into Utah the next day, akin to this report event date of April 15, 2008.



High western winds traversed the Western Desert and Great Salt Lake, entraining dust that traveled across the lake and into the Salt Lake valley. Figure 6 shows the hourly PM10 values across the valley before, during and after the dust storm. The highest PM10 values were in the northern portions of the valley consistent with the dust storm location and general directional movement.

Figure – 6 PM10 Hourly Values for Case Study

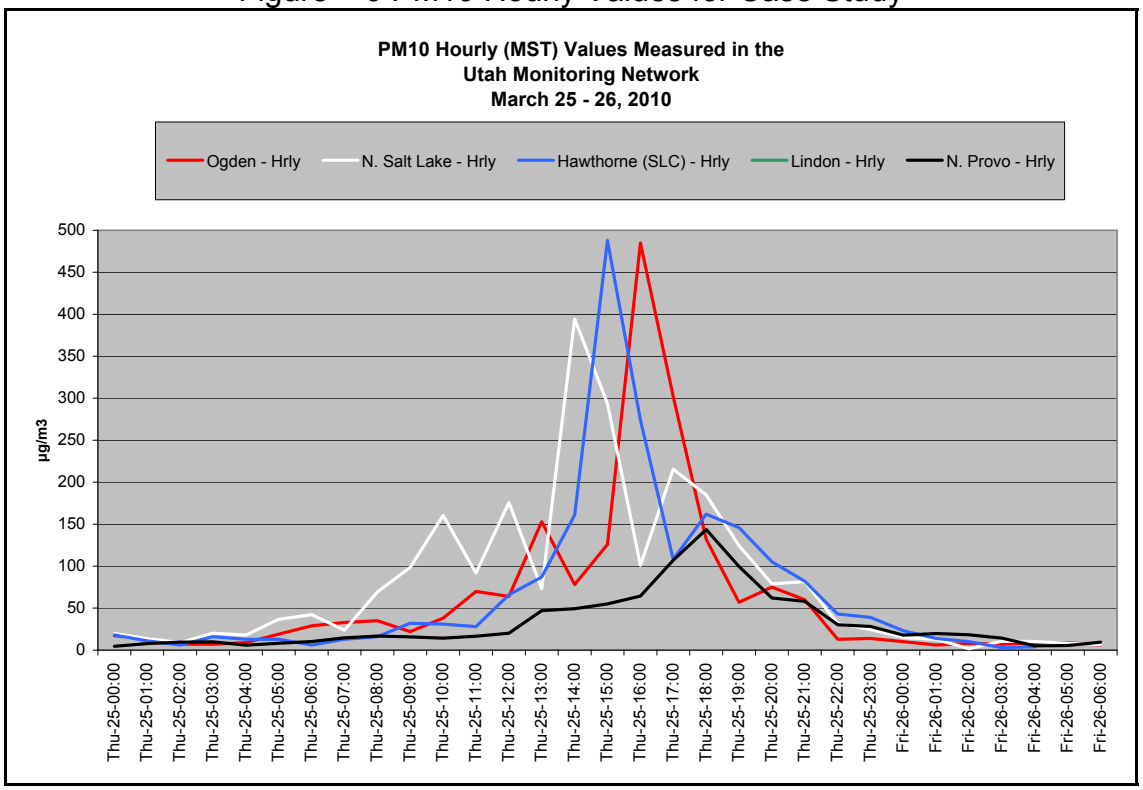


Image 4 shows the locations of the Western Desert, Kennecott tailings impoundments and the Saltaire concert venue that is located on the shore of the Great Salt Lake (lake visible in black/blue and white shore areas).

Image 4 – locations of Western Desert and Kennecott Impoundments

Image 5 provides an aerial view of the Kennecott impoundments which are hundreds of thousands of acres in size and the Great Salt Lake shoreline.

Image 5 – Aerial View of Kennecott Tailing Impoundments-Great Salt Lake Shoreline and Wind Vector at 2100Z March 25, 2010

The impoundments were a major source of particulate matter in the Salt Lake valley until Kennecott implemented a fugitive dust abatement program that was first implemented in

1997 and revised July 2002, as mandated by DEQ through permitting and compliance. The program effectiveness can be seen through a series of photographs that were taken of the March 25, 2010 dust storm as it came across the Great Salt Lake and traversed across the Kennecott property on its way to the Salt Lake valley.

March 25, 2010 Dust Storm Photo Documentation

View of dust storm coming across the Great Salt Lake at the Saltaire concert venue on the shore of the Lake, located across the road from Kennecott tailing impoundments.

The Great Salt Lake is obscured by the dust storm crossing it near the Kennecott tailings impoundment.

Kennecott smelter shrouded in dust storm.

The first photograph is of the dust storm crossing the southeast shore of the Great Salt Lake heading towards Kennecott in the afternoon around 3 p.m. MDT. The Saltaire concert venue located on the lake shore is visible in the background. The second photograph is of a truck traveling on Interstate 80 along the lake and across from the impoundments. Notice the Lake is not visible behind the truck. The last photograph in this series shows how the dust storm moved onto land shrouding the Kennecott smelter. Wind speed ranged from 20-25 mph with visibility limited to half mile at times (per Kennecott, measurements are required in their dust suppression plan).

March 25, 2010 Dust Storm Photo Documentation

View of Salt Lake valley from Olympus Cove.

The top photographs are of the impoundments, showing the dust storm but no contribution from the impoundments. The bottom photograph is of the Salt Lake valley shrouded by the dust storm.

This case study demonstrates:

1. Natural storm events in Utah generate high winds that traverse desert playa regions entraining arid surface soils creating dust storms. In this case, high winds were caused by an advancing cold front. The winds generated the dust storm as they traveled from the west to southeast across the Western Desert and the Great Salt Lake.
2. Photo documentation was made that the dust storm was in full force before landing on the lake southeast shore before reaching Kennecott.
3. Monitoring data confirms very high PM10 levels associated with the storm event starting around 1-2 p.m. MDT, consistent with dust storm observations made at Kennecott.
4. Photo documentation was made that the massive impoundments did not contribute to the dust storm; thus verifying that DEQ enforcement control measures are reasonably effective and consistent with the intent of the Exceptional Events Rule Preamble on this matter.

Mobile Sources Particulate Reduction

Automotive Inspection Maintenance Program

Utah is required by Section 182 of the Clean Air Act to implement an inspection maintenance program in Salt Lake County that is at least as effective as the EPA's Basic Performance Standard. Salt Lake County began its program in 1984. The program exceeds the Basic inspection maintenance performance standard for all pollutants and in doing so, mitigates PM.

Utah Clean Diesel Program

Agriculture: Diesel engines are a major source of pollution, emitting particulates, amongst other pollutants. DAQ applied for and received $750,000 from the American Recovery and Reinvestment Act to replace 11 agricultural vehicles and equipment, repower 21 engines in agricultural vehicles and equipment, and install 30 Auxiliary Power Units on agricultural vehicles. DAQ collaborated with the Utah Department of Agriculture and Food and Utah State University to identify agricultural operators whose operations are negatively impacting non-attainment areas in the state. The project's scope of replacing, repowering, and installing more fuel efficient technology on agricultural vehicles and equipment will ensure that stricter emissions standards requirements are met and yield more diesel fuel conservation.

School Bus Project: In 2007, DAQ started the Utah Clean School Bus Project in conjunction with Utah Office of Education, local school districts, county and municipal governments, as well as community and non-profit organizations. This coalition is working together to secure funding sources for school districts to purchase emission reducing technologies for buses statewide. The application of these technologies is expected to reduce particulate matter by 30%. As of 2009, a total of 247 buses have been retrofitted. By the fall of 2010, 454 buses will be retrofitted.

Clean Diesel Trucking Initiative: DAQ initiated the Clean Diesel Grant Program to install APUs (Auxiliary Power Units) on 48 long-haul tractors that will reduce diesel emissions and fuel usage from diesel-powered, long-haul trucks that travel and idle within the non-attainment areas of the Wasatch Front. The funding was provided by a State allocation of $352,941 through EPA's National Clean Diesel Campaign and a State match of $235,294, for a total of $588,235. EPA awarded DAQ a grant in 2010 to continue installation of APUs.

Clean Fuel Vehicle Tax Credit and Loan Program

The Utah Clean Fuels and Vehicle Technology Grant and Loan Program, funded through the Clean Fuels and Vehicle Technology Fund, provides grants to assist businesses and government entities in covering:

1) The cost of converting a vehicle to operate on clean fuels.
2) The incremental cost of purchasing an Original Equipment Manufacturer (OEM) clean fuel vehicle.
3) The cost of retrofitting diesel vehicles with EPA verified closed crankcase filtration devices, diesel oxidation catalysts, and/or diesel particulate filters.

The Clean-Fuels Grant and Loan Program also provides loans for the cost of converting a vehicle to operate on a clean fuel, for the purchase of OEM clean fuel vehicle, and for the purchase of fueling equipment for public/private sector business and government vehicles. Finally, the program can provide grants and loans to serve as matching funds for federal and non-federal grants for the purpose of converting vehicles to operate on a clean fuel, purchasing OEM clean fuel vehicles, or retrofitting diesel vehicles.

Smoking Vehicles

Vehicles emitting excessive smoke contribute to airborne particles. Five local health departments (Cache, Davis, Salt Lake, Utah and Weber Counties) operate smoking vehicle education and notification programs. People who spot a vehicle producing excessive smoke can report it through their respective county health department.

In 2009, 724 vehicles were reported to Salt Lake County Health Department alone. The County issued 490 notices.

Utah Clean City

Utah's Clean Cities Coalition is one of 85 coalitions around the country that's part of the U.S. Department of Energy's strategy to reduce America's dependence on imported foreign oil. The Utah coalition sponsored Idle Free Awareness Week which included educating school bus drivers on the air quality value of limiting idling.

Variable Message Signage

The Utah Department of Transportation (UDOT), in conjunction with the DEQ air quality forecasting program, issues air quality warnings on electronic message boards placed along Utah's highways. The signage asks drivers to limit their driving on high alert days. An informal study conducted this winter by UDOT during 6-days with and without air quality alerts indicates that there was a 3-5% auto traffic reduction (per Glen Blackwelder, UDOT Traffic Operations Engineer).

Division of Air Quality Community Outreach

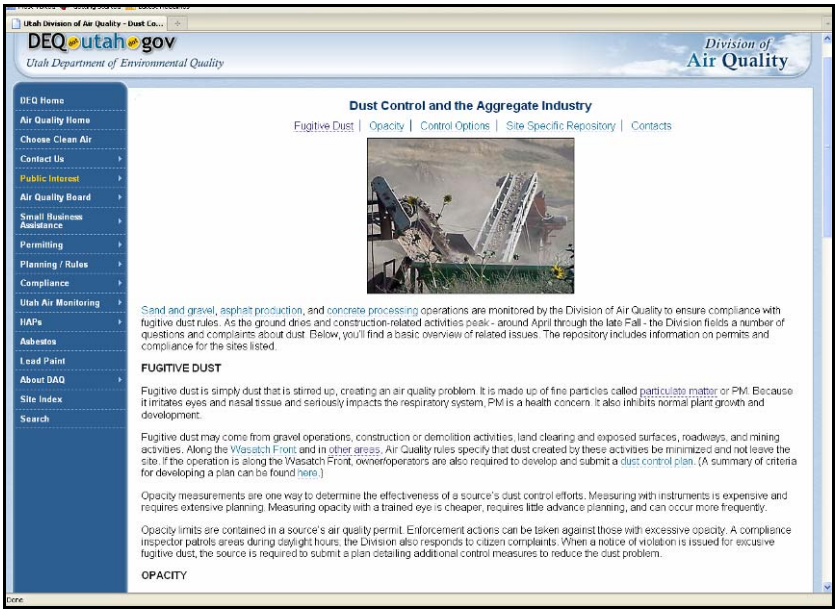
Choose Clean Air

An interactive source of information about ways individuals can help improve air quality by making smart choices in their personal lives can be found on the DEQ website. The site includes 50 suggestions for daily life.

The UDEQ also offers an electronic mail server (Listserv). Subscribers are automatically notified by e-mail when unhealthy air pollution levels are forecast for the Wasatch Front.

Dust Control Education

The DEQ website includes a page on dust control and the aggregate industry. The page is intended to educate the public about dust, control methods and community aggregate locations near them by providing links to aggregate firms Approval Orders containing fugitive dust control conditions.



Clean Utah

DEQ is committed to working with businesses to ensure the ongoing protection of public health and the environment. Clean Utah is a program that encourages and rewards business and other permit holders for going beyond compliance to preserve and protect Utah's environment.

Small Business Environmental Assistance Program

The Small Business Environmental Assistance Program helps small businesses with permitting assistance, emission calculations, technical issues, regulatory interpretation, and pollution prevention techniques. For example, this program provides businesses with tools to understand and meet Utah's environmental requirements. For example, see the best management practices pamphlet below.


1 Preservation of Existing Vegetation
• Minimize clearing and the amount of exposed soil.
• Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
• Protect streams, stream barriers, wild wood lands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.
2 Construction Phasing
• Sequence construction activities so that the soil is not exposed for long periods of time.
• Schedule or limit grading to small areas.
• Install key sediment control practices before site grading begins.
• Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.
3 Construction Entrances
• Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
• Make sure that the construction entrance does not become buried in soil.
• Properly site entrance BMPs for all anticipated vehicles.
4 Silt Fencing
• Inspect and maintain silt fences after each storm.
• Make sure the bottom of the silt fence is buried.
• Securely attach the material to the stakes.
• Don't place silt fences in the middle of a waterway or use them as a check dam.
• Stormwater should not flow around the silt fence.
TOP TEN BMPs
for Pollution Prevention at the Construction Site
For More Information on Pollution Prevention and Construction BMPs contact:
Utah Department of Environmental Quality
www.deq.utah.gov/construction
Environmental Hotline: 1-800-458-0145
5 Storm Drain Inlet Protection
• Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
• Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
• If you use inlet filters, maintain them regularly.
6 Vegetative Buffers
• Protect and install vegetative buffers along waterbodies to slow and filter stormwater run-off.
• Maintain buffers by mowing or replanting periodically to ensure their effectiveness.
7 Site Stabilization
• Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.
8 Equipment Fueling and Containment
• Use offsite fueling stations as much as possible, or dedicated fueling areas onsite.
• Discourage "topping-off" of fuel tanks.
• Dedicated fueling areas should be level, protected from stormwater, and located at least 50 ft from downstream drainage facilities and watercourses.
• Protect fueling areas with berms and dikes to prevent run-on, run-off, and to contain spills.
• Use vapor recovery nozzles with automatic shutoffs to control drips as well as air pollution.
9 Waste Management
• Choose smaller containers and more frequent collection. Do not allow waste to accumulate on-site.
• Separate recyclable materials from waste.
• Conduct visual inspections of dumpsters and recycling bins and remove contaminants.
• Stockpile processed materials on-site separately. Place, grade, and shape stockpiles to drain surfacewater. Cover to prevent windblown dust.
10 Fugitive Dust Suppression
• Apply water on haul roads.
• Haul materials in properly tarped or sealed containers.
• Restrict vehicle speeds to 10 mph.
• Cover excavated areas and material after excavation activity ceases.
• Reduce the excavation size and/or number of excavations.
• Water-down equipment and excavation faces.

Resource Development Coordinating Committee (RDCC)

The RDCC is a clearinghouse for information and coordination of state response on activities affecting state and public lands (including federal lands) throughout Utah. The RDCC includes representatives from the state agencies that are involved or impacted by public lands management. The RDCC coordinates the review of technical and policy actions that may affect the physical resources of the state and facilitates the exchange of information on those actions among federal, state, and local government agencies. The types of projects that are submitted for RDCC approval include oil and gas drilling and exploration, stream alteration, natural gas pipelines, transportation and construction projects of all sorts, forest fuel management, potable water management projects and recreational project development. The DEQ is a permanent agency member of the RDCC and as such, RDCC project approvals must include DEQ concurrence. Since the vast majority of the projects submitted for RDCC approval are of substantial size and scope, most projects include soil disturbance with the potential to generate fugitive dust. The DEQ assures that all projects receiving RDCC approval with the potential to generate fugitive dust include conditions that the projects will meet Utah air quality regulations and include fugitive dust management plans.

DEQ RDCC Project Reviews

Year	Projects Reviewed
2004	533
2005	1236
2006	1245
2007	1256
2008	1251
2009	810
Total	**6331+**

Division of Water Quality

The Utah Division of Water Quality is responsible for a variety of programs that monitor, assess, and protect the surface and ground waters of the state. These programs overlap with the DEQ, to some degree, in regard to soil and sediment nonpoint sources pollution prevention.

UPDES Storm Water General Permit for Construction Activities

Utah R317-8-3.9(6)(d)(l0) and R317-8-3.9(6)(e)(l), require a UPDES storm water permit when construction activities disturb one or more acres of land. Permit requirements include the development and approval of a pollution prevention plan (PPP) to control and mitigate erosion and sediment migration. The PPP must include slope and wind erosion controls for material piles at construction sites.

Nonpoint Source Pollution 319 Program

Section 319 of the Clean Water Act deals with nonpoint sources (NPS) of pollution. Land use activities such as agricultural production, road and building construction, mining, and forestry operations can all potentially be NPS polluters. The 1987 reauthorization of the Clean Water Act authorized the U.S. Environmental Protection Agency to fund individual state programs designed to control and eliminate NPS problems. Utah's Nonpoint Source Task Force has spent the past decade or more setting up local areas of the state to take on demonstration projects in specific watershed areas. Some of the largest watershed efforts have taken place in the Little Bear River in Cache County, Chalk Creek in Summit County, and Otter Creek in Piute and Sevier counties.

Agriculture

Recognizing the problems associated with soil erosion on agricultural cropland, rangeland and other environmentally sensitive cropland areas, the U.S. Department of Agriculture (USDA) included conservation provisions in the Farm Security and Rural Investment Act of 2002 (Farm Bill). The conservation provisions of the legislation are designed to assist farmers and ranchers with a number of voluntary programs including cost-share, land rental, incentive payments, and technical assistance. The conservation programs of the Farm Bill are administered by the NRCS.

The Farm Bill legislation created and reauthorized three programs that are designed to reduce erodible land:

- Conservation Reserve Program (CRP)
- Conservation Survey Program (CSP)
- Environmental Quality Incentives Program (EQIP)

The Conservation Reserve Program (CRP) encourages farmers to enter into contracts with USDA to place erodible cropland and other environmentally sensitive land into long-term conservation reserve. The reserves are generally 10 to 15 years in duration and the reserve is established by the implementation of environmental practices to reduce soil erosion.

The CRP systematically reduces soil erosion by planting vegetative cover on highly erodible lands (HEL). In Utah, HEL soils are normally on steeper valley side slopes subject to erosion from washing or open areas vulnerable to high wind events. In exchange, landowners receive annual rental payments for the land and cost-sharing assistance for the established practices. In the early years of the program, the emphasis was on HEL soils. Since 1996, there is an additional authorization to address wild life habitat and air quality. The more recent authorization includes additional conservation practices including windbreaks, riparian buffers and wetland mitigation which are instrumental in reducing soil erosion. Furthermore, the USDA and DEQ conducted an analysis of eligible parcels for the 2010 awards to preferentially select parcels that are in or adjacent to nonattainment areas in order to maximize program benefits. **There are 127,262 acres in this program in Utah**.

