

Exceptional Events Waiver Request

For Exceptional PM_{2.5} Events
between June 27 and July 6, 2013
and between August 1 and 14,
2013 in Fairbanks, Alaska

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Introduction

Fairbanks is the second largest city in Alaska. It lies in the Fairbank North Star Borough (FNSB), which covers an area of 7,361 square miles and has a population of approximately

99,200¹. Fairbanks is situated on the banks of the Chena River in the upper Tanana Valley in the interior region of the state. North of the city are low hills that border the Tanana Valley (Figure 1). Interior Alaska experiences average winter temperatures ranging between -2°F and -19°F and average summer temperatures between 53°F and 72°F. Temperatures have been recorded as low as -78°F in mid-winter, and as high as 93°F in summer. Average annual precipitation is 11.3 inches and ice fog is common during the winter.



Figure 1. Map of Alaska and inset showing Tanana Valley, Fairbanks, and North Pole.

Fairbanks experiences 21 hours of direct sunlight between May 10 and August 2 each summer, and less than four hours of direct sunlight between November 18 and January 24 each winter.

In December of 2009, the Environmental Protection Agency (EPA) designated 244 square miles (3.3%) with an estimated population of over 85,000 residents (88%) of the FNSB as a PM_{2.5} non-attainment area (Figure 2). The non-attainment area encompasses the cities of Fairbanks and North Pole. During the summer months (May through September), the main source of elevated PM_{2.5} concentrations is smoke from wildland fires. During the winter months (October through March), local home heating emissions are the dominant PM_{2.5} source², to a much greater extent than industrial or mobile source emissions.

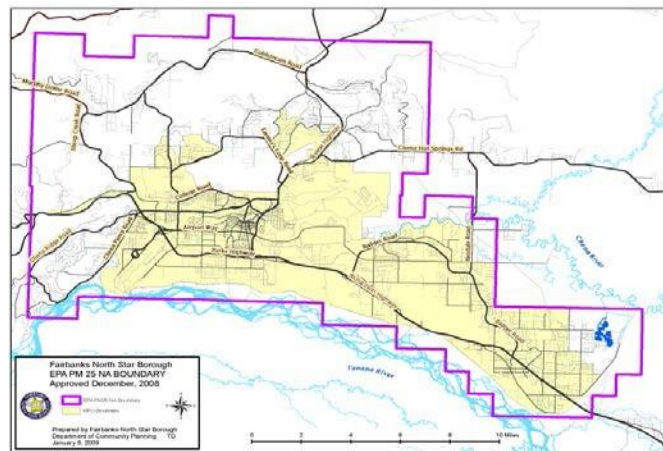


Figure 2. Map of PM_{2.5} non-attainment area in Fairbanks North Star Borough; purple lines indicate boundary.

¹ <http://www.co.fairbanks.ak.us/>

² http://dec.alaska.gov/air/anpms/comm/fbks1_pm.htm

During the summer of 2013, specifically on two days in June, two days in July, and three days in August 2013, the fine particulate monitor located in downtown Fairbanks recorded elevated concentrations of PM_{2.5} from wildland fire smoke in the interior of Alaska. The Alaska Department of Environmental Conservation (ADEC) has prepared this document as part of its Exceptional Events Waiver Request (EEWR) to exclude these seven days of air quality data (06/27/13, 06/30/13, 07/06/13, 07/15/2013, 08/08/2013, 08/11/13, and 08/14/13) from regulatory decisions pursuant to section 319(b)(3)(B) of the Clean Air Act.