The Conservation Security Program (CSP) is a newer approach to agricultural land protection authorized under the 2002 Farm Bill that rewards agricultural producers who have already undertaken conservation practices and commit to additional efforts. The CSP program, unlike other conservation programs, is available on pastureland, rangelands and all types of cropland including orchards, vegetable, and dry agriculture prevalent in Utah. The program has designated three watershed areas as eligible to participate in the program including two, Lower Bear-Malad (Cache County) and San Pitch Watershed (Sanpete County) that are within the north and south high-wind corridors identified by DAQ' source attribution model. **There are 232,847 acres in the CSP program in Utah.**

The Environmental Quality Incentives Program (EQIP) is a voluntary program that assists farmers and ranchers, who face existing soil and water resource degradation. The EQIP promotes agricultural production in a manner that allows producers to meet federal, state and local environmental requirements. Some of the stated aims of the program are as follows:

- Reduction of non-point source pollution, such as nutrients, pesticides;
- Reduction of emissions including particulate matter, nitrogen oxides, ozone precursors, and volatile organic compounds that can contribute to degradation air quality standards; and
- Reduction in soil erosion and sedimentation on agricultural lands.

In general, NRCS programs encourage agricultural practices that improve topsoil and prevent wind blown dust during high-wind events. Notable examples of techniques and practices advocated include:

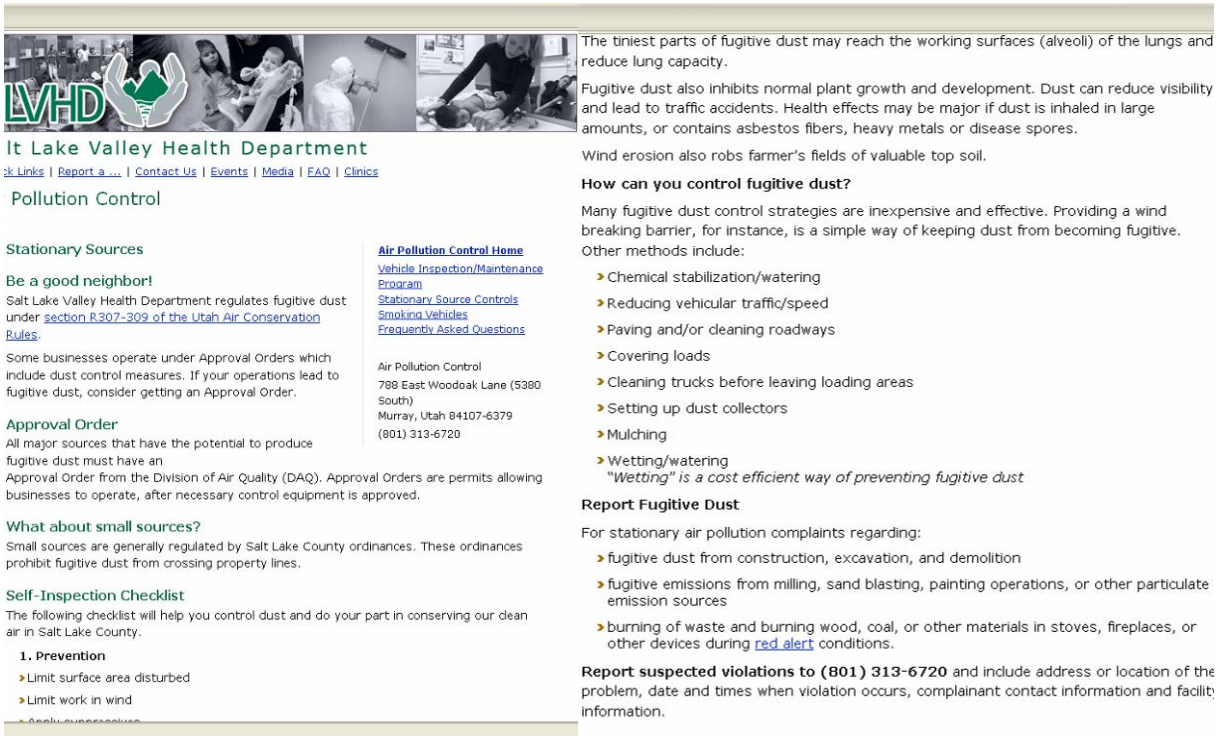
- Planting of cover crops and perennials to protect agricultural soils with emphasis on HEL soils;
- NRCS encourages the use of perennial crops and existing weeds on corners and non-utilized areas of agricultural land to resist soil erosion;
- NRCS "costs shares" on conservation practices with local farmers to prevent soil erosion; and
- NRCS works with Utah State University to identify agricultural techniques and practices to minimize soil erosion.

A primary aim of this process is to reduce soil erosion on agricultural land, which in turn reduces wind blown dust during high-wind events. This program is open to attainment and nonattainment areas in Utah. **There are 1,133,687 acres in this program in Utah.**

Representative County Dust Control Programs

Salt Lake County

Salt Lake Valley Health Department regulates fugitive dust under section R307-309 of the Utah Air Conservation Rules. The County enforces fugitive dust from construction, aggregate industries, sand blasting, painting and burning. The web site includes information on reporting violations. County inspectors actively inspect dust prone activities.



lt Lake Valley Health Department

k Links | Report a ... | Contact Us | Events | Media | FAQ | Clinics

Pollution Control

Stationary Sources

Be a good neighbor!

Salt Lake Valley Health Department regulates fugitive dust under section R307-309 of the Utah Air Conservation Rules.

Some businesses operate under Approval Orders which include dust control measures. If your operations lead to fugitive dust, consider getting an Approval Order.

Approval Order

All major sources that have the potential to produce fugitive dust must have an Approval Order from the Division of Air Quality (DAQ). Approval Orders are permits allowing businesses to operate, after necessary control equipment is approved.

What about small sources?

Small sources are generally regulated by Salt Lake County ordinances. These ordinances prohibit fugitive dust from crossing property lines.

Self-Inspection Checklist

The following checklist will help you control dust and do your part in conserving our clean air in Salt Lake County.

1. Prevention
   - Limit surface area disturbed
   - Limit work in wind

Air Pollution Control Home
Vehicle Inspection/Maintenance Program
Stationary Source Controls
Smoking Vehicles
Frequently Asked Questions

Air Pollution Control
788 East Woodoak Lane (5380 South)
Murray, Utah 84107-6379
(801) 313-6720

The tiniest parts of fugitive dust may reach the working surfaces (alveoli) of the lungs and reduce lung capacity.

Fugitive dust also inhibits normal plant growth and development. Dust can reduce visibility and lead to traffic accidents. Health effects may be major if dust is inhaled in large amounts, or contains asbestos fibers, heavy metals or disease spores.

Wind erosion also robs farmer's fields of valuable top soil.

How can you control fugitive dust?

Many fugitive dust control strategies are inexpensive and effective. Providing a wind breaking barrier, for instance, is a simple way of keeping dust from becoming fugitive. Other methods include:

- Chemical stabilization/watering
- Reducing vehicular traffic/speed
- Paving and/or cleaning roadways
- Covering loads
- Cleaning trucks before leaving loading areas
- Setting up dust collectors
- Mulching
- Wetting/watering
  "Wetting" is a cost efficient way of preventing fugitive dust

Report Fugitive Dust

For stationary air pollution complaints regarding:

- fugitive dust from construction, excavation, and demolition
- fugitive emissions from milling, sand blasting, painting operations, or other particulate emission sources
- burning of waste and burning wood, coal, or other materials in stoves, fireplaces, or other devices during red alert conditions.

Report suspected violations to (801) 313-6720 and include address or location of the problem, date and times when violation occurs, complainant contact information and facility information.

Davis County

Davis, like Salt Lake County, enforces fugitive dust through Utah R307-309 and also maintains a fugitive dust web page and violation reporting. Inspectors have been known to park themselves all day long on Beck Street to enforce compliance. Beck Street contains refineries and very large aggregate industries that are a source of fugitive dust.

The following is taken from the Davis County 2009 Annual Report:

"The Staff of the Air Quality Bureau is composed of both Environmental Health Scientists and employees of the Inspection/Maintenance program. Some of the activities in this bureau are to investigate any air related discharge from fuel and other volatile organic compounds (VOC) such as spills and fuel transfer operations. To investigate smoke of any kind, including open burning, point or stack emissions and mobile source violations."

Selected Statistics Taken From Annual Report

Air Quality	2009	2008	2007
Environmental Investigations in Air Quality	70	441	64
Open Burning Activities	28	18	21
Air Quality Complaints	31	10	70
Air Quality Consultations with the Public	297	156	422

Weber County

Weber County has its own Excavation Ordinance for construction that includes dust control. Application must be made and approved before construction. An application fee includes the cost for reviewing engineering plans and site inspection.

Cache County

Cache County maintains zoning ordnances that include dust controls.

Utah Air Quality Public Notifications

In order to improve the presentation of air quality information to the public, DAQ has improved our air quality forecasting webpage. The web page now shows the air quality forecast for today and the next two days. The Air Monitoring Center (AMC) provides air pollution information based on daily air quality status. The AMC data is used to determine the relationship of existing pollutant concentrations to the National Ambient Air Quality Standards. There is a three tiered air quality alert system: Green, Yellow (alert days), and Red (actions days) that is used to implement winter and summer **controls on the use of wood and coal burning stoves, fire places**, and motor vehicles. There are five health advisory categories: good, moderate, unhealthy advisories A and B, and very unhealthy. The AMC advisory is calculated for five major pollutants including ground-level ozone, particulate pollution (particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The new index now also incorporates recommendations for actions to take on days when concentrations are in the red zone, to mitigate the effects of pollution for affected groups and recommendations for industry and citizens that help reduce pollution levels. The outreach program information consolidated in the three day forecast includes the Summer and Winter Control Programs and Choose Clean Air information.

The web site includes additional information on wind blown dust.

News Release to Media

In additional to web site alerts, DEQ also notifies the media in order to maximize public distribution.

Air Monitoring Manager, Robert Dalley, notified DEQ staff via e-mail of RED alert day.

From: Robert Dalley
To: EQ ALL DEPT
Date: 4/15/2008 8:11 AM
Subject: Air Quality RED Alert blowing dust

The Utah Department of Environmental Quality has issued a RED air quality ALERT today April 15, 2008 because of blowing dust in Davis, Salt Lake, Utah and Weber Counties. A Health Advisory is issued for sensitive people, those with respiratory disease or heart disease, the elderly and children should avoid prolonged or heavy exertion outdoors and avoid dusty situations. Conditions will improve late tonight and tomorrow.

A similar notice was sent to the media by Mr. Dalley as indicated below from the Salt Lake Tribune.

Utah posts rare spring air alert because of blowing dust
The Salt Lake Tribune
Article Last Updated: 04/15/2008 09:38:47 AM MDT

Updated: 9:37 AM- Blowing dust this morning has prompted the Utah Department of Environmental Quality to issue a red air quality alert in Davis, Salt Lake, Weber and Utah counties.
A Health Advisory is issued for sensitive people, those with respiratory disease or heart disease, the elderly and children should avoid prolonged or heavy exertion outdoors and avoid dusty situations.
DEQ officials say conditions will improve late tonight and tomorrow.

Public Comment (Preamble V.G.)

The DEQ established a 30-day comment period from June 1, 2010 through June 30, 2010. The announcement of the comment period was published eight times in the Salt Lake Tribune between May 17 and June 1, 2010. The proof of publication can be found in Appendix C.

Response to Comments

Commenter 1
The commenter mistakenly believed that the mitigation portion of the report dealing with agricultural land preservation was supporting exceptional event waiver for livestock grazing. Since this is not the case, no response is necessary.

Commenter 2
This commenter offered complementary comments and suggestions. The responses to the suggestions follow:

> **Comment:** "It would be helpful if a way could be found to bifurcate the PM10 & 2.5 SIP processes into the separate problems of wintertime inversions & high wind/fireworks/fire events. The solutions to the causes of these various exceedances are very different, and present difficulties in completing work on the wintertime cool pool events, when staff time is necessary to address other exceedances.
>
> Such a bifurcation would require some creativity as the problems are linked by exceedances of the same NAAQS, while the cause & solutions of the problems are different.
>
> **Response:** This comment is directed at SIP issues which are being addressed by DEQ in the SIP design process.
>
> **Comment: "**Control Measures Demonstration Case Study - Kennecott Mine Tailing Impoundments This demonstration clearly shows that attention to disturbed areas results in a reduction of fugitive dust despite high wind events. Continued attention to methods of reducing & mitigating disturbance across the state would reduce the impact of high winds. "
>
> **Response:** DEQ appreciates the comment and will continue to enforce the fugitive dust rules requiring the development and implementation of dust control plans that define control mitigation methods.

Comment: This section would be much improved with a discussion of Utah County's dust control program. It is the only county covered by this Exceptional Event demonstration that is not discussed in this section.

Response: DEQ handles fugitive dust issues in Utah County.

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Appendix A

Hourly data from real time monitors during the event

		PM10							PM2.5							
		Ogden - Hr	N. Salt Lak	Hawthorne	Lindon - Hr	N. Provo -	24 Hr Std	Filter Switch	Logan - Hrl	Ogden - Hr	Hawthorne	Tooele - Hr	Lindon - Hr	N. Provo -	24 Hr Std	Filter Switch
4/13/08 0:00	0:00	37	40	28	23	29	150		0:00	12.3	20.5	13.3	6.4	16.9	12.54	35	
4/13/08 1:00	1:00	31	30	21	28	26	150		1:00	17.6	18.9	12.8	6.1	23.9	10.36	35	
4/13/08 2:00	2:00	31	20	17	24	14	150		2:00	20	19.3	11.7	6.5	27.3	8.35	35	
4/13/08 3:00	3:00	29	34	19	21	16	150		3:00	16.2	16.4	11.2	7.1	24.6	10.39	35	
4/13/08 4:00	4:00	20	21	20	28	13	150		4:00	18.3	16.6	12.1	7.1	17.5	9.48	35	
4/13/08 5:00	5:00	20	15	19	13	18	150		5:00	19.9	14.6	9.6	7	19	11.19	35	
4/13/08 6:00	6:00	28	12	24	29	19	150		6:00	21.5	13.5	9.2	7.8	16.1	10.34	35	
4/13/08 7:00	7:00	28	23	29	24	16	150		7:00	21.8	16	11.2	8.5	14.8	11.95	35	
4/13/08 8:00	8:00	19	16	23	16	0	150		8:00	18.7	17	12.8	7.6	16.4	13.32	35	
4/13/08 9:00	9:00	17	22	17	8	8	150		9:00	18.3	15.2	13.9	8.7	14	12.01	35	
4/13/08 10:00	10:00	10	10	8	21	37	150		10:00	19.3	16.4	12.9	9.2	12.5	10.53	35	
4/13/08 11:00	11:00	8	8	5	15	11	150		11:00	13.6	12.9	8.6	9.2	17.4	10.35	35	
4/13/08 12:00	12:00	9	13	8	8	13	150		12:00	10.2	11	7.3	9.5	5.8	14.47	35	
4/13/08 13:00	13:00	13	12	5	4	13	150		13:00	12.7	11.8	7.3	12.1	17.1	8.68	35	
4/13/08 14:00	14:00	13	15	6	2	9	150		14:00	12.4	15.4	6.6	10	16.2	5.96	35	
4/13/08 15:00	15:00	22	14	6	4	7	150		15:00	11.7	17.9	8.1	9.3	9.7	5.4	35	
4/13/08 16:00	16:00	17	14	13	3	4	150		16:00	10.1	18.7	5.8	13.5	11.9	4.89	35	
4/13/08 17:00	17:00	11	16	18	4	9	150		17:00	9.2	16.9	12.7	13.7	5.2	6.73	35	
4/13/08 18:00	18:00	10	16	12	5	6	150		18:00	8.2	14.4	16.3	15.3	6	5.93	35	
4/13/08 19:00	19:00	25	29	16	12	13	150		19:00	8.3	15.6	14.3	17.4	11.3	6.47	35	
4/13/08 20:00	20:00	44	30	11	15	14	150		20:00	8.7	22.6	10.6	15.7	11.9	4.07	35	
4/13/08 21:00	21:00	31	10	15	5	24	150		21:00	9.4	20.1	10.1	13.6	10.9	4.67	35	
4/13/08 22:00	22:00	28	17	19	12	11	150		22:00	9.5	15.5	10.9	9.2	7.3	5.61	35	
4/13/08 23:00	23:00	19	17	17	18	14	150	900	23:00	9.7	12.4	11.7	8.4	10.3	5.54	35	150
4/14/08 0:00	0:00	15	8	14	8	35	150		0:00	10.1	10.9	9.4	7	10.8	8.28	35	
4/14/08 1:00	1:00	13	33	14	5	47	150		1:00	10	10.3	8.2	5.4	8.4	12.73	35	
4/14/08 2:00	2:00	14	23	11	11	28	150		2:00	10.9	8.6	9.5	6.3	7	8.84	35	
4/14/08 3:00	3:00	14	21	17	10	10	150		3:00	11.1	7.8	6.7	5.9	10	4.77	35	
4/14/08 4:00	4:00	25	15	14	8	26	150		4:00	11.9	7.7	6.1	5.4	7.8	6.29	35	
4/14/08 5:00	5:00	40	19	19	18	16	150		5:00	13.3	10.2	7.1	9.3	10.1	8.65	35	
4/14/08 6:00	6:00	66	25	30	14	26	150		6:00	13.3	10.8	7.3	9.5	7.6	6.77	35	
4/14/08 7:00	7:00	72	44	38	24	20	150		7:00	17	15.6	7.1	9.1	12.2	7.76	35	
4/14/08 8:00	8:00	39	47	32	38	10	150		8:00	18.1	12.9	9.2	7.1	17.3	9.55	35	
4/14/08 9:00	9:00	17	40	29	35	5	150		9:00	13.9	11.6	9.2	4.8	18.9	10.04	35	
4/14/08 10:00	10:00	20	96	31	17	22	150		10:00	12.5	9.9	9.1	6	22.8	5.88	35	
4/14/08 11:00	11:00	26	52	17	6	17	150		11:00	10.4	10.1	9	4.3	11.5	5.08	35	
4/14/08 12:00	12:00	46	52	36	4	16	150		12:00	6.2	10.3	19.4	8	10.8	8.66	35	
4/14/08 13:00	13:00	16	47	31	3	13	150		13:00	9.4	11.7	8.4	8.5	7.2	4.7	35	
4/14/08 14:00	14:00	10	44	19	5	13	150		14:00	10.6	8.8	6.7	9.2	9.3	2.91	35	
4/14/08 15:00	15:00	8	70	43	47	16	150		15:00	5.6	4.4	8	7.7	12.9	7.64	35	
4/14/08 16:00	16:00	14	76	65	93	105	150		16:00	4.8	5	15.4	7.3	23.2	19.22	35	
4/14/08 17:00	17:00	21	88	87	179	206	150		17:00	6.5	8.8	21.3	10.3	31.5	36.33	35	
4/14/08 18:00	18:00	25	238	129	149	351	150		18:00	7.2	8.3	31.4	10.8	45.5	58.7	35	
4/14/08 19:00	19:00	81	229	100	117	358	150		19:00	7.1	13.3	34.4	16.6	43.5	64.17	35	
4/14/08 20:00	20:00	99	127	56	114	300	150		20:00	12.2	31.8	24.1	26.2	46.6	59.89	35	
4/14/08 21:00	21:00	59	128	58	70	165	150		21:00	24.4	27.6	18	18	37.9	32.13	35	
4/14/08 22:00	22:00	55	140	53	57	120	150		22:00	20.8	18.8	21.8	13.4	23.5	21.09	35	
4/14/08 23:00	23:00	49	151	95	22	55	150	900	23:00	14.3	19.6	18.5	20.1	16.6	10.92	35	150
4/15/08 0:00	0:00	81	147	59	7	22	150		0:00	13.3	19.6	15.7	9.9	5.7	3.74	35	
4/15/08 1:00	1:00	62	183	95	16	13	150		1:00	16.8	19	18	8.3	6.8	4.67	35	
4/15/08 2:00	2:00	146	322	130	31	24	150		2:00	17.9	22.6	30.7	25.8	9.2	4.62	35	
4/15/08 3:00	3:00	234	821	402	32	31	150		3:00	29.7	46.1	62.5	44.8	11.9	4.53	35	
4/15/08 4:00	4:00	474	644	472	71	25	150		4:00	33.2	86	145.9	23.8	13.2	3.82	35	