During the summer wildland fire season in 2013, the FNSB operated two separate air quality sampling technologies to measure PM_{2.5} concentrations. Primary observational PM_{2.5} concentrations are from the Fairbanks NCORE Federal Reference Monitor (FRM) AQS ID 02-090-0034-88101-1 (and collocated 02-090-0034-88101-2) and the State Office Building (SOB) FRM AQS ID 02-090-0010-88101-1. Secondary data are from the co-located NCORE Federal Reference Monitor (FRM) AQS ID 02-090-0034-88101-2. Hourly concentrations are reported from a co-located beta attenuation monitor (BAM) AQS ID 02-090-0034-88502-3. The BAM does not meet Federal Equivalence Method (FEM) criteria. The data recorded with the BAM are therefore only used for a qualitative description of the event, rather than comparison of the measurements to the National Ambient Air Quality Standards (NAAQS). The primary FRM collects PM_{2.5} 24-hour averaged samples every third day following the EPA national sampling schedule. The secondary FRM collects PM_{2.5} 24-hour averaged samples every sixth day. The co-located continuous BAM data are hourly PM_{2.5} concentrations used on non-FRM days. The SOB data are PM_{2.5} 24-hour averaged filters run on a 1-in-3 day schedule.

Borough staff mainly use the BAM data for issuing air quality advisories. For this analysis, these data are only used for a qualitative discussion of the event and are considered supporting documentation. The FRM sampler collects a 24-hour integrated averaged, while the continuous BAMs record hourly averages.

The BAM continuous hourly data are correlated to the FRM data using the following method: First, the continuous BAM 24-hr concentration average is compared to the FRM coincident 24 consecutive hours i.e., midnight to midnight local standard time for days when the FRM was operated. This correlation is then applied as a correction to the BAM continuous hourly concentration values. During the summer months (multiple years) both instruments showed an excellent correlation.

All PM_{2.5} monitors at the Fairbanks NCORE site, the NCORE Federal Reference Monitor (FRM) AQS ID 02-090-0034-88101-1, the co-located NCORE Federal Reference Monitor (FRM) AQS ID 02-090-0034-88101-2, and the continuous beta attenuation monitor (BAM) AQS ID 02-090-0034-88502-3 recorded elevated PM_{2.5} concentrations that were caused by smoke originating from wildland fires in Interior Alaska. The monitor at the SOB, FRM AQS ID 02-090-88101-1

also recorded elevated PM_{2.5} concentrations that were caused by smoke originating from wildland fires in Interior Alaska. Because there were multiple fires and because it is not possible to separate the impacts from individual fire events, ADEC combined the documentation for all seven days into one EEWR.

This EEWR follows the steps outlined in the Exceptional Events Rule and includes:

- a brief description of the event,
- evidence supporting the natural origin of the events,
- evidence that the events could not have been reasonably controlled or prevented,
- data showing that the event affected air quality,
- data showing that the PM_{2.5} concentrations exceeded historical fluctuations,
- evidence supporting a clear, causal relationship between the events and air quality impacts, and
- evidence that there would not have been an exceedance(s) but for the events.

Description of the Event

The first part of the event began in late June 2013, and lasted through early July. In mid-August the smoke again increased and another occurrence of high PM_{2.5} concentrations was recorded.

The Skinny Road and Stuart Creek² fires were the fires closest to Fairbanks during the June/July event and were the primary cause of the high concentrations during that period. However, there were numerous lightning strikes between June 21 and June 26 that resulted in many new fire starts. Figure 3 shows the main fires and the late June fire starts that contributed to smoke throughout the interior of Alaska during this time.