4/15/08 5:00	5:00	209	578	429	299	64	150		5:00	22.2	51.4	95	25.2	38.2	11.97	35		
4/15/08 6:00	6:00	173	285	300	385	123	150		6:00	17	20.5	61.6	39	74.4	16.74	35		
4/15/08 7:00	7:00	148	214	211	366	291	150		7:00	17.1	21.3	35.8	37.7	74	40.58	35		
4/15/08 8:00	8:00	132	143	180	289	280	150		8:00	13.8	20.4	29	36.1	62.6	54.32	35		
4/15/08 9:00	9:00	135	194	165	261	236	150		9:00	15.4	19.4	28.8	33.4	54.6	46.43	35		
4/15/08 10:00	10:00	101	278	127	222	226	150		10:00	12.4	16.7	27	26.2	44.1	42.06	35		
4/15/08 11:00	11:00	138	405	143	188	212	150		11:00	10.5	12.5	25.7	19	36.6	42.44	35		
4/15/08 12:00	12:00	25	456	113	214	176	150		12:00	8.2	12.3	17.4	16.9	26.5	29.79	35		
4/15/08 13:00	13:00	47	47	41	393	231	150		13:00	3.6	12.1	7.9	14.8	21.9	25	35		
4/15/08 14:00	14:00	17	19	30	151	137	150		14:00	1.1	10.7	6.3	11.8	12.3	15.57	35		
4/15/08 15:00	15:00	16	12	39	28	43	150		15:00	4.8	7.4	4.6	9	5.4	11.49	35		
4/15/08 16:00	16:00	21	29	34	51	19	150		16:00	9.6	7.3	2.2	24.7	0	3.09	35		
4/15/08 17:00	17:00	26	23	75	83	34	150		17:00	11.4	7.7	10.9	31.8	12	12.18	35		
4/15/08 18:00	18:00	28	12	17	111	78	150		18:00	12.3	6.6	9.7	25.1	20.7	17.59	35		
4/15/08 19:00	19:00	41	11	62	126	86	150		19:00	13.4	8.9	8	19.2	21.7	18.55	35		
4/15/08 20:00	20:00	36	16	48	109	96	150		20:00	7	8.7	10.7	17.9	18.6	21.4	35		
4/15/08 21:00	21:00	30	17	50	80	95	150		21:00	5.7	8.9	9.4	17.1	18.5	20.41	35		
4/15/08 22:00	22:00	7	14	16	84	84	150		22:00	4.6	8.3	4	22.6	14.7	17.65	35		
4/15/08 23:00	23:00	11	18	22	41	48	150	900	23:00	4.7	7.8	3.2	14.9	8.1	8.96	35	150	
4/16/08 0:00	0:00	19	19	29	41	33	150		0:00	8.5	8.4	5.4	11.1	9.6	7.37	35		
4/16/08 1:00	1:00	8	4	17	32	27	150		1:00	9.8	8.1	8.6	9.3	7.9	5.75	35		
4/16/08 2:00	2:00	19	19	13	12	13	150		2:00	8.3	8	6.6	8.4	6.6	3.79	35		
4/16/08 3:00	3:00	18	38	6	5	21	150		3:00	7.8	8.8	6.1	7	4.6	6.94	35		
4/16/08 4:00	4:00	21	9	10	7	19	150		4:00	10.1	9	5.2	10	4.1	5.59	35		
4/16/08 5:00	5:00	25	31	8	4	11	150		5:00	7.7	10.1	6.2	11.9	4.7	4.58	35		
4/16/08 6:00	6:00	34	45	13	16	8	150		6:00	10.7	10.1	5.9	9.2	6.9	5.79	35		
4/16/08 7:00	7:00	18	25	27	38	6	150		7:00	10.9	12.7	5.8	9.4	16.4	6.99	35		
4/16/08 8:00	8:00	17	24	23	26	26	150		8:00	10.9	9.6	9.8	9	28.6	15.27	35		
4/16/08 9:00	9:00	10	35	10	15	23	150		9:00	9.9	7	6.5	9.3	16.7	11.04	35		
4/16/08 10:00	10:00	11	24	10	17	21	150		10:00	8.4	6.8	2.5	9.3	18.1	13.79	35		
4/16/08 11:00	11:00	9	14		15	27	150		11:00	9	7.3	2.8	7.3	9.5	10.68	35		
4/16/08 12:00	12:00	10	21		24	18	150		12:00	6.3	9.4	1.8	5.7	9.9	10.44	35		
4/16/08 13:00	13:00	17	50	48	40	41	150		13:00	3.2	9	3.6	5.6	11	4.97	35		
4/16/08 14:00	14:00	14	43	39	32	27	150		14:00	3.8	9.7	3.9	4.8	8.4	3.16	35		
4/16/08 15:00	15:00	23	47	45	10	27	150		15:00	10.2	6.7	7.4	6.7	8.3	7.29	35		
4/16/08 16:00	16:00	9	30	35	6	27	150		16:00	10.5	7	6.6	7	8.5	3.87	35		
4/16/08 17:00	17:00	10	5	51	25	18	150		17:00	8.5	6.3	7.5	5.3	10.8	5.53	35		
4/16/08 18:00	18:00	12	17	17	17	6	150		18:00	9.3	5.8	6	7	10.3	6.39	35		
4/16/08 19:00	19:00	12	20	19	15	0	150		19:00	9.5	6.3	5.3	7.3	11.4	5.48	35		
4/16/08 20:00	20:00	5	14	25	5	7	150		20:00	9	7.7	5.8	7	9	4.39	35		
4/16/08 21:00	21:00	28	24	14	8	20	150		21:00	9.8	5	6.5	6.7	10.5	6.34	35		
4/16/08 22:00	22:00	34	34	13	7	19	150		22:00	11	9.9	6	7.7	8.7	6.94	35		
4/16/08 23:00	23:00	23	28	12	5	15	150	900	23:00	8.8	12.4	5	9.2	8.7	6.34	35	150	
4/17/08 0:00	0:00	18	31	20	3	16	150		0:00	7.2	10.5	4	7.2	8.3	5.18	35		
4/17/08 1:00	1:00	17	35	14	4	13	150		1:00	6.7	10.7	5.1	5.4	9.6	5.73	35		
4/17/08 2:00	2:00	18	38	6	5	13	150		2:00	6.6	10.2	4.3	7	7.5	5.82	35		
4/17/08 3:00	3:00	14	25	10	5	10	150		3:00	8	9.8	4.4	7.1	7.8	4.6	35		
4/17/08 4:00	4:00	18	25	51	6	10	150		4:00	8.8	7.9	6	7.4	5.8	5.36	35		
4/17/08 5:00	5:00	24	38	53	8	5	150		5:00	9.9	9.1	8.9	8.2	6.1	6.84	35		
4/17/08 6:00	6:00	44	17	35	16	9	150		6:00	13.3	11.8	9.4	9.5	7.5	6.5	35		
4/17/08 7:00	7:00	41	24	27	18	11	150		7:00	12.4	15.7	8.1	7.7	9.3	7.2	35		
4/17/08 8:00	8:00	17	29	26		24	150		8:00	13.7	12.4	8	10.7	12	9.53	35		
4/17/08 9:00	9:00	20	105	21	16	19	150		9:00	10.2	10.3	8.2	12.4	16.2	10.96	35		
4/17/08 10:00	10:00	20	32	19	6	17	150		10:00	10.2	14.8	9.2	56.1	9.3	7.55	35		
4/17/08 11:00	11:00	19	22	20	13	14	150		11:00	6.4	17.6	13.5	30.8	7.8	6.27	35		

4/17/08 12:00	12:00	16	19	15	16	12	150		12:00	5.6	18.1	14.1	13.2	13.7	4.78	35	
4/17/08 13:00	13:00	11	26	16	13	14	150		13:00	8.2	16.7	16.7	14.1	11.6	5.67	35	
4/17/08 14:00	14:00	14	14	10	17	19	150		14:00	10.8	16	17.5	12.2	17.5	9.68	35	
4/17/08 15:00	15:00	6	15	7	24	16	150		15:00	10.7	18.1	13.2	9.4	17	11.8	35	
4/17/08 16:00	16:00	11	31	9	18	24	150		16:00	9.5	13.7	7.9	8.8	19.8	15.03	35	
4/17/08 17:00	17:00	8	9	10	13	27	150		17:00	11.8	12.3	6.7	8.9	19.3	15.44	35	
4/17/08 18:00	18:00	11	8	10	14	32	150		18:00	17.1	14.2	9.5	10.8	13.3	18.16	35	
4/17/08 19:00	19:00	11	49	18	26	28	150		19:00	22.7	12.7	9.7	10.2	11.8	16.75	35	
4/17/08 20:00	20:00	14	64	18	30	25	150		20:00	22.7	11.9	9.9	12.6	16.6	14.97	35	
4/17/08 21:00	21:00	26	79	51	20	34	150		21:00	19.3	14	11.7	11.6	17.9	18.99	35	
4/17/08 22:00	22:00	28	13	34	17	42	150		22:00	16	17.5	12.8	10.6	17.7	23.59	35	
4/17/08 23:00	23:00	44	19	36	22	26	150	900	23:00	19.7	15.3	8.7	8.8	12.8	11.58	35	150
4/18/08 0:00	0:00	54	30	49	21	20	150		0:00	19.1	12.4	12.1	9.2	14.7	9.51	35	

h

Appendix B

PM2.5 Speciation filter data for Lindon on April 15, 2008

STATE OF UTAH DEQ

CLIENT # U005
REPORT # 09-089

SUBMITTED BY:
CHESTER LabNet
12242 S.W. GARDEN PLACE
TIGARD, OR 97223
(503)624-2183/FAX (503)624-2653
www.ChesterLab.Net

CHESTER LabNet

12242 SW Garden Place ❖ Tigard, OR 97223-8246 ❖ USA
Telephone 503-624-2183 ❖ Fax 503-624-2653 ❖ www.chesterlab.net

Case Narrative

Date: April 16, 2009

General Information

Client:	State of Utah DEQ
Client Number:	U005
Report Number:	09-089
Sample Description:	47mm Quartz and Teflon filters
Sample Numbers:	09-U253 – 09-U259, 09-X779 – 09-X787

Analysis

Analytes:	XRF Metals (Na - Pb), Cl, Br, NO_3, SO_4, Na, NH_4, K, Organic Carbon, Elemental Carbon
Analytical Protocols:	X-Ray Fluorescence protcol 6, Ion Chromatography, OC/EC by TOT
Analytical Notes:	No problems were encountered during the analyses. The method blanks and laboratory control samples were not from the same lot of filters as the samples since the filters did not originate from Chester LabNet. Results have **not** been blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

Paul Duda 4/16/09

Project Manager Date
Paul Duda

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U253
Client ID: 20080488
Site: Lindon (LN)
Sample Date: 4/15/08
Mass: 3487. +- 40. µg
Volume: 21.20 +- 2.120 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 164.5 +- 16.56 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	91.39 ± 6.854	2.621 ± 0.1989	4.311 ± 0.5389
P	0.0000 ± 3.158	0.0000 ± 0.0906	0.0000 ± 0.1490
S	24.49 ± 2.188	0.7024 ± 0.0633	1.155 ± 0.1549
Cl	41.28 ± 2.989	1.184 ± 0.0868	1.947 ± 0.2404
K	89.58 ± 5.582	2.569 ± 0.1628	4.225 ± 0.4979
Ca	326.0 ± 19.56	9.350 ± 0.5711	15.38 ± 1.793
Ti	9.868 ± 0.6192	0.2830 ± 0.0181	0.4655 ± 0.0550
V	0.0000 ± 0.1188	0.0000 ± 0.0034	0.0000 ± 0.0056
Cr	1.241 ± 0.0996	0.0356 ± 0.0029	0.0585 ± 0.0075
Mn	2.862 ± 0.1848	0.0821 ± 0.0054	0.1350 ± 0.0161
Fe	136.0 ± 10.85	3.899 ± 0.3144	6.413 ± 0.8206
Co	0.0000 ± 0.0744	0.0000 ± 0.0021	0.0000 ± 0.0035
Ni	0.3456 ± 0.0384	0.0099 ± 0.0011	0.0163 ± 0.0024
Cu	0.6900 ± 0.1152	0.0198 ± 0.0033	0.0325 ± 0.0063
Zn	1.145 ± 0.1380	0.0328 ± 0.0040	0.0540 ± 0.0085
Ga	0.2448 ± 0.0816	0.0070 ± 0.0023	0.0115 ± 0.0040
Ge	0.3120 ± 0.0708	0.0089 ± 0.0020	0.0147 ± 0.0036
As	0.1452 ± 0.0624	0.0042 ± 0.0018	0.0068 ± 0.0030
Se	0.0984 ± 0.0576	0.0028 ± 0.0017	0.0046 ± 0.0028
Br	0.3684 ± 0.0588	0.0106 ± 0.0017	0.0174 ± 0.0033
Rb	0.6912 ± 0.0804	0.0198 ± 0.0023	0.0326 ± 0.0050
Sr	2.746 ± 0.1632	0.0787 ± 0.0048	0.1295 ± 0.0151
Y	0.2256 ± 0.0924	0.0065 ± 0.0027	0.0106 ± 0.0045
Zr	1.908 ± 0.1512	0.0547 ± 0.0044	0.0900 ± 0.0115
Mo	1.196 ± 0.1644	0.0343 ± 0.0047	0.0564 ± 0.0096
Pd	0.1656 ± 0.0936	0.0047 ± 0.0027	0.0078 ± 0.0045
Ag	0.2676 ± 0.0888	0.0077 ± 0.0025	0.0126 ± 0.0044
Cd	0.2772 ± 0.0876	0.0079 ± 0.0025	0.0131 ± 0.0043
In	0.3984 ± 0.0912	0.0114 ± 0.0026	0.0188 ± 0.0047
Sn	0.6480 ± 0.1080	0.0186 ± 0.0031	0.0306 ± 0.0059
Sb	0.1080 ± 0.1296	0.0031 ± 0.0037	0.0051 ± 0.0061
Ba	5.394 ± 0.5952	0.1547 ± 0.0172	0.2544 ± 0.0379
La	3.188 ± 0.6648	0.0914 ± 0.0191	0.1504 ± 0.0348
Hg	0.1476 ± 0.1572	0.0042 ± 0.0045	0.0070 ± 0.0074
Pb	0.4392 ± 0.1584	0.0126 ± 0.0045	0.0207 ± 0.0078
IC			
Cl	50.96 ± 2.548	1.461 ± 0.0174	2.404 ± 0.2688
Br	0.0000 ± 1.000	0.0000 ± 0.0029	0.0000 ± 0.0472
NO3	26.60 ± 1.330	0.7628 ± 0.0094	1.255 ± 0.1403
SO4	90.70 ± 4.535	2.601 ± 0.0305	4.278 ± 0.4783
Na	114.1 ± 5.704	3.272 ± 0.0381	5.381 ± 0.6016
NH4	3.600 ± 0.1800	0.1032 ± 0.0017	0.1698 ± 0.0190
K	7.440 ± 0.3720	0.2134 ± 0.0030	0.3509 ± 0.0392
OC/EC			
OC	278.4 ± 16.32	7.984 ± 0.4769	13.13 ± 1.522
EC	5.004 ± 2.652	0.1435 ± 0.0761	0.2360 ± 0.1273
TC	283.2 ± 17.76	8.122 ± 0.5178	13.36 ± 1.577

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U254
Client ID: 20080492
Site: Lindon (LN)
Sample Date: 4/19/08
Mass: 3717. +- 40. µg
Volume: 20.50 +- 2.050 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 181.3 +- 18.24 $\mu g/m^3$

Analyte	µg/filter	percent	$\mu g/m^3$
XRF			
Al	87.83 ± 6.602	2.363 ± 0.1794	4.284 ± 0.5360
P	0.0000 ± 3.022	0.0000 ± 0.0813	0.0000 ± 0.1474
S	33.84 ± 2.782	0.9104 ± 0.0755	1.651 ± 0.2137
Cl	28.01 ± 2.063	0.7535 ± 0.0561	1.366 ± 0.1697
K	87.80 ± 5.424	2.362 ± 0.1481	4.283 ± 0.5034
Ca	444.6 ± 26.46	11.96 ± 0.7234	21.69 ± 2.524
Ti	9.743 ± 0.6096	0.2621 ± 0.0166	0.4753 ± 0.0561
V	0.1548 ± 0.1236	0.0042 ± 0.0033	0.0076 ± 0.0061
Cr	1.568 ± 0.1176	0.0422 ± 0.0032	0.0765 ± 0.0096
Mn	2.923 ± 0.1884	0.0786 ± 0.0051	0.1426 ± 0.0170
Fe	107.5 ± 5.972	2.892 ± 0.1637	5.244 ± 0.5999
Co	0.0000 ± 0.0744	0.0000 ± 0.0020	0.0000 ± 0.0036
Ni	0.2868 ± 0.0384	0.0077 ± 0.0010	0.0140 ± 0.0023
Cu	0.4704 ± 0.0948	0.0127 ± 0.0026	0.0229 ± 0.0052
Zn	0.7344 ± 0.1044	0.0198 ± 0.0028	0.0358 ± 0.0062
Ga	0.0396 ± 0.0660	0.0011 ± 0.0018	0.0019 ± 0.0032
Ge	0.1992 ± 0.0588	0.0054 ± 0.0016	0.0097 ± 0.0030
As	0.0048 ± 0.0504	0.0001 ± 0.0014	0.0002 ± 0.0025
Se	0.0240 ± 0.0468	0.0006 ± 0.0013	0.0012 ± 0.0023
Br	0.1884 ± 0.0468	0.0051 ± 0.0013	0.0092 ± 0.0025
Rb	0.5676 ± 0.0648	0.0153 ± 0.0018	0.0277 ± 0.0042
Sr	2.670 ± 0.1548	0.0718 ± 0.0042	0.1302 ± 0.0151
Y	0.0036 ± 0.0744	0.0001 ± 0.0020	0.0002 ± 0.0036
Zr	1.033 ± 0.1080	0.0278 ± 0.0029	0.0504 ± 0.0073
Mo	0.9228 ± 0.1320	0.0248 ± 0.0036	0.0450 ± 0.0079
Pd	0.1236 ± 0.0828	0.0033 ± 0.0022	0.0060 ± 0.0041
Ag	0.1536 ± 0.0792	0.0041 ± 0.0021	0.0075 ± 0.0039
Cd	0.1872 ± 0.0780	0.0050 ± 0.0021	0.0091 ± 0.0039
In	0.0336 ± 0.0792	0.0009 ± 0.0021	0.0016 ± 0.0039
Sn	0.4656 ± 0.0948	0.0125 ± 0.0026	0.0227 ± 0.0052
Sb	0.0072 ± 0.1164	0.0002 ± 0.0031	0.0004 ± 0.0057
Ba	2.825 ± 0.4920	0.0760 ± 0.0133	0.1378 ± 0.0277
La	1.766 ± 0.5832	0.0475 ± 0.0157	0.0862 ± 0.0297
Hg	0.0000 ± 0.1296	0.0000 ± 0.0035	0.0000 ± 0.0063
Pb	0.3228 ± 0.1272	0.0087 ± 0.0034	0.0157 ± 0.0064
IC			
Cl	42.24 ± 2.112	1.136 ± 0.0128	2.060 ± 0.2304
Br	0.0000 ± 1.000	0.0000 ± 0.0027	0.0000 ± 0.0488
NO3	28.76 ± 1.438	0.7737 ± 0.0089	1.403 ± 0.1569
SO4	126.9 ± 6.344	3.414 ± 0.0374	6.189 ± 0.6920
Na	136.1 ± 6.806	3.662 ± 0.0400	6.640 ± 0.7424
NH4	7.280 ± 0.3640	0.1959 ± 0.0027	0.3551 ± 0.0397
K	8.400 ± 0.4200	0.2260 ± 0.0030	0.4098 ± 0.0458
OC/EC			
OC	319.2 ± 18.36	8.588 ± 0.5025	15.57 ± 1.796
EC	1.416 ± 2.472	0.0381 ± 0.0665	0.0691 ± 0.1208
TC	320.4 ± 19.68	8.620 ± 0.5375	15.63 ± 1.834

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U255
Client ID: 20080609
Site: Hawthorn (HW)
Sample Date: 4/19/08
Mass: 3960. +- 40. µg
Volume: 20.70 +- 2.070 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 191.3 +- 19.23 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	57.18 ± 4.878	1.444 ± 0.1240	2.762 ± 0.3631
P	0.0000 ± 2.762	0.0000 ± 0.0698	0.0000 ± 0.1334
S	127.3 ± 9.353	3.215 ± 0.2384	6.151 ± 0.7632
Cl	108.7 ± 7.381	2.745 ± 0.1884	5.252 ± 0.6348
K	68.60 ± 4.230	1.732 ± 0.1082	3.314 ± 0.3894
Ca	469.3 ± 27.79	11.85 ± 0.7120	22.67 ± 2.635
Ti	6.448 ± 0.4332	0.1628 ± 0.0111	0.3115 ± 0.0375
V	0.0000 ± 0.1236	0.0000 ± 0.0031	0.0000 ± 0.0060
Cr	1.499 ± 0.1164	0.0378 ± 0.0030	0.0724 ± 0.0092
Mn	1.870 ± 0.1332	0.0472 ± 0.0034	0.0903 ± 0.0111
Fe	80.65 ± 4.475	2.037 ± 0.1149	3.896 ± 0.4456
Co	0.0000 ± 0.0660	0.0000 ± 0.0017	0.0000 ± 0.0032
Ni	0.3156 ± 0.0372	0.0080 ± 0.0009	0.0152 ± 0.0024
Cu	0.8004 ± 0.0528	0.0202 ± 0.0013	0.0387 ± 0.0046
Zn	1.234 ± 0.1344	0.0312 ± 0.0034	0.0596 ± 0.0088
Ga	0.2304 ± 0.0720	0.0058 ± 0.0018	0.0111 ± 0.0037
Ge	0.4032 ± 0.0672	0.0102 ± 0.0017	0.0195 ± 0.0038
As	0.1920 ± 0.0564	0.0048 ± 0.0014	0.0093 ± 0.0029
Se	0.0000 ± 0.0504	0.0000 ± 0.0013	0.0000 ± 0.0024
Br	0.2760 ± 0.0516	0.0070 ± 0.0013	0.0133 ± 0.0028
Rb	0.5112 ± 0.0684	0.0129 ± 0.0017	0.0247 ± 0.0041
Sr	11.11 ± 0.5676	0.2807 ± 0.0146	0.5369 ± 0.0603
Y	0.1248 ± 0.0792	0.0032 ± 0.0020	0.0060 ± 0.0039
Zr	0.9468 ± 0.1164	0.0239 ± 0.0029	0.0457 ± 0.0072
Mo	0.8460 ± 0.1404	0.0214 ± 0.0036	0.0409 ± 0.0079
Pd	0.0948 ± 0.0864	0.0024 ± 0.0022	0.0046 ± 0.0042
Ag	0.1200 ± 0.0816	0.0030 ± 0.0021	0.0058 ± 0.0040
Cd	0.0780 ± 0.0804	0.0020 ± 0.0020	0.0038 ± 0.0039
In	0.1536 ± 0.0828	0.0039 ± 0.0021	0.0074 ± 0.0041
Sn	0.5760 ± 0.1008	0.0145 ± 0.0025	0.0278 ± 0.0056
Sb	0.0936 ± 0.1224	0.0024 ± 0.0031	0.0045 ± 0.0059
Ba	5.735 ± 0.5700	0.1448 ± 0.0145	0.2770 ± 0.0391
La	2.160 ± 0.6084	0.0545 ± 0.0154	0.1043 ± 0.0312
Hg	0.0000 ± 0.1416	0.0000 ± 0.0036	0.0000 ± 0.0068
Pb	0.1704 ± 0.1392	0.0043 ± 0.0035	0.0082 ± 0.0068
IC			
Cl	130.6 ± 6.531	3.298 ± 0.0339	6.310 ± 0.7055
Br	0.0000 ± 1.000	0.0000 ± 0.0025	0.0000 ± 0.0483
NO3	35.82 ± 1.791	0.9045 ± 0.0097	1.730 ± 0.1935
SO4	477.4 ± 23.87	12.06 ± 0.1224	23.06 ± 2.578
Na	331.8 ± 16.59	8.379 ± 0.0853	16.03 ± 1.792
NH4	5.680 ± 0.2840	0.1434 ± 0.0020	0.2744 ± 0.0307
K	10.94 ± 0.5470	0.2763 ± 0.0034	0.5285 ± 0.0591
OC/EC			
OC	337.2 ± 19.32	8.515 ± 0.4954	16.29 ± 1.877
EC	4.392 ± 2.616	0.1109 ± 0.0661	0.2122 ± 0.1281
TC	342.0 ± 20.64	8.636 ± 0.5285	16.52 ± 1.930

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U256
Client ID: 20080727
Site: Lindon (LN)
Sample Date: 5/20/08
Mass: 3584. +- 40. µg
Volume: 20.30 +- 2.030 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 176.6 +- 17.76 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	95.57 ± 7.046	2.667 ± 0.1988	4.708 ± 0.5849
P	0.0000 ± 3.252	0.0000 ± 0.0907	0.0000 ± 0.1602
S	10.32 ± 1.220	0.2879 ± 0.0342	0.5083 ± 0.0787
Cl	8.380 ± 0.8448	0.2338 ± 0.0237	0.4128 ± 0.0586
K	89.76 ± 5.552	2.504 ± 0.1574	4.422 ± 0.5199
Ca	463.1 ± 27.60	12.92 ± 0.7835	22.81 ± 2.656
Ti	9.788 ± 0.6144	0.2731 ± 0.0174	0.4822 ± 0.0569
V	0.1524 ± 0.1236	0.0043 ± 0.0034	0.0075 ± 0.0061
Cr	1.691 ± 0.1236	0.0472 ± 0.0035	0.0833 ± 0.0103
Mn	2.959 ± 0.1908	0.0826 ± 0.0054	0.1458 ± 0.0173
Fe	116.9 ± 9.254	3.260 ± 0.2608	5.756 ± 0.7343
Co	0.0000 ± 0.0744	0.0000 ± 0.0021	0.0000 ± 0.0037
Ni	0.2976 ± 0.0384	0.0083 ± 0.0011	0.0147 ± 0.0024
Cu	0.6720 ± 0.1056	0.0188 ± 0.0030	0.0331 ± 0.0062
Zn	1.848 ± 0.1704	0.0516 ± 0.0048	0.0910 ± 0.0124
Ga	0.1800 ± 0.0720	0.0050 ± 0.0020	0.0089 ± 0.0037
Ge	0.2364 ± 0.0648	0.0066 ± 0.0018	0.0116 ± 0.0034
As	0.2232 ± 0.0564	0.0062 ± 0.0016	0.0110 ± 0.0030
Se	0.0924 ± 0.0516	0.0026 ± 0.0014	0.0046 ± 0.0026
Br	0.2556 ± 0.0516	0.0071 ± 0.0014	0.0126 ± 0.0028
Rb	0.5556 ± 0.0708	0.0155 ± 0.0020	0.0274 ± 0.0044
Sr	2.278 ± 0.1392	0.0635 ± 0.0039	0.1122 ± 0.0131
Y	0.2664 ± 0.0828	0.0074 ± 0.0023	0.0131 ± 0.0043
Zr	1.364 ± 0.1248	0.0381 ± 0.0035	0.0672 ± 0.0091
Mo	1.121 ± 0.1464	0.0313 ± 0.0041	0.0552 ± 0.0091
Pd	0.0372 ± 0.0864	0.0010 ± 0.0024	0.0018 ± 0.0043
Ag	0.0252 ± 0.0816	0.0007 ± 0.0023	0.0012 ± 0.0040
Cd	0.1668 ± 0.0816	0.0047 ± 0.0023	0.0082 ± 0.0041
In	0.2004 ± 0.0840	0.0056 ± 0.0023	0.0099 ± 0.0043
Sn	0.7776 ± 0.1032	0.0217 ± 0.0029	0.0383 ± 0.0064
Sb	0.1608 ± 0.1212	0.0045 ± 0.0034	0.0079 ± 0.0060
Ba	3.445 ± 0.5232	0.0961 ± 0.0146	0.1697 ± 0.0309
La	0.7068 ± 0.6024	0.0197 ± 0.0168	0.0348 ± 0.0299
Hg	0.1116 ± 0.1440	0.0031 ± 0.0040	0.0055 ± 0.0071
Pb	0.0528 ± 0.1404	0.0015 ± 0.0039	0.0026 ± 0.0069
IC			
Cl	14.08 ± 0.7040	0.3929 ± 0.0050	0.6936 ± 0.0775
Br	0.0000 ± 1.000	0.0000 ± 0.0028	0.0000 ± 0.0493
NO3	31.40 ± 1.570	0.8761 ± 0.0104	1.547 ± 0.1729
SO4	40.34 ± 2.017	1.126 ± 0.0132	1.987 ± 0.2222
Na	48.36 ± 2.418	1.349 ± 0.0157	2.382 ± 0.2663
NH4	4.980 ± 0.2490	0.1390 ± 0.0021	0.2453 ± 0.0274
K	8.520 ± 0.4260	0.2377 ± 0.0032	0.4197 ± 0.0469
OC/EC			
OC	324.0 ± 18.60	9.040 ± 0.5287	15.96 ± 1.840
EC	20.04 ± 3.408	0.5592 ± 0.0953	0.9872 ± 0.1948
TC	344.4 ± 20.76	9.609 ± 0.5891	16.97 ± 1.981

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U257
Client ID: 20081074
Site: Ogden (O2)
Sample Date: 7/ 4/08
Mass: 1656. +- 40. µg
Volume: 20.30 +- 2.030 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 81.58 +- 8.39 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	44.42 ± 4.576	2.683 ± 0.2838	2.188 ± 0.3142
P	0.0000 ± 2.050	0.0000 ± 0.1238	0.0000 ± 0.1010
S	80.22 ± 6.407	4.844 ± 0.4042	3.952 ± 0.5057
Cl	64.46 ± 4.652	3.893 ± 0.2963	3.176 ± 0.3916
K	277.0 ± 17.34	16.72 ± 1.122	13.64 ± 1.610
Ca	124.6 ± 7.595	7.522 ± 0.4933	6.136 ± 0.7187
Ti	2.754 ± 0.2796	0.1663 ± 0.0174	0.1357 ± 0.0193
V	0.1380 ± 0.1296	0.0083 ± 0.0078	0.0068 ± 0.0064
Cr	0.5352 ± 0.0756	0.0323 ± 0.0046	0.0264 ± 0.0046
Mn	1.418 ± 0.1080	0.0857 ± 0.0068	0.0699 ± 0.0088
Fe	35.03 ± 2.812	2.115 ± 0.1773	1.726 ± 0.2213
Co	0.0000 ± 0.0456	0.0000 ± 0.0028	0.0000 ± 0.0022
Ni	0.2784 ± 0.0324	0.0168 ± 0.0020	0.0137 ± 0.0021
Cu	8.588 ± 0.4356	0.5186 ± 0.0291	0.4231 ± 0.0474
Zn	2.456 ± 0.2160	0.1483 ± 0.0135	0.1210 ± 0.0161
Ga	0.0000 ± 0.0732	0.0000 ± 0.0044	0.0000 ± 0.0036
Ge	0.0168 ± 0.0648	0.0010 ± 0.0039	0.0008 ± 0.0032
As	0.1908 ± 0.0960	0.0115 ± 0.0058	0.0094 ± 0.0048
Se	0.0888 ± 0.0516	0.0054 ± 0.0031	0.0044 ± 0.0026
Br	0.2760 ± 0.0516	0.0167 ± 0.0031	0.0136 ± 0.0029
Rb	0.1848 ± 0.0624	0.0112 ± 0.0038	0.0091 ± 0.0032
Sr	5.948 ± 0.3132	0.3592 ± 0.0208	0.2930 ± 0.0331
Y	0.0240 ± 0.0792	0.0014 ± 0.0048	0.0012 ± 0.0039
Zr	0.8028 ± 0.1104	0.0485 ± 0.0068	0.0395 ± 0.0067
Mo	1.105 ± 0.1452	0.0667 ± 0.0089	0.0544 ± 0.0090
Pd	0.1176 ± 0.0876	0.0071 ± 0.0053	0.0058 ± 0.0044
Ag	0.2736 ± 0.0840	0.0165 ± 0.0051	0.0135 ± 0.0044
Cd	0.3108 ± 0.0828	0.0188 ± 0.0050	0.0153 ± 0.0044
In	0.3012 ± 0.0840	0.0182 ± 0.0051	0.0148 ± 0.0044
Sn	0.7752 ± 0.1032	0.0468 ± 0.0063	0.0382 ± 0.0064
Sb	1.256 ± 0.1416	0.0759 ± 0.0087	0.0619 ± 0.0093
Ba	26.35 ± 1.424	1.591 ± 0.0942	1.298 ± 0.1476
La	2.245 ± 0.6132	0.1356 ± 0.0372	0.1106 ± 0.0322
Hg	0.0084 ± 0.1452	0.0005 ± 0.0088	0.0004 ± 0.0072
Pb	0.5856 ± 0.1476	0.0354 ± 0.0090	0.0288 ± 0.0078
IC			
Cl	64.30 ± 3.215	3.883 ± 0.0944	3.167 ± 0.3541
Br	0.0000 ± 1.000	0.0000 ± 0.0060	0.0000 ± 0.0493
NO3	34.28 ± 1.714	2.070 ± 0.0506	1.689 ± 0.1888
SO4	192.1 ± 9.606	11.60 ± 0.2809	9.464 ± 1.058
Na	93.08 ± 4.654	5.621 ± 0.1364	4.585 ± 0.5126
NH4	4.300 ± 0.2150	0.2597 ± 0.0069	0.2118 ± 0.0237
K	208.0 ± 10.40	12.56 ± 0.3040	10.25 ± 1.146
OC/EC			
OC	247.2 ± 14.76	14.93 ± 0.9615	12.18 ± 1.418
EC	41.40 ± 4.476	2.500 ± 0.2770	2.039 ± 0.3003
TC	288.0 ± 18.00	17.39 ± 1.165	14.19 ± 1.673

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U258
Client ID: 20090387
Site: Lindon (LN)
Sample Date: 3/ 4/09
Mass: 4258. +- 40. µg
Volume: 21.00 +- 2.100 m^3
Deposit Area: 12.0 cm^2
Size Fraction: PM10
Suspended
Particulates: 202.8 +- 20.37 $\mu g/m^3$

Analyte	µg/filter	percent	µg/m^3
XRF			
Al	60.94 ± 5.242	1.431 ± 0.1238	2.902 ± 0.3828
P	0.0000 ± 2.972	0.0000 ± 0.0698	0.0000 ± 0.1415
S	82.06 ± 6.294	1.927 ± 0.1489	3.907 ± 0.4925
Cl	43.22 ± 3.094	1.015 ± 0.0733	2.058 ± 0.2531
K	69.89 ± 4.354	1.641 ± 0.1034	3.328 ± 0.3921
Ca	551.6 ± 32.96	12.96 ± 0.7837	26.27 ± 3.060
Ti	6.890 ± 0.4656	0.1618 ± 0.0110	0.3281 ± 0.0396
V	0.0000 ± 0.1296	0.0000 ± 0.0030	0.0000 ± 0.0062
Cr	1.710 ± 0.1284	0.0402 ± 0.0030	0.0814 ± 0.0102
Mn	2.218 ± 0.1524	0.0521 ± 0.0036	0.1056 ± 0.0128
Fe	99.43 ± 7.936	2.335 ± 0.1877	4.735 ± 0.6058
Co	0.0000 ± 0.0684	0.0000 ± 0.0016	0.0000 ± 0.0033
Ni	0.3180 ± 0.0384	0.0075 ± 0.0009	0.0151 ± 0.0024
Cu	0.6960 ± 0.0480	0.0163 ± 0.0011	0.0331 ± 0.0040
Zn	2.184 ± 0.1980	0.0513 ± 0.0047	0.1040 ± 0.0140
Ga	0.1080 ± 0.0756	0.0025 ± 0.0018	0.0051 ± 0.0036
Ge	0.1428 ± 0.0660	0.0034 ± 0.0016	0.0068 ± 0.0032
As	0.1188 ± 0.0588	0.0028 ± 0.0014	0.0057 ± 0.0029
Se	0.1332 ± 0.0540	0.0031 ± 0.0013	0.0063 ± 0.0026
Br	0.1752 ± 0.0528	0.0041 ± 0.0012	0.0083 ± 0.0026
Rb	0.6444 ± 0.0756	0.0151 ± 0.0018	0.0307 ± 0.0047
Sr	7.352 ± 0.3828	0.1727 ± 0.0091	0.3501 ± 0.0395
Y	0.0732 ± 0.0864	0.0017 ± 0.0020	0.0035 ± 0.0041
Zr	1.189 ± 0.1260	0.0279 ± 0.0030	0.0566 ± 0.0083
Mo	1.087 ± 0.1536	0.0255 ± 0.0036	0.0518 ± 0.0090
Pd	0.0000 ± 0.0888	0.0000 ± 0.0021	0.0000 ± 0.0042
Ag	0.2856 ± 0.0876	0.0067 ± 0.0021	0.0136 ± 0.0044
Cd	0.1440 ± 0.0852	0.0034 ± 0.0020	0.0069 ± 0.0041
In	0.0576 ± 0.0864	0.0014 ± 0.0020	0.0027 ± 0.0041
Sn	0.8076 ± 0.1080	0.0190 ± 0.0025	0.0385 ± 0.0064
Sb	0.1152 ± 0.1272	0.0027 ± 0.0030	0.0055 ± 0.0061
Ba	5.932 ± 0.5976	0.1393 ± 0.0141	0.2825 ± 0.0401
La	2.130 ± 0.6360	0.0500 ± 0.0149	0.1014 ± 0.0319
Hg	0.0672 ± 0.1488	0.0016 ± 0.0035	0.0032 ± 0.0071
Pb	0.3972 ± 0.1464	0.0093 ± 0.0034	0.0189 ± 0.0072
IC			
Cl	165.1 ± 8.254	3.877 ± 0.0370	7.861 ± 0.8789
Br	0.0000 ± 1.000	0.0000 ± 0.0023	0.0000 ± 0.0476
NO3	21.04 ± 1.052	0.4941 ± 0.0052	1.002 ± 0.1120
SO4	338.6 ± 16.93	7.952 ± 0.0753	16.12 ± 1.803
Na	310.2 ± 15.51	7.285 ± 0.0691	14.77 ± 1.652
NH4	0.0000 ± 1.000	0.0000 ± 0.0023	0.0000 ± 0.0476
K	9.400 ± 0.4700	0.2208 ± 0.0026	0.4476 ± 0.0500
OC/EC			
OC	345.6 ± 19.68	8.116 ± 0.4684	16.46 ± 1.894
EC	4.824 ± 2.640	0.1133 ± 0.0620	0.2297 ± 0.1278
TC	350.4 ± 21.12	8.229 ± 0.5020	16.69 ± 1.948

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-U259
Client ID: 2009B001
Deposit Area: 12.0 cm²
Size Fraction: PM10
Comments: Blank