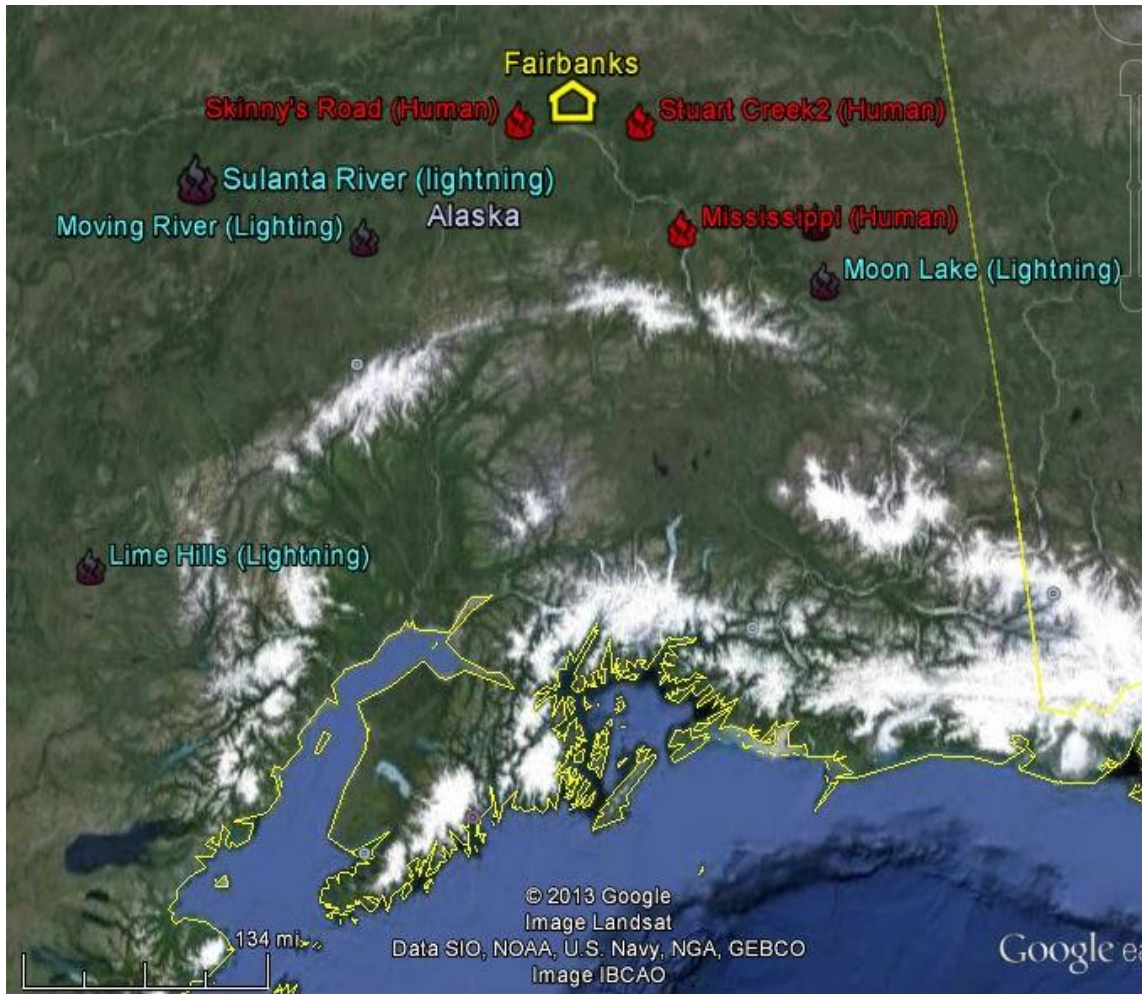


Figure 3. Main contributing fires during the June/July event in red. Contributing fires to the June/July event in light blue.

³There were two fires named Stuart Creek2. The first fire in May was a small prescribed burn. On June 19, the second wildfire was ignited by U. S. Army live fire training. The second wildfire is addressed in this document.

In mid-August, two of the fires that caused the June/July events sprang back to life and raised smoke in the Fairbanks area again.

The Stuart Creek² fire that impacted Fairbanks in both June and July was started by military training on June 19, 2013. On June 21 the fire was flown and Alaska Fire Service (AFS) reported two small smokes. The term smokes denotes smoke was visible but no flames or other fire activity were observed. The fire was not flown again until June 25 when the aircraft reported the fire had “blown out” (crossed the boundary) of the military area. Between June 26 and 27 the fire increased in size from 50 to 400 acres.