Analyte	µg/filter
XRF	
Al	11.07 ± 3.764
P	0.0000 ± 2.396
S	1.050 ± 0.9636
Cl	0.0000 ± 0.5616
K	10.04 ± 1.055
Ca	61.33 ± 3.772
Ti	0.1776 ± 0.1524
V	0.0000 ± 0.0708
Cr	0.3660 ± 0.0480
Mn	0.2340 ± 0.0480
Fe	2.652 ± 0.1620
Co	0.0000 ± 0.0264
Ni	0.2604 ± 0.0288
Cu	0.3492 ± 0.0312
Zn	0.9468 ± 0.1212
Ga	0.1728 ± 0.0720
Ge	0.3072 ± 0.0648
As	0.0684 ± 0.0540
Se	0.0492 ± 0.0504
Br	0.0420 ± 0.0468
Rb	0.1908 ± 0.0624
Sr	0.2868 ± 0.0720
Y	0.0000 ± 0.0828
Zr	0.9276 ± 0.1140
Mo	1.286 ± 0.1536
Pd	0.0264 ± 0.0852
Ag	0.2292 ± 0.0816
Cd	0.2856 ± 0.0816
In	0.1320 ± 0.0828
Sn	0.6132 ± 0.1008
Sb	0.3324 ± 0.1236
Ba	2.825 ± 0.5172
La	1.295 ± 0.6156
Hg	0.0000 ± 0.1416
Pb	0.1092 ± 0.1392
IC	
Cl	3.560 ± 0.1780
Br	0.0000 ± 1.000
NO3	4.940 ± 0.2470
SO4	1.800 ± 0.0900
Na	34.92 ± 1.746
NH4	0.0000 ± 1.000
K	0.0000 ± 1.000
OC/EC	
OC	101.9 ± 7.500
EC	0.0000 ± 2.400
TC	101.9 ± 8.700

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X779
Client ID: 8131301
Site: Lindon (LN)
Sample Date: 4/15/08
Mass: 589. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 24.54 +- 2.49 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	3.923 ± 1.412	0.6661 ± 0.2401	0.1635 ± 0.0611
Mg	19.06 ± 1.504	3.237 ± 0.2612	0.7943 ± 0.1012
Al	31.09 ± 1.984	5.278 ± 0.3486	1.295 ± 0.1537
Si	87.33 ± 4.677	14.83 ± 0.8330	3.639 ± 0.4128
P	0.0068 ± 0.0463	0.0012 ± 0.0079	0.0003 ± 0.0019
S	5.571 ± 0.3153	0.9458 ± 0.0559	0.2321 ± 0.0267
Cl	4.736 ± 0.2622	0.8040 ± 0.0466	0.1973 ± 0.0226
K	11.64 ± 0.5989	1.976 ± 0.1071	0.4850 ± 0.0545
Ca	33.50 ± 1.698	5.688 ± 0.3041	1.396 ± 0.1565
Ti	1.449 ± 0.0757	0.2460 ± 0.0135	0.0604 ± 0.0068
V	0.0316 ± 0.0113	0.0054 ± 0.0019	0.0013 ± 0.0005
Cr	0.0226 ± 0.0090	0.0038 ± 0.0015	0.0009 ± 0.0004
Mn	0.3458 ± 0.0452	0.0587 ± 0.0077	0.0144 ± 0.0024
Fe	16.05 ± 0.8057	2.724 ± 0.1444	0.6686 ± 0.0748
Co	0.0000 ± 0.0271	0.0000 ± 0.0046	0.0000 ± 0.0011
Ni	0.0396 ± 0.0158	0.0067 ± 0.0027	0.0016 ± 0.0007
Cu	0.0282 ± 0.0147	0.0048 ± 0.0025	0.0012 ± 0.0006
Zn	0.1808 ± 0.0170	0.0307 ± 0.0029	0.0075 ± 0.0010
Ga	0.0170 ± 0.0102	0.0029 ± 0.0017	0.0007 ± 0.0004
Ge	0.0023 ± 0.0090	0.0004 ± 0.0015	0.0001 ± 0.0004
As	0.0000 ± 0.0124	0.0000 ± 0.0021	0.0000 ± 0.0005
Se	0.0011 ± 0.0068	0.0002 ± 0.0012	0.0000 ± 0.0003
Br	0.0599 ± 0.0068	0.0102 ± 0.0012	0.0025 ± 0.0004
Rb	0.0655 ± 0.0079	0.0111 ± 0.0014	0.0027 ± 0.0004
Sr	0.2396 ± 0.0158	0.0407 ± 0.0028	0.0100 ± 0.0012
Y	0.0147 ± 0.0090	0.0025 ± 0.0015	0.0006 ± 0.0004
Zr	0.0396 ± 0.0124	0.0067 ± 0.0021	0.0016 ± 0.0005
Mo	0.0000 ± 0.0170	0.0000 ± 0.0029	0.0000 ± 0.0007
Pd	0.0034 ± 0.0497	0.0006 ± 0.0084	0.0001 ± 0.0021
Ag	0.0441 ± 0.0520	0.0075 ± 0.0088	0.0018 ± 0.0022
Cd	0.0294 ± 0.0565	0.0050 ± 0.0096	0.0012 ± 0.0024
In	0.0011 ± 0.0622	0.0002 ± 0.0106	0.0000 ± 0.0026
Sn	0.0000 ± 0.0723	0.0000 ± 0.0123	0.0000 ± 0.0030
Sb	0.2260 ± 0.1480	0.0384 ± 0.0251	0.0094 ± 0.0062
Ba	0.1322 ± 0.0588	0.0224 ± 0.0100	0.0055 ± 0.0025
La	0.0282 ± 0.0441	0.0048 ± 0.0075	0.0012 ± 0.0018
Hg	0.0000 ± 0.0181	0.0000 ± 0.0031	0.0000 ± 0.0008
Pb	0.0158 ± 0.0181	0.0027 ± 0.0031	0.0007 ± 0.0008
IC			
Cl	6.270 ± 0.3135	1.065 ± 0.0204	0.2612 ± 0.0292
Br	0.0000 ± 0.5000	0.0000 ± 0.0120	0.0000 ± 0.0208
NO3	9.890 ± 0.4945	1.679 ± 0.0309	0.4121 ± 0.0461
SO4	21.62 ± 1.081	3.671 ± 0.0648	0.9008 ± 0.1007
Na	8.300 ± 0.4150	1.409 ± 0.0263	0.3458 ± 0.0387
NH4	4.330 ± 0.2165	0.7351 ± 0.0148	0.1804 ± 0.0202
K	2.090 ± 0.1045	0.3548 ± 0.0081	0.0871 ± 0.0097

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X780
Client ID: 8131368
Site: Lindon (LN)
Sample Date: 4/19/08
Mass: 754. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 31.42 +- 3.17 $\mu g/m^3$
Comments: NUD-Mn

Analyte	µg/filter	percent	$\mu g/m^3$
XRF			
Na	0.5435 ± 0.7017	0.0721 ± 0.0931	0.0226 ± 0.0293
Mg	30.80 ± 2.368	4.085 ± 0.3188	1.283 ± 0.1619
Al	40.19 ± 2.598	5.331 ± 0.3517	1.675 ± 0.1994
Si	111.2 ± 6.035	14.75 ± 0.8240	4.635 ± 0.5273
P	0.0000 ± 0.0565	0.0000 ± 0.0075	0.0000 ± 0.0024
S	8.003 ± 0.4441	1.061 ± 0.0606	0.3334 ± 0.0381
Cl	4.013 ± 0.2305	0.5322 ± 0.0314	0.1672 ± 0.0193
K	14.78 ± 0.7605	1.960 ± 0.1042	0.6158 ± 0.0693
Ca	67.02 ± 3.397	8.889 ± 0.4657	2.793 ± 0.3131
Ti	1.850 ± 0.0960	0.2453 ± 0.0131	0.0771 ± 0.0087
V	0.0328 ± 0.0124	0.0043 ± 0.0016	0.0014 ± 0.0005
Cr	0.0350 ± 0.0113	0.0046 ± 0.0015	0.0015 ± 0.0005
Mn	0.4870 ± 0.0712	0.0646 ± 0.0095	0.0203 ± 0.0036
Fe	19.61 ± 0.9831	2.600 ± 0.1349	0.8169 ± 0.0914
Co	0.0000 ± 0.0294	0.0000 ± 0.0039	0.0000 ± 0.0012
Ni	0.0362 ± 0.0181	0.0048 ± 0.0024	0.0015 ± 0.0008
Cu	0.0667 ± 0.0158	0.0088 ± 0.0021	0.0028 ± 0.0007
Zn	0.1209 ± 0.0147	0.0160 ± 0.0020	0.0050 ± 0.0008
Ga	0.0237 ± 0.0113	0.0031 ± 0.0015	0.0010 ± 0.0005
Ge	0.0090 ± 0.0102	0.0012 ± 0.0013	0.0004 ± 0.0004
As	0.0000 ± 0.0147	0.0000 ± 0.0019	0.0000 ± 0.0006
Se	0.0000 ± 0.0079	0.0000 ± 0.0010	0.0000 ± 0.0003
Br	0.0836 ± 0.0090	0.0111 ± 0.0012	0.0035 ± 0.0005
Rb	0.0836 ± 0.0090	0.0111 ± 0.0012	0.0035 ± 0.0005
Sr	0.4791 ± 0.0271	0.0635 ± 0.0037	0.0200 ± 0.0023
Y	0.0124 ± 0.0113	0.0016 ± 0.0015	0.0005 ± 0.0005
Zr	0.0362 ± 0.0136	0.0048 ± 0.0018	0.0015 ± 0.0006
Mo	0.0124 ± 0.0192	0.0016 ± 0.0025	0.0005 ± 0.0008
Pd	0.0000 ± 0.0520	0.0000 ± 0.0069	0.0000 ± 0.0022
Ag	0.0045 ± 0.0542	0.0006 ± 0.0072	0.0002 ± 0.0023
Cd	0.0655 ± 0.0599	0.0087 ± 0.0079	0.0027 ± 0.0025
In	0.1085 ± 0.0678	0.0144 ± 0.0090	0.0045 ± 0.0029
Sn	0.0520 ± 0.0791	0.0069 ± 0.0105	0.0022 ± 0.0033
Sb	0.2215 ± 0.1582	0.0294 ± 0.0210	0.0092 ± 0.0067
Ba	0.0881 ± 0.0712	0.0117 ± 0.0094	0.0037 ± 0.0030
La	0.0000 ± 0.0531	0.0000 ± 0.0070	0.0000 ± 0.0022
Hg	0.0000 ± 0.0203	0.0000 ± 0.0027	0.0000 ± 0.0008
Pb	0.0102 ± 0.0203	0.0013 ± 0.0027	0.0004 ± 0.0008
IC			
Cl	5.080 ± 0.2540	0.6737 ± 0.0112	0.2117 ± 0.0237
Br	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
NO3	10.67 ± 0.5335	1.415 ± 0.0211	0.4446 ± 0.0497
SO4	29.00 ± 1.450	3.846 ± 0.0535	1.208 ± 0.1351
Na	7.250 ± 0.3625	0.9615 ± 0.0150	0.3021 ± 0.0338
NH4	5.120 ± 0.2560	0.6790 ± 0.0112	0.2133 ± 0.0239
K	2.150 ± 0.1075	0.2851 ± 0.0058	0.0896 ± 0.0100

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X781
Client ID: 8131360
Site: Hawthorn (HW)
Sample Date: 4/19/08
Mass: 752. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 31.33 +- 3.16 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	15.91 ± 2.319	2.116 ± 0.3096	0.6629 ± 0.1172
Mg	40.30 ± 3.037	5.358 ± 0.4102	1.679 ± 0.2103
Al	25.02 ± 1.638	3.327 ± 0.2223	1.042 ± 0.1246
Si	76.98 ± 4.173	10.24 ± 0.5714	3.207 ± 0.3648
P	0.0000 ± 0.0554	0.0000 ± 0.0074	0.0000 ± 0.0023
S	16.40 ± 0.8690	2.180 ± 0.1191	0.6832 ± 0.0773
Cl	10.22 ± 0.5413	1.359 ± 0.0742	0.4257 ± 0.0482
K	10.23 ± 0.5300	1.360 ± 0.0728	0.4262 ± 0.0480
Ca	64.66 ± 3.275	8.598 ± 0.4502	2.694 ± 0.3020
Ti	1.248 ± 0.0667	0.1659 ± 0.0091	0.0520 ± 0.0059
V	0.0508 ± 0.0113	0.0068 ± 0.0015	0.0021 ± 0.0005
Cr	0.0192 ± 0.0102	0.0026 ± 0.0014	0.0008 ± 0.0004
Mn	0.2090 ± 0.0158	0.0278 ± 0.0021	0.0087 ± 0.0011
Fe	13.01 ± 0.6531	1.730 ± 0.0898	0.5419 ± 0.0606
Co	0.0000 ± 0.0260	0.0000 ± 0.0035	0.0000 ± 0.0011
Ni	0.0237 ± 0.0158	0.0032 ± 0.0021	0.0010 ± 0.0007
Cu	0.0497 ± 0.0147	0.0066 ± 0.0020	0.0021 ± 0.0006
Zn	0.0994 ± 0.0136	0.0132 ± 0.0018	0.0041 ± 0.0007
Ga	0.0000 ± 0.0102	0.0000 ± 0.0014	0.0000 ± 0.0004
Ge	0.0000 ± 0.0090	0.0000 ± 0.0012	0.0000 ± 0.0004
As	0.0000 ± 0.0136	0.0000 ± 0.0018	0.0000 ± 0.0006
Se	0.0045 ± 0.0068	0.0006 ± 0.0009	0.0002 ± 0.0003
Br	0.0870 ± 0.0079	0.0116 ± 0.0011	0.0036 ± 0.0005
Rb	0.0441 ± 0.0079	0.0059 ± 0.0011	0.0018 ± 0.0004
Sr	3.083 ± 0.1559	0.4099 ± 0.0214	0.1284 ± 0.0144
Y	0.0102 ± 0.0102	0.0014 ± 0.0014	0.0004 ± 0.0004
Zr	0.0441 ± 0.0136	0.0059 ± 0.0018	0.0018 ± 0.0006
Mo	0.0000 ± 0.0170	0.0000 ± 0.0023	0.0000 ± 0.0007
Pd	0.0034 ± 0.0497	0.0005 ± 0.0066	0.0001 ± 0.0021
Ag	0.1209 ± 0.0542	0.0161 ± 0.0072	0.0050 ± 0.0023
Cd	0.1774 ± 0.0588	0.0236 ± 0.0078	0.0074 ± 0.0026
In	0.0102 ± 0.0633	0.0014 ± 0.0084	0.0004 ± 0.0026
Sn	0.0226 ± 0.0746	0.0030 ± 0.0099	0.0009 ± 0.0031
Sb	0.1831 ± 0.1514	0.0243 ± 0.0201	0.0076 ± 0.0064
Ba	0.0520 ± 0.0576	0.0069 ± 0.0077	0.0022 ± 0.0024
La	0.0000 ± 0.0508	0.0000 ± 0.0068	0.0000 ± 0.0021
Hg	0.0000 ± 0.0158	0.0000 ± 0.0021	0.0000 ± 0.0007
Pb	0.0576 ± 0.0192	0.0077 ± 0.0026	0.0024 ± 0.0008
IC			
Cl	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
Br	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
NO3	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
SO4	0.0000 ± 0.5000	0.0000 ± 0.0094	0.0000 ± 0.0208
Na	23.60 ± 1.180	3.138 ± 0.0442	0.9833 ± 0.1099
NH4	4.460 ± 0.2230	0.5931 ± 0.0101	0.1858 ± 0.0208
K	2.480 ± 0.1240	0.3298 ± 0.0064	0.1033 ± 0.0116

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X782
Client ID: 8131377
Site: North Provo (NP)
Sample Date: 4/19/08
Mass: 1199. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 49.96 +- 5.01 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.0000 ± 0.8837	0.0000 ± 0.0737	0.0000 ± 0.0368
Mg	39.08 ± 3.138	3.259 ± 0.2631	1.628 ± 0.2088
Al	64.76 ± 4.325	5.401 ± 0.3635	2.698 ± 0.3245
Si	173.1 ± 9.682	14.44 ± 0.8164	7.213 ± 0.8265
P	0.5673 ± 0.0757	0.0473 ± 0.0063	0.0236 ± 0.0039
S	8.115 ± 0.4599	0.6768 ± 0.0388	0.3381 ± 0.0389
Cl	2.730 ± 0.1729	0.2277 ± 0.0145	0.1138 ± 0.0135
K	23.46 ± 1.209	1.957 ± 0.1022	0.9774 ± 0.1100
Ca	102.6 ± 5.226	8.558 ± 0.4417	4.276 ± 0.4798
Ti	3.051 ± 0.1559	0.2545 ± 0.0132	0.1271 ± 0.0143
V	0.0689 ± 0.0158	0.0057 ± 0.0013	0.0029 ± 0.0007
Cr	0.0644 ± 0.0124	0.0054 ± 0.0010	0.0027 ± 0.0006
Mn	0.8113 ± 0.0723	0.0677 ± 0.0061	0.0338 ± 0.0045
Fe	32.71 ± 1.638	2.728 ± 0.1385	1.363 ± 0.1524
Co	0.0565 ± 0.0328	0.0047 ± 0.0027	0.0024 ± 0.0014
Ni	0.0701 ± 0.0170	0.0058 ± 0.0014	0.0029 ± 0.0008
Cu	0.1062 ± 0.0170	0.0089 ± 0.0014	0.0044 ± 0.0008
Zn	0.2170 ± 0.0181	0.0181 ± 0.0015	0.0090 ± 0.0012
Ga	0.0090 ± 0.0102	0.0008 ± 0.0008	0.0004 ± 0.0004
Ge	0.0000 ± 0.0102	0.0000 ± 0.0008	0.0000 ± 0.0004
As	0.0000 ± 0.0136	0.0000 ± 0.0011	0.0000 ± 0.0006
Se	0.0068 ± 0.0068	0.0006 ± 0.0006	0.0003 ± 0.0003
Br	0.0927 ± 0.0079	0.0077 ± 0.0007	0.0039 ± 0.0005
Rb	0.1243 ± 0.0102	0.0104 ± 0.0009	0.0052 ± 0.0007
Sr	0.5921 ± 0.0316	0.0494 ± 0.0027	0.0247 ± 0.0028
Y	0.0000 ± 0.0102	0.0000 ± 0.0008	0.0000 ± 0.0004
Zr	0.1424 ± 0.0147	0.0119 ± 0.0012	0.0059 ± 0.0009
Mo	0.0328 ± 0.0181	0.0027 ± 0.0015	0.0014 ± 0.0008
Pd	0.0757 ± 0.0542	0.0063 ± 0.0045	0.0032 ± 0.0023
Ag	0.0000 ± 0.0565	0.0000 ± 0.0047	0.0000 ± 0.0024
Cd	0.1322 ± 0.0622	0.0110 ± 0.0052	0.0055 ± 0.0026
In	0.0090 ± 0.0678	0.0008 ± 0.0057	0.0004 ± 0.0028
Sn	0.1277 ± 0.0791	0.0106 ± 0.0066	0.0053 ± 0.0033
Sb	0.2893 ± 0.1593	0.0241 ± 0.0133	0.0121 ± 0.0067
Ba	0.2384 ± 0.1028	0.0199 ± 0.0086	0.0099 ± 0.0044
La	0.0147 ± 0.0734	0.0012 ± 0.0061	0.0006 ± 0.0031
Hg	0.0181 ± 0.0170	0.0015 ± 0.0014	0.0008 ± 0.0007
Pb	0.0904 ± 0.0203	0.0075 ± 0.0017	0.0038 ± 0.0009
IC			
Cl	13.60 ± 0.6800	1.134 ± 0.0117	0.5667 ± 0.0634
Br	0.0000 ± 0.5000	0.0000 ± 0.0059	0.0000 ± 0.0208
NO3	12.46 ± 0.6230	1.039 ± 0.0109	0.5192 ± 0.0580
SO4	58.75 ± 2.938	4.900 ± 0.0433	2.448 ± 0.2737
Na	6.720 ± 0.3360	0.5605 ± 0.0067	0.2800 ± 0.0313
NH4	5.000 ± 0.2500	0.4170 ± 0.0054	0.2083 ± 0.0233
K	2.980 ± 0.1490	0.2485 ± 0.0038	0.1242 ± 0.0139

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X783
Client ID: 8131629
Site: Lindon (LN)
Sample Date: 5/20/08
Mass: 877. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 36.54 +- 3.68 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.0000 ± 0.6983	0.0000 ± 0.0796	0.0000 ± 0.0291
Mg	24.25 ± 1.936	2.765 ± 0.2230	1.010 ± 0.1293
Al	41.57 ± 2.704	4.740 ± 0.3130	1.732 ± 0.2066
Si	113.8 ± 6.203	12.98 ± 0.7226	4.741 ± 0.5400
P	0.6147 ± 0.0644	0.0701 ± 0.0074	0.0256 ± 0.0037
S	4.557 ± 0.2712	0.5196 ± 0.0315	0.1899 ± 0.0221
Cl	0.7661 ± 0.0836	0.0874 ± 0.0096	0.0319 ± 0.0047
K	16.23 ± 0.8339	1.850 ± 0.0974	0.6761 ± 0.0760
Ca	79.30 ± 4.021	9.043 ± 0.4699	3.304 ± 0.3705
Ti	1.991 ± 0.1040	0.2270 ± 0.0121	0.0830 ± 0.0094
V	0.0429 ± 0.0124	0.0049 ± 0.0014	0.0018 ± 0.0005
Cr	0.0181 ± 0.0113	0.0021 ± 0.0013	0.0008 ± 0.0005
Mn	0.5311 ± 0.0554	0.0606 ± 0.0064	0.0221 ± 0.0032
Fe	21.09 ± 1.058	2.404 ± 0.1237	0.8786 ± 0.0983
Co	0.0000 ± 0.0294	0.0000 ± 0.0034	0.0000 ± 0.0012
Ni	0.0418 ± 0.0170	0.0048 ± 0.0019	0.0017 ± 0.0007
Cu	0.0475 ± 0.0147	0.0054 ± 0.0017	0.0020 ± 0.0006
Zn	0.2565 ± 0.0192	0.0292 ± 0.0022	0.0107 ± 0.0013
Ga	0.0079 ± 0.0102	0.0009 ± 0.0012	0.0003 ± 0.0004
Ge	0.0124 ± 0.0090	0.0014 ± 0.0010	0.0005 ± 0.0004
As	0.0000 ± 0.0124	0.0000 ± 0.0014	0.0000 ± 0.0005
Se	0.0102 ± 0.0068	0.0012 ± 0.0008	0.0004 ± 0.0003
Br	0.1186 ± 0.0090	0.0135 ± 0.0010	0.0049 ± 0.0006
Rb	0.0791 ± 0.0090	0.0090 ± 0.0010	0.0033 ± 0.0005
Sr	0.3548 ± 0.0203	0.0405 ± 0.0024	0.0148 ± 0.0017
Y	0.0090 ± 0.0102	0.0010 ± 0.0012	0.0004 ± 0.0004
Zr	0.0633 ± 0.0124	0.0072 ± 0.0014	0.0026 ± 0.0006
Mo	0.0090 ± 0.0181	0.0010 ± 0.0021	0.0004 ± 0.0008
Pd	0.0000 ± 0.0508	0.0000 ± 0.0058	0.0000 ± 0.0021
Ag	0.1345 ± 0.0542	0.0153 ± 0.0062	0.0056 ± 0.0023
Cd	0.0407 ± 0.0588	0.0046 ± 0.0067	0.0017 ± 0.0025
In	0.0655 ± 0.0667	0.0075 ± 0.0076	0.0027 ± 0.0028
Sn	0.0554 ± 0.0757	0.0063 ± 0.0086	0.0023 ± 0.0032
Sb	0.0000 ± 0.1503	0.0000 ± 0.0171	0.0000 ± 0.0063
Ba	0.1695 ± 0.0746	0.0193 ± 0.0085	0.0071 ± 0.0032
La	0.0000 ± 0.0542	0.0000 ± 0.0062	0.0000 ± 0.0023
Hg	0.0000 ± 0.0192	0.0000 ± 0.0022	0.0000 ± 0.0008
Pb	0.0701 ± 0.0192	0.0080 ± 0.0022	0.0029 ± 0.0009
IC			
Cl	1.920 ± 0.0960	0.2189 ± 0.0043	0.0800 ± 0.0089
Br	0.0000 ± 0.5000	0.0000 ± 0.0081	0.0000 ± 0.0208
NO3	9.990 ± 0.4995	1.139 ± 0.0153	0.4162 ± 0.0465
SO4	16.77 ± 0.8385	1.912 ± 0.0242	0.6988 ± 0.0781
Na	2.070 ± 0.1035	0.2360 ± 0.0045	0.0862 ± 0.0096
NH4	4.150 ± 0.2075	0.4732 ± 0.0075	0.1729 ± 0.0193
K	2.480 ± 0.1240	0.2828 ± 0.0051	0.1033 ± 0.0116

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X784
Client ID: 8132053
Site: Brigham City (BR)
Sample Date: 6/26/08
Mass: 1026. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 42.75 +- 4.30 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	0.3865 ± 0.5345	0.0377 ± 0.0521	0.0161 ± 0.0223
Mg	3.445 ± 0.5062	0.3358 ± 0.0494	0.1436 ± 0.0255
Al	8.667 ± 0.6068	0.8447 ± 0.0597	0.3611 ± 0.0441
Si	35.73 ± 1.947	3.483 ± 0.1928	1.489 ± 0.1695
P	0.0000 ± 0.0384	0.0000 ± 0.0037	0.0000 ± 0.0016
S	7.094 ± 0.3887	0.6914 ± 0.0385	0.2956 ± 0.0337
Cl	2.907 ± 0.1695	0.2834 ± 0.0167	0.1211 ± 0.0140
K	7.734 ± 0.6803	0.7538 ± 0.0667	0.3222 ± 0.0429
Ca	18.51 ± 0.9402	1.804 ± 0.0933	0.7712 ± 0.0865
Ti	0.8611 ± 0.0475	0.0839 ± 0.0047	0.0359 ± 0.0041
V	0.0215 ± 0.0090	0.0021 ± 0.0009	0.0009 ± 0.0004
Cr	0.0090 ± 0.0079	0.0009 ± 0.0008	0.0004 ± 0.0003
Mn	0.2011 ± 0.0147	0.0196 ± 0.0014	0.0084 ± 0.0010
Fe	10.71 ± 0.5390	1.044 ± 0.0535	0.4464 ± 0.0500
Co	0.0000 ± 0.0237	0.0000 ± 0.0023	0.0000 ± 0.0010
Ni	0.0475 ± 0.0158	0.0046 ± 0.0015	0.0020 ± 0.0007
Cu	0.1322 ± 0.0170	0.0129 ± 0.0017	0.0055 ± 0.0009
Zn	0.2656 ± 0.0192	0.0259 ± 0.0019	0.0111 ± 0.0014
Ga	0.0000 ± 0.0090	0.0000 ± 0.0009	0.0000 ± 0.0004
Ge	0.0000 ± 0.0079	0.0000 ± 0.0008	0.0000 ± 0.0003
As	0.0000 ± 0.0124	0.0000 ± 0.0012	0.0000 ± 0.0005
Se	0.0000 ± 0.0068	0.0000 ± 0.0007	0.0000 ± 0.0003
Br	0.2712 ± 0.0158	0.0264 ± 0.0016	0.0113 ± 0.0013
Rb	0.0181 ± 0.0068	0.0018 ± 0.0007	0.0008 ± 0.0003
Sr	0.0983 ± 0.0090	0.0096 ± 0.0009	0.0041 ± 0.0006
Y	0.0124 ± 0.0090	0.0012 ± 0.0009	0.0005 ± 0.0004
Zr	0.0667 ± 0.0124	0.0065 ± 0.0012	0.0028 ± 0.0006
Mo	0.0079 ± 0.0158	0.0008 ± 0.0015	0.0003 ± 0.0007
Pd	0.1130 ± 0.0475	0.0110 ± 0.0046	0.0047 ± 0.0020
Ag	0.0588 ± 0.0497	0.0057 ± 0.0048	0.0024 ± 0.0021
Cd	0.0678 ± 0.0531	0.0066 ± 0.0052	0.0028 ± 0.0022
In	0.0429 ± 0.0588	0.0042 ± 0.0057	0.0018 ± 0.0025
Sn	0.0678 ± 0.0701	0.0066 ± 0.0068	0.0028 ± 0.0029
Sb	0.0271 ± 0.1379	0.0026 ± 0.0134	0.0011 ± 0.0057
Ba	0.1446 ± 0.0475	0.0141 ± 0.0046	0.0060 ± 0.0021
La	0.0000 ± 0.0373	0.0000 ± 0.0036	0.0000 ± 0.0016
Hg	0.0000 ± 0.0170	0.0000 ± 0.0017	0.0000 ± 0.0007
Pb	0.0599 ± 0.0181	0.0058 ± 0.0018	0.0025 ± 0.0008
IC			
Cl	4.070 ± 0.2035	0.3967 ± 0.0059	0.1696 ± 0.0190
Br	0.0000 ± 0.5000	0.0000 ± 0.0069	0.0000 ± 0.0208
NO3	7.400 ± 0.3700	0.7212 ± 0.0092	0.3083 ± 0.0345
SO4	23.13 ± 1.156	2.254 ± 0.0243	0.9638 ± 0.1078
Na	4.570 ± 0.2285	0.4454 ± 0.0064	0.1904 ± 0.0213
NH4	7.250 ± 0.3625	0.7066 ± 0.0090	0.3021 ± 0.0338
K	3.060 ± 0.1530	0.2982 ± 0.0048	0.1275 ± 0.0143

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X785
Client ID: 8132188
Site: Ogden (O2)
Sample Date: 7/ 4/08
Mass: 1027. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 42.79 +- 4.30 $\mu g/m^3$
Comments: Bismuth

Analyte	µg/filter	percent	µg/m³
XRF			
Na	0.0000 ± 0.9537	0.0000 ± 0.0929	0.0000 ± 0.0397
Mg	33.06 ± 2.641	3.219 ± 0.2590	1.378 ± 0.1763
Al	23.98 ± 1.609	2.335 ± 0.1583	0.9991 ± 0.1203
Si	32.34 ± 1.803	3.149 ± 0.1783	1.348 ± 0.1543
P	0.0000 ± 0.0746	0.0000 ± 0.0073	0.0000 ± 0.0031
S	63.52 ± 3.300	6.185 ± 0.3269	2.647 ± 0.2982
Cl	42.05 ± 2.184	4.094 ± 0.2164	1.752 ± 0.1974
K	199.1 ± 10.16	19.39 ± 1.008	8.296 ± 0.9315
Ca	11.46 ± 0.6012	1.116 ± 0.0595	0.4774 ± 0.0539
Ti	0.7266 ± 0.5028	0.0707 ± 0.0490	0.0303 ± 0.0212
V	0.0000 ± 0.1785	0.0000 ± 0.0174	0.0000 ± 0.0074
Cr	0.0475 ± 0.0226	0.0046 ± 0.0022	0.0020 ± 0.0010
Mn	0.4599 ± 0.0282	0.0448 ± 0.0028	0.0192 ± 0.0022
Fe	10.78 ± 0.5424	1.050 ± 0.0538	0.4493 ± 0.0503
Co	0.0271 ± 0.0271	0.0026 ± 0.0026	0.0011 ± 0.0011
Ni	0.0396 ± 0.0181	0.0039 ± 0.0018	0.0016 ± 0.0008
Cu	6.523 ± 0.3322	0.6352 ± 0.0329	0.2718 ± 0.0305
Zn	1.105 ± 0.0949	0.1076 ± 0.0093	0.0460 ± 0.0061
Ga	0.0226 ± 0.0113	0.0022 ± 0.0011	0.0009 ± 0.0005
Ge	0.0000 ± 0.0102	0.0000 ± 0.0010	0.0000 ± 0.0004
As	0.0497 ± 0.0181	0.0048 ± 0.0018	0.0021 ± 0.0008
Se	0.0023 ± 0.0079	0.0002 ± 0.0008	0.0001 ± 0.0003
Br	0.1345 ± 0.0102	0.0131 ± 0.0010	0.0056 ± 0.0007
Rb	0.0531 ± 0.0090	0.0052 ± 0.0009	0.0022 ± 0.0004
Sr	3.894 ± 0.1966	0.3792 ± 0.0195	0.1622 ± 0.0182
Y	0.0000 ± 0.0102	0.0000 ± 0.0010	0.0000 ± 0.0004
Zr	0.0497 ± 0.0147	0.0048 ± 0.0014	0.0021 ± 0.0006
Mo	0.0486 ± 0.0181	0.0047 ± 0.0018	0.0020 ± 0.0008
Pd	0.0000 ± 0.0576	0.0000 ± 0.0056	0.0000 ± 0.0024
Ag	0.1300 ± 0.0610	0.0127 ± 0.0059	0.0054 ± 0.0026
Cd	0.0881 ± 0.0655	0.0086 ± 0.0064	0.0037 ± 0.0028
In	0.0588 ± 0.0723	0.0057 ± 0.0070	0.0024 ± 0.0030
Sn	0.0000 ± 0.0836	0.0000 ± 0.0081	0.0000 ± 0.0035
Sb	1.420 ± 0.1944	0.1383 ± 0.0190	0.0592 ± 0.0100
Ba	11.15 ± 0.6701	1.085 ± 0.0661	0.4644 ± 0.0542
La	0.3345 ± 0.1966	0.0326 ± 0.0191	0.0139 ± 0.0083
Hg	0.0000 ± 0.0203	0.0000 ± 0.0020	0.0000 ± 0.0008
Pb	0.3774 ± 0.0316	0.0367 ± 0.0031	0.0157 ± 0.0021
Bi	0.1932 ± 0.0339	0.0188 ± 0.0033	0.0081 ± 0.0016
IC			
Cl	48.74 ± 2.437	4.746 ± 0.0486	2.031 ± 0.2271
Br	0.0000 ± 0.5000	0.0000 ± 0.0069	0.0000 ± 0.0208
NO3	21.27 ± 1.064	2.071 ± 0.0225	0.8862 ± 0.0991
SO4	182.5 ± 9.125	17.77 ± 0.1755	7.604 ± 0.8502
Na	6.310 ± 0.3155	0.6144 ± 0.0081	0.2629 ± 0.0294
NH4	3.090 ± 0.1545	0.3009 ± 0.0048	0.1288 ± 0.0144
K	203.2 ± 10.16	19.79 ± 0.1951	8.467 ± 0.9466

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X786
Client ID: 9516469
Site: Lindon (LN)
Sample Date: 3/ 4/09
Mass: 550. +- 10. µg
Volume: 24.00 +- 2.400 m^3
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Suspended
Particulates: 22.92 +- 2.33 µg/m^3

Analyte	µg/filter	percent	µg/m^3
XRF			
Na	10.75 ± 1.728	1.955 ± 0.3161	0.4480 ± 0.0848
Mg	27.65 ± 2.076	5.027 ± 0.3883	1.152 ± 0.1441
Al	17.97 ± 1.167	3.267 ± 0.2204	0.7486 ± 0.0893
Si	57.27 ± 3.066	10.41 ± 0.5887	2.386 ± 0.2707
P	0.0000 ± 0.0441	0.0000 ± 0.0080	0.0000 ± 0.0018
S	9.698 ± 0.5209	1.763 ± 0.1000	0.4041 ± 0.0459
Cl	10.20 ± 0.5368	1.854 ± 0.1032	0.4249 ± 0.0480
K	7.738 ± 0.4023	1.407 ± 0.0775	0.3224 ± 0.0363
Ca	52.24 ± 2.640	9.498 ± 0.5101	2.177 ± 0.2439
Ti	0.9436 ± 0.0508	0.1716 ± 0.0098	0.0393 ± 0.0045
V	0.0373 ± 0.0102	0.0068 ± 0.0019	0.0016 ± 0.0005
Cr	0.0136 ± 0.0090	0.0025 ± 0.0016	0.0006 ± 0.0004
Mn	0.1808 ± 0.0147	0.0329 ± 0.0027	0.0075 ± 0.0010
Fe	9.996 ± 0.5028	1.817 ± 0.0972	0.4165 ± 0.0466
Co	0.0260 ± 0.0226	0.0047 ± 0.0041	0.0011 ± 0.0009
Ni	0.0508 ± 0.0147	0.0092 ± 0.0027	0.0021 ± 0.0006
Cu	0.0090 ± 0.0124	0.0016 ± 0.0023	0.0004 ± 0.0005
Zn	0.1130 ± 0.0136	0.0205 ± 0.0025	0.0047 ± 0.0007
Ga	0.0068 ± 0.0090	0.0012 ± 0.0016	0.0003 ± 0.0004
Ge	0.0000 ± 0.0079	0.0000 ± 0.0014	0.0000 ± 0.0003
As	0.0000 ± 0.0113	0.0000 ± 0.0021	0.0000 ± 0.0005
Se	0.0045 ± 0.0056	0.0008 ± 0.0010	0.0002 ± 0.0002
Br	0.0576 ± 0.0068	0.0105 ± 0.0012	0.0024 ± 0.0004
Rb	0.0271 ± 0.0068	0.0049 ± 0.0012	0.0011 ± 0.0003
Sr	0.7616 ± 0.0396	0.1385 ± 0.0076	0.0317 ± 0.0036
Y	0.0000 ± 0.0090	0.0000 ± 0.0016	0.0000 ± 0.0004
Zr	0.0090 ± 0.0113	0.0016 ± 0.0021	0.0004 ± 0.0005
Mo	0.0215 ± 0.0147	0.0039 ± 0.0027	0.0009 ± 0.0006
Pd	0.0215 ± 0.0475	0.0039 ± 0.0086	0.0009 ± 0.0020
Ag	0.1119 ± 0.0508	0.0203 ± 0.0093	0.0047 ± 0.0022
Cd	0.0848 ± 0.0542	0.0154 ± 0.0099	0.0035 ± 0.0023
In	0.1062 ± 0.0599	0.0193 ± 0.0109	0.0044 ± 0.0025
Sn	0.0859 ± 0.0701	0.0156 ± 0.0127	0.0036 ± 0.0029
Sb	0.1797 ± 0.1390	0.0327 ± 0.0253	0.0075 ± 0.0058
Ba	0.0508 ± 0.0486	0.0092 ± 0.0088	0.0021 ± 0.0020
La	0.0000 ± 0.0429	0.0000 ± 0.0078	0.0000 ± 0.0018
Hg	0.0000 ± 0.0158	0.0000 ± 0.0029	0.0000 ± 0.0007
Pb	0.0463 ± 0.0170	0.0084 ± 0.0031	0.0019 ± 0.0007
IC			
Cl	12.94 ± 0.6470	2.353 ± 0.0452	0.5392 ± 0.0603
Br	0.0000 ± 0.5000	0.0000 ± 0.0129	0.0000 ± 0.0208
NO3	5.940 ± 0.2970	1.080 ± 0.0220	0.2475 ± 0.0277
SO4	35.74 ± 1.787	6.498 ± 0.1206	1.489 ± 0.1665
Na	18.24 ± 0.9120	3.316 ± 0.0627	0.7600 ± 0.0850
NH4	2.330 ± 0.1165	0.4236 ± 0.0099	0.0971 ± 0.0109
K	1.860 ± 0.0930	0.3382 ± 0.0083	0.0775 ± 0.0087

Client: U005 - State of Utah DEQ
Report Number: 09-089

Lab ID: 09-X787
Client ID: 8131370
Site: Lindon (LN)
Sample Date: 4/21/08
Deposit Area: 11.3 cm^2
Size Fraction: PM2.5
Comments: Blank