The Mississippi fire was ignited on May 31, 2013, and increased in size to 652 acres by June 4, but did not grow after that time and was in monitor status. The Mississippi fire had no impact on the elevated concentrations in late June/early July. Although this fire increased in size slowly between June 4 and August 9 when it was measured at 2,456 acres, the real impact began on August 10 when the fire grew by 31,397 acres to a total of 33,853 acres. The ‘Clear Causal’ section provides a detailed fire, meteorology, and smoke description.

Samples collected by FNSB staff from the Federal Reference Method (FRM) monitor every three days according to EPA’s national monitoring schedule document the impacts to the area caused by the event. The FRM at the State Office Building (SOB) and the Fairbanks NCORE sites in downtown Fairbanks collected samples that had elevated PM_{2.5} concentrations on four of seven samples day between June 27 and July 15, 2013, and again on three consecutive sample days between August 8 and August 14, 2013. Table 1 lists the dates and the PM_{2.5} concentrations.

Table 1. 24-hour PM_{2.5} concentrations FRM in µg/m³ at the Fairbanks NCORE and SOB sites

| Date | PM _{2.5} Concentration * | | |
|------------|-----------------------------------|------------------|-------------|
| | NCORE primary | NCORE collocated | SOB |
| 06/27/2013 | 58.0 | 58.3 | 58.7 |
| 06/30/2013 | 32.9 | n/a | 32.6 |
| 07/06/2013 | 27.5 | n/a | 34.4 |
| 07/15/2013 | 12.9 | n/a | 11.9 |
| 08/08/2013 | 12.1 | 11.9 | 12.1 |
| 08/11/2013 | 21.0 | n/a | 20.6 |
| 08/14/2013 | 20.8 | 22.6 | 23.5 |

* Exceedances indicated in bold font.

While not all seven 24-hour concentrations exceeded the 24-hour National Ambient Air Quality Standard (NAAQS), all were at least twice as high as levels typical of times with no wildland fire smoke. During non-wildfire summer months in the Fairbanks area, the maximum 24-hour average

PM_{2.5} average concentrations range between 3 and 6 µg/m³⁴. Figure 4 shows the two spikes in PM_{2.5} associated with the fires in late June/early July and again in August.

ADEC flagged all concentrations during this period that were near the new annual NAAQS of 12 µg/m³. Some of the fires impacting the interior of Alaska ignited in mid-June and continued to burn throughout the entire period. Because smoke from multiple fires caused the elevated PM_{2.5} concentrations, ADEC decided to treat all the days listed in Table 1 as one event. Daily PM_{2.5} concentrations varied with meteorological conditions and fire growth or suppression. Wind direction and the proximity of the Skinny Road and Stuart Creek² fires were the most important components. Although the PM_{2.5} concentrations varied, the cause of the elevated PM_{2.5} levels throughout the entire period was wildland fire smoke. See the Clear Causal Relationship section for a detailed breakout of fire area and smoke (PM_{2.5}) activity.