Analyte	µg/filter
XRF	
Na	0.3480 ± 0.2938
Mg	0.0000 ± 0.1232
Al	0.0000 ± 0.0531
Si	0.0000 ± 0.0441
P	0.0000 ± 0.0215
S	0.0000 ± 0.0192
Cl	0.0000 ± 0.0339
K	0.0000 ± 0.0192
Ca	0.0531 ± 0.0147
Ti	0.0000 ± 0.0079
V	0.0000 ± 0.0068
Cr	0.0000 ± 0.0079
Mn	0.0000 ± 0.0102
Fe	0.0000 ± 0.0158
Co	0.0192 ± 0.0203
Ni	0.0565 ± 0.0158
Cu	0.0056 ± 0.0136
Zn	0.0056 ± 0.0113
Ga	0.0090 ± 0.0102
Ge	0.0000 ± 0.0090
As	0.0000 ± 0.0124
Se	0.0045 ± 0.0068
Br	0.0034 ± 0.0056
Rb	0.0079 ± 0.0068
Sr	0.0000 ± 0.0079
Y	0.0079 ± 0.0090
Zr	0.0000 ± 0.0113
Mo	0.0023 ± 0.0170
Pd	0.0780 ± 0.0475
Ag	0.0610 ± 0.0497
Cd	0.0000 ± 0.0531
In	0.0915 ± 0.0610
Sn	0.1232 ± 0.0723
Sb	0.1220 ± 0.1424
Ba	0.0396 ± 0.0271
La	0.0203 ± 0.0147
Hg	0.0000 ± 0.0158
Pb	0.0339 ± 0.0181
IC	
Cl	0.0000 ± 0.5000
Br	0.0000 ± 0.5000
NO3	0.5100 ± 0.0255
SO4	0.0000 ± 0.5000
Na	0.0000 ± 1.000
NH4	0.0000 ± 0.5000
K	0.0000 ± 0.5000

Chester LabNet - Portland

XRF-772 **XRF Analytical Quality Assurance Report**

Client: Utah DEQ
Report: 09-089
Analysis Period: April 2, 2009
Number of Samples: 7

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Ti(0)	1	287.42	288.90	na	na	0.52
Fe(1)	1	325.13	330.34	na	na	1.60
Se(2)	1	68.70	71.42	na	na	3.96
Pb(2)	1	83.76	87.62	na	na	4.61
Cd(3)	1	79.25	85.48	na	na	7.86

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)			% Rec.
			High	Low	Average	
Al 1832	4	14.6 +/- .97	15.17	14.01	14.68 +/- 0.42	100.6
Si 1832	4	34.0 +/- 1.1	35.24	33.76	34.59 +/- 0.54	101.7
Si 1833	4	31.5 +/- 2.1	31.69	31.03	31.37 +/- 0.24	99.6
S 2708	4	2.46 +/- .25	2.35	2.21	2.28 +/- 0.06	92.7
K 1833	4	16.4 +/- 1.64	16.88	16.55	16.67 +/- 0.13	101.6
Ca 1832	4	1.32 +/- 0.17	1.32	1.27	1.30 +/- 0.02	98.2
Ti 1833	4	12.1 +/- 1.79	11.88	11.50	11.63 +/- 0.15	96.1
V 1832	4	4.70 +/- .49	4.97	4.77	4.85 +/- 0.08	103.2
Mn 1832	4	4.54 +/- .49	4.87	4.79	4.82 +/- 0.03	106.2
Fe 1833	4	13.6 +/- .45	13.29	13.00	13.14 +/- 0.10	96.6
Cu 1832	4	2.43 +/- .16	2.77	2.25	2.57 +/- 0.19	105.6
Zn 1833	4	3.88 +/- .30	4.10	3.93	4.01 +/- 0.07	103.4
Pb 1833	4	16.1 +/- .75	17.01	16.03	16.55 +/- 0.41	102.8

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-772 REPLICATE REPORT

3.71

Original ID: 09-U257

Replicate ID: RU257

Filter Lot:

Deposit Mass: 309 µg

Deposit Area: 1.0 cm^2

Particle Size: T

Element	Original ug/cm2	Replicate ug/cm2	Difference ug/cm2		RPD
Al	3.7024 +- 0.3813	3.8940 +- 0.4332	-0.1916 +- 0.5771	+	-5.0 +- 15.2
P	0.0000 +- 0.1708	0.0000 +- 0.2175	0.0000 +- 0.2765		
S	6.6853 +- 0.5339	6.8057 +- 0.5614	-0.1205 +- 0.7748	+	-1.8 +- 11.5
Cl	5.3724 +- 0.3877	5.2391 +- 0.3899	0.1333 +- 0.5499	+	2.5 +- 10.4
K	23.0788 +- 1.4446	23.0994 +- 1.4494	-0.0206 +- 2.0464	+	-0.1 +- 8.9
Ca	10.3786 +- 0.6329	10.4685 +- 0.6416	-0.0899 +- 0.9012	+	-0.9 +- 8.6
Ti	0.2295 +- 0.0233	0.2587 +- 0.0308	-0.0291 +- 0.0386	+	-11.9 +- 15.8
V	0.0115 +- 0.0108	0.0312 +- 0.0154	-0.0197 +- 0.0188		
Cr	0.0446 +- 0.0063	0.0495 +- 0.0085	-0.0049 +- 0.0106	+	-10.4 +- 22.5
Mn	0.1182 +- 0.0090	0.1290 +- 0.0113	-0.0108 +- 0.0144	+	-8.7 +- 11.7
Fe	2.9190 +- 0.2343	2.9296 +- 0.2386	-0.0106 +- 0.3344	+	-0.4 +- 11.4
Co	0.0000 +- 0.0038	0.0000 +- 0.0053	0.0000 +- 0.0065		
Ni	0.0232 +- 0.0027	0.0296 +- 0.0038	-0.0064 +- 0.0047	0	-24.2 +- 17.7
Cu	0.7157 +- 0.0363	0.7500 +- 0.0568	-0.0343 +- 0.0674	+	-4.7 +- 9.2
Zn	0.2047 +- 0.0180	0.2085 +- 0.0208	-0.0038 +- 0.0275	+	-1.8 +- 13.3
Ga	0.0000 +- 0.0061	0.0000 +- 0.0090	0.0000 +- 0.0108		
Ge	0.0014 +- 0.0054	0.0042 +- 0.0075	-0.0028 +- 0.0092		
As	0.0159 +- 0.0080	0.0286 +- 0.0071	-0.0126 +- 0.0107		
Se	0.0074 +- 0.0043	0.0000 +- 0.0060	0.0074 +- 0.0073		
Br	0.0230 +- 0.0043	0.0250 +- 0.0060	-0.0020 +- 0.0074	+	-8.3 +- 30.9
Rb	0.0154 +- 0.0052	0.0303 +- 0.0075	-0.0149 +- 0.0092		
Sr	0.4957 +- 0.0261	0.5065 +- 0.0278	-0.0108 +- 0.0381	+	-2.2 +- 7.6
Y	0.0020 +- 0.0066	0.0220 +- 0.0096	-0.0200 +- 0.0117		
Zr	0.0669 +- 0.0092	0.0898 +- 0.0130	-0.0229 +- 0.0159	0	-29.3 +- 20.3
Mo	0.0921 +- 0.0121	0.1028 +- 0.0168	-0.0107 +- 0.0207	+	-11.0 +- 21.3
Pd	0.0098 +- 0.0073	0.0227 +- 0.0103	-0.0129 +- 0.0126		
Ag	0.0228 +- 0.0070	0.0231 +- 0.0098	-0.0003 +- 0.0120	+	-1.5 +- 52.5
Cd	0.0259 +- 0.0069	0.0000 +- 0.0096	0.0259 +- 0.0118		
In	0.0251 +- 0.0070	0.0000 +- 0.0099	0.0251 +- 0.0121		
Sn	0.0646 +- 0.0086	0.0513 +- 0.0118	0.0133 +- 0.0146	+	23.0 +- 25.2
Sb	0.1047 +- 0.0118	0.0797 +- 0.0154	0.0250 +- 0.0194	0	27.2 +- 21.0
Ba	2.1959 +- 0.1187	2.0758 +- 0.1216	0.1201 +- 0.1699	+	5.6 +- 8.0
La	0.1871 +- 0.0511	0.1693 +- 0.0716	0.0178 +- 0.0880	+	10.0 +- 49.4
Hg	0.0007 +- 0.0121	0.0020 +- 0.0170	-0.0013 +- 0.0209		
Pb	0.0488 +- 0.0123	0.0139 +- 0.0166	0.0350 +- 0.0206		

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

Blank Data

Analyte	Sample ID	Measured Conc. mg/L	MDL Conc. mg/L
Cl	ICB	< MDL	0.050
Cl	Prep_Blk	< MDL	0.050
Cl	*Meth_Blk**	*< MDL*	*1.00*
Cl	CCB	< MDL	0.050
Cl	CCB	< MDL	0.050
Br	ICB	< MDL	0.050
Br	Prep_Blk	< MDL	0.050
Br	*Meth_Blk**	*< MDL*	*1.00*
Br	CCB	< MDL	0.050
Br	CCB	< MDL	0.050
NO3	ICB	< MDL	0.050
NO3	Prep_Blk	< MDL	0.050
NO3	*Meth_Blk**	*< MDL*	*1.00*
NO3	CCB	< MDL	0.050
NO3	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	Prep_Blk	< MDL	0.050
SO4	*Meth_Blk**	*1.66*	*1.00*
SO4	CCB	< MDL	0.050
SO4	CCB	< MDL	0.050
Na	ICB	< MDL	0.100
Na	Prep_Blk	< MDL	0.100
Na	*Meth_Blk**	*39.3*	*2.00*
Na	CCB	< MDL	0.100
Na	CCB	< MDL	0.100
Na	ICB	< MDL	0.100
Na	CCB	< MDL	0.100
NH4	ICB	< MDL	0.050
NH4	Prep_Blk	< MDL	0.050
NH4	*Meth_Blk**	*< MDL*	*1.00*
NH4	CCB	< MDL	0.050
NH4	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	Prep_Blk	< MDL	0.050
K	*Meth_Blk**	*< MDL*	*1.00*
K	CCB	< MDL	0.050
K	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	CCB	< MDL	0.050

*: Method Blank concentration in µg/filter

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

Calibration QC

Analyte	Sample ID	Standard Conc. mg/L	Measured Conc. mg/L	Percent Recovery
Cl	ICV_LO	1.00	1.01	100.9
Cl	ICV_MID	10.0	9.79	97.9
Cl	CCV_LO	1.00	1.05	105.2
Cl	CCV_MID	10.0	9.85	98.5
Cl	CCV_LO	1.00	1.01	101.4
Cl	CCV_MID	10.0	9.80	98.0
Br	ICV_LO	1.00	0.98	97.7
Br	ICV_MID	10.0	9.29	92.9
Br	CCV_LO	1.00	0.98	98.4
Br	CCV_MID	10.0	9.35	93.5
Br	CCV_LO	1.00	0.98	97.9
Br	CCV_MID	10.0	9.29	92.9
NO3	ICV_LO	1.00	0.99	98.9
NO3	ICV_MID	10.0	9.69	96.9
NO3	CCV_LO	1.00	1.00	99.9
NO3	CCV_MID	10.0	9.74	97.4
NO3	CCV_LO	1.00	0.99	99.1
NO3	CCV_MID	10.0	9.67	96.7
SO4	ICV_LO	1.00	1.03	103.1
SO4	ICV_MID	10.0	9.89	98.9
SO4	CCV_LO	1.00	1.09	109.3
SO4	CCV_MID	10.0	9.95	99.5
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.89	98.9
Na	ICV_LO	0.500	0.51	102.2
Na	ICV_MID	5.00	5.16	103.3
Na	CCV_LO	0.500	0.51	101.8
Na	CCV_MID	5.00	5.16	103.1
Na	CCV_LO	0.500	0.51	102.0
Na	CCV_MID	5.00	5.12	102.3
Na	ICV_MID	5.00	5.10	102.0
Na	CCV_MID	5.00	5.10	102.1
NH4	ICV_LO	0.500	0.50	100.2
NH4	ICV_MID	5.00	4.96	99.2
NH4	CCV_LO	0.500	0.50	100.4
NH4	CCV_MID	5.00	4.98	99.6
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.92	98.5
K	ICV_LO	0.500	0.52	103.8
K	ICV_MID	5.00	5.15	103.0
K	CCV_LO	0.500	0.52	103.8
K	CCV_MID	5.00	5.14	102.9
K	CCV_LO	0.500	0.52	104.0
K	CCV_MID	5.00	5.10	102.0
K	ICV_MID	5.00	5.07	101.4
K	CCV_MID	5.00	5.08	101.6

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Quartz
Report Number: 09-089

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Replicate Data

Analyte	Sample ID	Sample Conc. mg/L	Replicate Conc. mg/L	RPD
Cl	09-U253	2.55	2.54	0.24
Br	09-U253	< 0.05	< 0.05	N/C #
NO3	09-U253	1.33	1.32	0.75
SO4	09-U253	4.54	4.52	0.42
Na	09-U255	16.6	16.7	0.60
NH4	09-U255	0.284	0.285	0.35
K	09-U255	0.547	0.546	0.18

RPD = {(sample-replicate)/[(sample+replicate)/2]}x100
N/C: RPD is not calculated when sample or replicate is below detection limit
#: per EPA CLP protocol, control limits do not apply if sample and/or replicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Post Spike Analysis

Analyte	Sample ID	Sample Conc. mg/L	Spike Conc. mg/L	Spike Amount mg/L	Percent Recovery
Cl	LCS	< 0.05	9.49	10.0	94.9
Cl	09-U254	2.11	11.3	10.0	91.8
Br	LCS	< 0.05	9.00	10.0	90.0
Br	09-U254	< 0.05	9.06	10.0	90.6
NO3	LCS	< 0.05	9.35	10.0	93.5
NO3	09-U254	1.44	11.2	10.0	97.4
SO4	LCS	0.083	9.73	10.0	96.5
SO4	09-U254	6.34	16.3	10.0	99.2
Na	LCS	1.96	6.84	5.00	97.6
Na	09-U256	2.42	7.43	5.00	100.
NH4	LCS	< 0.05	4.78	5.00	95.6
NH4	09-U256	0.249	5.16	5.00	98.1
K	LCS	< 0.05	5.00	5.00	100.
K	09-U256	0.426	5.79	5.00	107.

*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: OC/EC
Sample Description: 47mm Quartz
Report Number: 09-089

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Calibration QC

Sucrose Standard

Sample ID	Sucrose Std. Conc. µg/cm²	Measured Conc. µg/cm²	Percent Recovery
Sucrose 10ul 4/8/09	28.06	28.4	101.2

OC/EC Split

Sample ID	%OC Given	%OC Measured	Percent Recovery
94-Q150 4/8/09	89.6	91	101.6

Blank Data

Sample ID	Analyte	Measured Conc. µg/cm²	MDL µg/cm²
4/8/09	OC	<MDL	0.2
	EC	<MDL	0.2

Duplicate Data

Sample ID	Analyte	Sample Conc. µg/cm²	Duplicate Conc. µg/cm²	RPD
09-U254	OC	26.6	26.13	1.8
	EC	0.12	0.13	8.0
	TC	26.72	26.26	1.7

RPD = [(sample - duplicate)/(sample + duplicate)/2] x 100

QA/QC Limits
Sucrose Standard: 90 - 115% Recovery *OC/EC Split: 80-120% Recovery*
Duplicate: ± 20% RPD

CHESTER LabNet

XRF-770 **XRF Analytical Quality Assurance Report**

Client: Utah DEQ
Report: 09-089
Analysis Period: April 3, 2009
Number of Samples: 9

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Si(0)	1	1785.92	1844.00	na	na	3.25
Ti(1)	1	591.36	576.76	na	na	-2.47
Fe(1)	1	1321.41	1294.08	na	na	-2.07
Se(3)	1	343.74	321.69	na	na	-6.41
Pb(3)	1	394.75	368.40	na	na	-6.68
Cd(4)	1	277.97	272.66	na	na	-1.91

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833, SRM 2783

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)					% Rec.
			High	Low	Average			
Al 1832	4	14.6 +/- .97	15.60	14.50	15.11	+/-	0.42	103.5
Si 1832	4	34.0 +/- 1.1	35.08	34.09	34.73	+/-	0.41	102.1
Si 1833	4	31.5 +/- 2.1	31.71	30.52	31.03	+/-	0.51	98.5
S 2708	4	2.46 +/- .25	2.43	2.38	2.40	+/-	0.02	97.4
K 1833	4	16.4 +/- 1.64	17.54	16.89	17.27	+/-	0.24	105.3
Ca 2783	4	1.33 +/- 0.17	1.31	1.28	1.29	+/-	0.01	97.7
Ti 1833	4	12.1 +/- 1.79	11.87	11.39	11.62	+/-	0.22	96.0
V 1832	4	4.70 +/- .49	4.73	4.38	4.51	+/-	0.13	95.9
Mn 1832	4	4.54 +/- .49	4.53	4.36	4.45	+/-	0.07	98.0
Fe 1833	4	13.6 +/- .45	13.47	13.39	13.42	+/-	0.03	98.7
Cu 1832	4	2.43 +/- .16	2.63	2.47	2.55	+/-	0.08	104.8
Zn 1833	4	3.88 +/- .30	3.97	3.59	3.79	+/-	0.14	97.6
Pb 1833	4	16.1 +/- .75	15.99	15.53	15.71	+/-	0.18	97.6

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-770 REPLICATE REPORT

3.49

Original ID: 09-X782

Replicate ID: RX782

Filter Lot:

Deposit Mass: 1199 µg

Deposit Area: 11.3 cm^2

Particle Size: F

Element	Original ug/cm2	Replicate ug/cm2	Difference ug/cm2	RPD
Na	0.0000 +- 0.0782	0.0000 +- 0.0875	0.0000 +- 0.1174	
Mg	3.4575 +- 0.2777	3.1481 +- 0.2592	0.3095 +- 0.3799	+ 9.4 +- 11.5
Al	5.7308 +- 0.3827	5.4823 +- 0.3671	0.2484 +- 0.5304	+ 4.4 +- 9.5
Si	15.3227 +- 0.8568	14.9105 +- 0.8334	0.4123 +- 1.1953	+ 2.7 +- 7.9
P	0.0502 +- 0.0067	0.0423 +- 0.0076	0.0079 +- 0.0102	+ 17.1 +- 22.0
S	0.7181 +- 0.0407	0.7319 +- 0.0434	-0.0138 +- 0.0595	+ -1.9 +- 8.2
Cl	0.2416 +- 0.0153	0.2548 +- 0.0178	-0.0132 +- 0.0235	+ -5.3 +- 9.5
K	2.0760 +- 0.1070	2.1142 +- 0.1095	-0.0382 +- 0.1531	+ -1.8 +- 7.3
Ca	9.0809 +- 0.4625	9.2507 +- 0.4715	-0.1699 +- 0.6604	+ -1.9 +- 7.2
Ti	0.2700 +- 0.0138	0.2745 +- 0.0144	-0.0045 +- 0.0199	+ -1.7 +- 7.3
V	0.0061 +- 0.0014	0.0080 +- 0.0020	-0.0019 +- 0.0024	+ -27.1 +- 35.0
Cr	0.0057 +- 0.0011	0.0073 +- 0.0016	-0.0016 +- 0.0019	+ -24.0 +- 29.6
Mn	0.0718 +- 0.0064	0.0719 +- 0.0089	-0.0001 +- 0.0110	+ -0.2 +- 15.3
Fe	2.8946 +- 0.1450	2.9315 +- 0.1470	-0.0369 +- 0.2065	+ -1.3 +- 7.1
Co	0.0050 +- 0.0029	0.0000 +- 0.0041	0.0050 +- 0.0051	
Ni	0.0062 +- 0.0015	0.0039 +- 0.0021	0.0023 +- 0.0026	+ 46.2 +- 51.4
Cu	0.0094 +- 0.0015	0.0091 +- 0.0020	0.0003 +- 0.0025	+ 3.0 +- 27.1
Zn	0.0192 +- 0.0016	0.0194 +- 0.0020	-0.0003 +- 0.0026	+ -1.4 +- 13.3
Ga	0.0008 +- 0.0009	0.0006 +- 0.0013	0.0002 +- 0.0016	
Ge	0.0000 +- 0.0009	0.0000 +- 0.0011	0.0000 +- 0.0015	
As	0.0000 +- 0.0012	0.0000 +- 0.0017	0.0000 +- 0.0020	
Se	0.0006 +- 0.0006	0.0010 +- 0.0009	-0.0004 +- 0.0011	
Br	0.0082 +- 0.0007	0.0080 +- 0.0009	0.0002 +- 0.0012	+ 2.4 +- 14.9
Rb	0.0110 +- 0.0009	0.0124 +- 0.0012	-0.0014 +- 0.0015	+ -12.1 +- 12.7
Sr	0.0524 +- 0.0028	0.0526 +- 0.0030	-0.0003 +- 0.0041	+ -0.5 +- 7.8
Y	0.0000 +- 0.0009	0.0027 +- 0.0013	-0.0027 +- 0.0015	
Zr	0.0126 +- 0.0013	0.0179 +- 0.0018	-0.0053 +- 0.0023	- -35.0 +- 14.8
Mo	0.0029 +- 0.0016	0.0000 +- 0.0021	0.0029 +- 0.0026	
Pd	0.0067 +- 0.0048	0.0001 +- 0.0067	0.0067 +- 0.0083	
Ag	0.0000 +- 0.0050	0.0038 +- 0.0070	-0.0038 +- 0.0086	
Cd	0.0117 +- 0.0055	0.0129 +- 0.0076	-0.0012 +- 0.0094	
In	0.0008 +- 0.0060	0.0203 +- 0.0085	-0.0196 +- 0.0104	
Sn	0.0113 +- 0.0070	0.0163 +- 0.0098	-0.0050 +- 0.0120	
Sb	0.0256 +- 0.0141	0.0318 +- 0.0199	-0.0062 +- 0.0244	
Ba	0.0211 +- 0.0091	0.0311 +- 0.0112	-0.0100 +- 0.0144	
La	0.0013 +- 0.0065	0.0000 +- 0.0092	0.0013 +- 0.0113	
Hg	0.0016 +- 0.0015	0.0003 +- 0.0021	0.0013 +- 0.0026	
Pb	0.0080 +- 0.0018	0.0105 +- 0.0024	-0.0024 +- 0.0030	+ -26.2 +- 32.5

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Blank Data

Analyte	Sample ID	Measured Conc. mg/L	MDL Conc. mg/L
Cl	ICB	< MDL	0.050
Cl	Prep_Blk	< MDL	0.050
Cl	*Meth_Blk**	*0.500*	*0.500*
Cl	CCB	< MDL	0.050
Cl	CCB	< MDL	0.050
Br	ICB	< MDL	0.050
Br	Prep_Blk	< MDL	0.050
Br	*Meth_Blk**	< *MDL*	*0.500*
Br	CCB	< MDL	0.050
Br	CCB	< MDL	0.050
NO3	ICB	< MDL	0.050
NO3	Prep_Blk	< MDL	0.050
NO3	*Meth_Blk**	*0.700*	*0.500*
NO3	CCB	< MDL	0.050
NO3	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	Prep_Blk	< MDL	0.050
SO4	*Meth_Blk**	< *MDL*	*0.500*
SO4	CCB	< MDL	0.050
SO4	CCB	< MDL	0.050
SO4	ICB	< MDL	0.050
SO4	CCB	< MDL	0.050
Na	ICB	< MDL	0.100
Na	Prep_Blk	< MDL	0.100
Na	*Meth_Blk**	*1.10*	*1.00*
Na	CCB	< MDL	0.100
Na	CCB	< MDL	0.100
NH4	ICB	< MDL	0.050
NH4	Prep_Blk	< MDL	0.050
NH4	*Meth_Blk**	< *MDL*	*0.500*
NH4	CCB	< MDL	0.050
NH4	CCB	< MDL	0.050
K	ICB	< MDL	0.050
K	Prep_Blk	< MDL	0.050
K	*Meth_Blk**	< *MDL*	*0.500*
K	CCB	< MDL	0.050
K	CCB	< MDL	0.050
K	ICB	< MDL	0.050

*: Method Blank concentration in µg/filter

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Calibration QC

Analyte	Sample ID	Standard Conc. mg/L	Measured Conc. mg/L	Percent Recovery
Cl	ICV_LO	1.00	1.05	105.2
Cl	ICV_MID	10.0	9.85	98.5
Cl	CCV_LO	1.00	1.01	101.4
Cl	CCV_MID	10.0	9.80	98.0
Cl	CCV_LO	1.00	1.01	100.9
Cl	CCV_MID	10.0	9.72	97.2
Br	ICV_LO	1.00	0.98	98.4
Br	ICV_MID	10.0	9.35	93.5
Br	CCV_LO	1.00	0.98	97.9
Br	CCV_MID	10.0	9.29	92.9
Br	CCV_LO	1.00	0.97	97.4
Br	CCV_MID	10.0	9.21	92.1
NO3	ICV_LO	1.00	1.00	99.9
NO3	ICV_MID	10.0	9.74	97.4
NO3	CCV_LO	1.00	0.99	99.1
NO3	CCV_MID	10.0	9.67	96.7
NO3	CCV_LO	1.00	0.99	98.6
NO3	CCV_MID	10.0	9.59	95.9
SO4	ICV_LO	1.00	1.09	109.3
SO4	ICV_MID	10.0	9.95	99.5
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.89	98.9
SO4	CCV_LO	1.00	1.03	103.4
SO4	CCV_MID	10.0	9.81	98.1
SO4	ICV_LO	1.00	1.02	101.8
SO4	ICV_MID	10.0	9.87	98.7
SO4	CCV_LO	1.00	1.04	103.7
SO4	CCV_MID	10.0	9.96	99.6
Na	ICV_LO	0.500	0.51	101.8
Na	ICV_MID	5.00	5.16	103.1
Na	CCV_LO	0.500	0.51	102.0
Na	CCV_MID	5.00	5.12	102.3
Na	CCV_LO	0.500	0.50	100.8
Na	CCV_MID	5.00	5.06	101.2
NH4	ICV_LO	0.500	0.50	100.4
NH4	ICV_MID	5.00	4.98	99.6
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.92	98.5
NH4	CCV_LO	0.500	0.50	99.6
NH4	CCV_MID	5.00	4.86	97.1
K	ICV_LO	0.500	0.52	103.8
K	ICV_MID	5.00	5.14	102.9
K	CCV_LO	0.500	0.52	104.0
K	CCV_MID	5.00	5.10	102.0
K	CCV_LO	0.500	0.52	103.4
K	CCV_MID	5.00	5.05	101.0
K	ICV_MID	5.00	5.07	101.4
K	CCV_MID	5.00	5.08	101.6

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: State of Utah DEQ
Project Number: U005
Analytical Technique: Ion Chromatography
Sample Description: 47mm Teflon
Report Number: 09-089

Replicate Data

Analyte	Sample ID	Sample Conc. mg/L	Replicate Conc. mg/L	RPD	
Cl	09-X779	0.627	0.623	0.64	
Br	09-X779	< 0.05	< 0.05	N/C	#
NO3	09-X779	0.989	0.991	0.20	
SO4	09-X779	2.16	2.17	0.23	
Na	09-X781	2.36	2.36	0.13	
NH4	09-X781	0.446	0.446	0.00	
K	09-X781	0.248	0.248	0.00	#

RPD = {(sample-replicate)/[(sample+replicate)/2]}x100
N/C: RPD is not calculated when sample or replicate is below detection limit
#: per EPA CLP protocol, control limits do not apply if sample and/or replicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Post Spike Analysis

Analyte	Sample ID	Sample Conc. mg/L	Spike Conc. mg/L	Spike Amount mg/L	Percent Recovery
Cl	LCS	0.050	9.32	10.0	92.8
Cl	09-X780	0.508	9.98	10.0	94.7
Br	LCS	< 0.05	8.64	10.0	86.4
Br	09-X780	< 0.05	9.15	10.0	91.5
NO3	LCS	0.070	9.04	10.0	89.7
NO3	09-X780	1.07	10.5	10.0	93.9
SO4	LCS	< 0.05	9.24	10.0	92.4
SO4	09-X780	2.90	12.4	10.0	94.5
Na	LCS	0.110	4.83	5.00	94.4
Na	09-X782	0.672	6.12	5.00	109.
NH4	LCS	< 0.05	4.67	5.00	93.4
NH4	09-X782	0.500	5.32	5.00	96.3
K	LCS	< 0.05	4.80	5.00	96.0
K	09-X782	0.298	5.39	5.00	102.

*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Spikes: ± 25%*

CHAIN-OF-CUSTODY FORM (March.2009)

ANALYSIS REQUESTED BY:	
Company:	Utah Division of Air Quality Air Monitoring Center
Address:	2861 West Parkway Blvd., West Valley City, Utah 84119
phone:	801.887.0760
fax:	801.972.6164
contact:	Andy Hale, 801.887.0771, andyhale@utah.gov Ken Symons, 801.887.0773, ksymons@utah.gov
Project Name	
Contract Number	076206

TESTING LABORATORY	
Company:	CHESTER LabNet
Address:	12242 SW Garden Place, Tigard, OR 97223
phone:	503.624.2183
fax:	503.624.2653
contact:	Paul Duda, pduda@chesterlab.net Lisa Ball, lball@chesterlab.net

SHIPPING CARRIER	
Company:	FedEx
Tracking Number:	7974 6806 1788
Shipping Date:	April.1.2009
Delivery Type:	Standard Overnight

#	Filter		Sampling						Sampler		Blank	Type of Analysis Needed				Lab Number
	Number	Type	Location	Date	Type	Length (hr)	Volume (m^3)	Mass Wt (mg)	Type	Size		XRF	IC	OC/EC		
1	20080488	Quartz	Lindon (LN)	April.15.2008	Ambient	24:00	21.2	3.487	Low Vol	PM10	no	yes	yes	yes		09-U253
2	20080492	Quartz	Lindon (LN)	April.19.2008	Ambient	23:59	20.5	3.717	Low Vol	PM10	no	yes	yes	yes		09-U254
3	20080609	Quartz	Hawthorn (HW)	April.19.2008	Ambient	23:59	20.7	3.960	Low Vol	PM10	no	yes	yes	yes		09-U255
4	20080727	Quartz	Lindon (LN)	May.20.2008	Ambient	24:00	20.3	3.584	Low Vol	PM10	no	yes	yes	yes		09-U256
5	20081074	Quartz	Ogden (O2)	July.4.2008	Ambient	23:59	20.3	1.656	Low Vol	PM10	no	yes	yes	yes		09-U257
6	20090387	Quartz	Lindon (LN)	March.4.2009	Ambient	24:00	21.0	4.258	Low Vol	PM10	no	yes	yes	yes		09-U258
7	8131301	Teflon	Lindon (LN)	April.15.2008	Ambient	23:59	24.0	0.589	Low Vol	PM2.5	no	yes	yes			09-X779
8	8131368	Teflon	Lindon (LN)	April.19.2008	Ambient	23:59	24.0	0.754	Low Vol	PM2.5	no	yes	yes			09-X780
9	8131360	Teflon	Hawthorn (HW)	April.19.2008	Ambient	24:00	24.0	0.752	Low Vol	PM2.5	no	yes	yes			09-X781
10	8131377	Teflon	North Provo (NP)	April.19.2008	Ambient	24:00	24.0	1.199	Low Vol	PM2.5	no	yes	yes			09-X782
11	8131629	Teflon	Lindon (LN)	May.20.2008	Ambient	23:59	24.0	0.877	Low Vol	PM2.5	no	yes	yes			09-X783
12	8132053	Teflon	Brigham City (BR)	June.26.2008	Ambient	24:00	24.0	1.026	Low Vol	PM2.5	no	yes	yes			09-X784
13	8132188	Teflon	Ogden (O2)	July.4.2008	Ambient	23:59	24.0	1.027	Low Vol	PM2.5	no	yes	yes			09-X785
14	9516469	Teflon	Lindon (LN)	March.4.2009	Ambient	24:00	24.0	0.550	Low Vol	PM2.5	no	yes	yes			09-X786
15	8131370	Teflon	Lindon (LN)	April.21.2008						PM2.5	yes	yes	yes			09-X787

Relinquished by:		Comments:	Received by:		Comments:
Date:	April.1.2009	Price Quote Number: B0903261	Date:	4/2/09	
Time:	10:50		Time:	9:40	
Name:	Andy Hale		Name:	Paul Duda	
Signature:	Andy Hale		Signature:	Paul Duda	

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CHAIN-OF-CUSTODY FORM (March.2009)

ANALYSIS REQUESTED BY:	
Company:	Utah Division of Air Quality Air Monitoring Center
Address:	2861 West Parkway Blvd., West Valley City, Utah 84119
phone:	801.887.0760
fax:	801.972.6164
contact:	Andy Hale, 801.887.0771, andyhale@utah.gov Ken Symons, 801.887.0773, ksymons@utah.gov
Project Name	
Contract Number	076206

TESTING LABORATORY	
Company:	CHESTER LabNet
Address:	12242 SW Garden Place, Tigard, OR 97223
phone:	503.624.2183
fax:	503.624.2653
contact:	Paul Duda, pduda@chesterlab.net Lisa Ball, lball@chesterlab.net

SHIPPING CARRIER	
Company:	FedEx
Tracking Number:	7974 6806 1788
Shipping Date:	April.1.2009
Delivery Type:	Standard Overnight

#	Filter		Sampling						Sampler		Blank	Type of Analysis Needed				Lab Number
	Number	Type	Location	Date	Type	Length (hr)	Volume (m^3)	Mass Wt (mg)	Type	Size		XRF	IC	OC/EC		
16	2009B001	Quartz								PM10	yes	yes	yes	yes		09-0259
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																

Relinquished by:		Comments:
Date:	April.1.2009	Price Quote Number: B0903261
Time:	10:50	
Name:	Andy Hale	
Signature:	Andy Hale	

Received by:		Comments:
Date:	4/2/09	
Time:	9:40	
Name:	Paul Duda	
Signature:	Paul Duda	

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RAW DATA

Available upon request

Appendix C

Proof of Publication

4770 S. 5600 W.
P.O. POX 704005
WEST VALLEY CITY, UTAH 84170
FED.TAX I.D.# 87-0217663

The Salt Lake Tribune MEDIAOne A NEWSPAPER AGENCY COMPANY Morning News

PROOF OF PUBLICATION

CUSTOMER'S COPY

CUSTOMER NAME AND ADDRESS	ACCOUNT NUMBER	DATE
UT ST DEPT OF ENV QUALITY, DIVISION OF AIR QUALITY PO BOX 144820 SALT LAKE CITY UT 84114	9001399880	6/2/2010

ACCOUNT NAME	
UT ST DEPT OF ENV QUALITY,	
TELEPHONE	ADORDER# / INVOICE NUMBER
8015364000	0000575972 / I00575972-05172010
SCHEDULE	
Start 05/17/2010	End 06/01/2010
CUST. REF. NO.	
DAQPN-006-10	
CAPTION	
Notice of Public Comment Period High Wir	
SIZE	
51 Lines	3.00 CC
TIMES	R
8	
MISC. CHARGES	AD CI
	TOTA
	519.08

Notice of Public Comment Period
High Wind Exceptional Event - Event Date April 15, 2008

Federal regulations, 40 Code of Federal Regulations (CFR) Part 50, allow states to exclude air quality data that exceed or violate a National Ambient Air Quality Standard (NAAQS) if they can demonstrate that an "exceptional event" has caused the exceedance or violation. Exceptional events are unusual or naturally occurring events that can affect air quality but are not reasonably controllable or preventable using techniques implemented to attain and maintain the NAAQS.

Exceptional events may be caused by human activity that is unlikely to recur at a particular location, or may be due to a natural event. The Environmental Protection agency (EPA) defines a "natural event" as an event in which human activity plays little or no direct causal role to the event in question. For example, a natural event could include such things as high winds, wild fires, and seismic/volcanic activity. In addition, the EPA will allow states to exclude data from regulatory determinations on a case-by-case basis for monitoring stations that measure values that exceed or violate the NAAQS due to emissions from fireworks displays from cultural events.

Federal regulations (40 CFR Part 50.14 (c) (3)(i)) require that all relevant flagged data, the reasons for the data being flagged, and a demonstration that the flagged data are caused by exceptional events be made available by the State for 30 days of public review and comment. These comments will be considered in the final demonstration of the event that is submitted to EPA. The following monitored values have been attributed to a high wind exceptional event:

- April 15, 2008, North Salt Lake Monitoring Station, 188 µg/m^3 PM10
- April 15, 2008, North Salt Lake Co-monitoring Station, 220 PM10
- April 15, 2008, Hawthorne Monitoring Station, 166 µg/m^3 PM10
- April 15, 2008, Cottonwood Monitoring Station, 177 µg/m^3 PM10
- April 15, 2008, Lindon Monitoring Station, 164 µg/m^3 PM10

The documentation to support removing these data from use in regulatory determinations wil be available beginning June 1, 2010 (for public review and comment) at the following www.airquality.utah.gov\Public-Interest\Public-Commen-Hearings\Exceptional_Events\Exceptional_Events.htm or at the Multi Agency State Govern ment Office Building, 195 North 1950 West in Salt Lake City. In compliance with the Ameri can with Disabilities Act, individuals with special needs (including auxiliary communicative aid and services) should contact Brooke Baker, Office of Human Resources at (801) 536-441 (TDD 536-4414).

The comment period will close at 5:00 p.m. on June 30, 2010. Comments postmarked on o before that date will be accepted. Comments may be submitted by electronic mail t jkarmazyn@utah.gov or may be mailed to:

M. Cheryl Heying, Director
ATTN: High Wind Exceptional Events
Utah Division of Air Quality
PO Box 144820
Salt Lake City, UT 84114-3097

575972 UPAXL

AFFIDAVIT OF PUBLICATION

AS NEWSPAPER AGENCY CORPORATION LEGAL BOOKER, I CERTIFY THAT THE ATTACHED ADVERTISEMENT OF **Notice of Public Comment Period High Win** FOR **UT ST DEPT OF ENV QUALITY,** WAS PUBLISHED BY THE NEWSPAPER AGENCY CORPORATION, AGENT FOR THE SALT LAKE TRIBUNE AND DESERET NEWS, DAILY NEWSPAPERS PRINTED IN THE ENGLISH LANGUAGE WITH GENERAL CIRCULATION IN UTAH, AND PUBLISHED IN SALT LAKE CITY, SALT LAKE COUNTY IN THE STATE OF UTAH. NOTICE IS ALSO POSTED ON UTAHLEGALS.COM ON THE SAME DAY AS THE FIRST NEWSPAPER PUBLICATION DATE AND REMAINS ON UTAHLEGALS.COM INDEFINATELY.

PUBLISHED ON Start 05/17/2010 End 06/01/2010

SIGNATURE Linda L Stone

VIRGINIA CRAFT
Notary Public, State of Utah
Commission # 581469
My Commission Expires
January 12, 2014

DATE 6/2/2010

Virginia Craft

THIS IS NOT A STATEMENT BUT A "PROOF OF PUBLICATION"
PLEASE PAY FROM BILLING STATEMENT

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Certification

I, Joel Karmazyn, Environmental Scientist III for the Utah Division of Air Quality, do hereby certify that the public comment period held to receive comments regarding PM10 Exceptional Wind Event - April 15, 2008, was held in accordance with the information provided in each published public notice and as defined in Utah Code 19-2-109.

Signed this 06 day of July 2010.