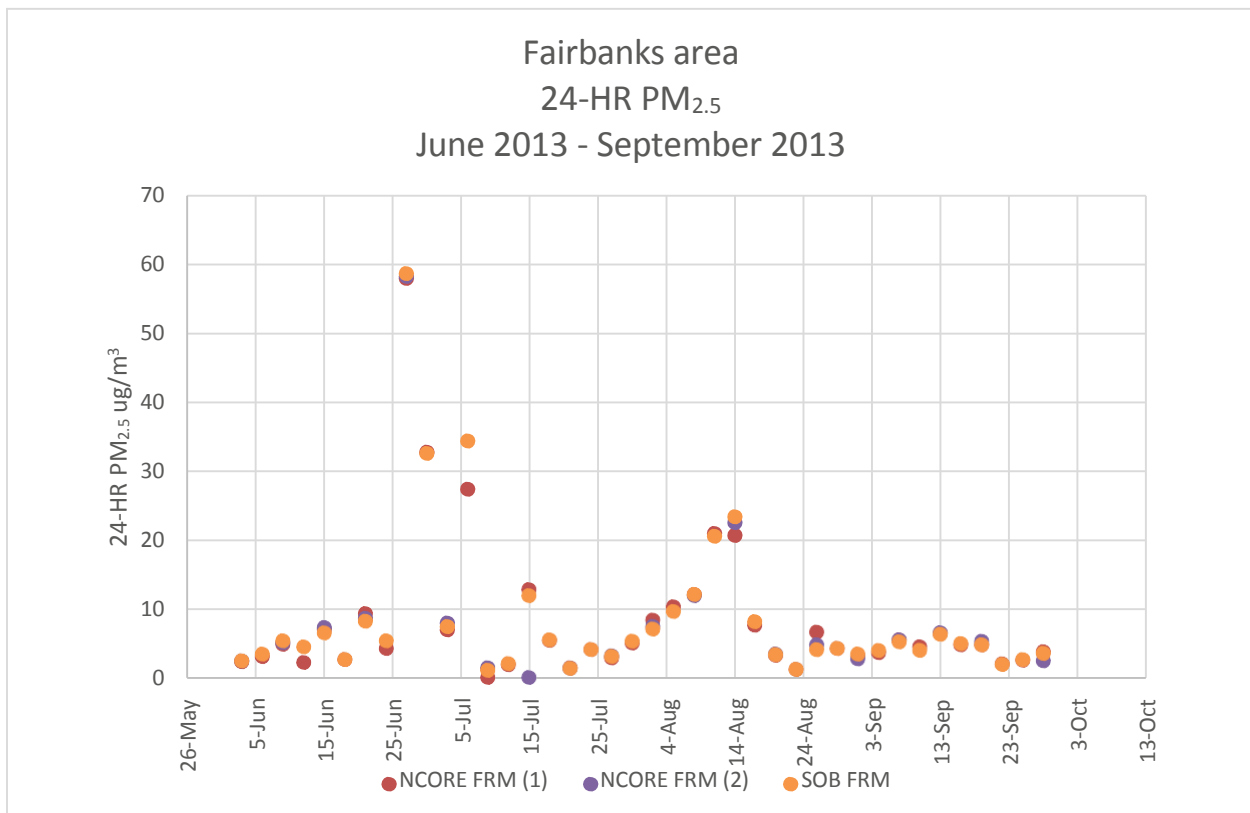


Figure 4. Fairbanks area 24-hr PM_{2.5} June through September 2013

⁴For more background information see the EEWR for 2009 (sections: The Event Was Natural & PM_{2.5} Concentrations Exceeded Historical Fluctuations).
http://www.dec.state.ak.us/air/am/am_projects.htm

Meteorology

The Alaska Fire Service (AFS) meteorologist summarized the 2013 fires season as follows:

“2013 will be remembered as one of the shortest, but hottest summers on record. After a cold spring and snowy May, temperatures ramped up by June, and conditions stayed hot and dry till the end of August, with only a little precipitation. Fuel conditions reached near record dryness at some locations, spurring the issuance of three Fuels and Fire Behavior Advisories. See Appendix E. Despite many record-setting hot temperatures, the stable high pressure kept thunderstorms at bay, and lightning to a minimum. The end of August heralded a cold and wet month, finally wetting fuels across the state.”

With many comparisons between the hot, dry summers of 2004 and 2013, it seems that the lack of lightning, and therefore the lack of natural fire starts, is what kept the 2013 fire season from becoming catastrophic.”

<http://fire.ak.blm.gov/content/weather/summaries/2013%20Fire%20Season.pdf>.

Monthly meteorological conditions below are from the Alaska Center for Climate Assessment and Policy, in Partnership with the Alaska Climate Research Center, Sea Ice Outlook, National Center for Environmental Prediction, and the National Weather Service and are published in the Alaska Climate Dispatch <http://accap.uaf.edu/library/dispatches>.

May 2013. The meteorological conditions required for an active fire season in Fairbanks began setting up very early in the season. May 2013 was a month of extremes which favored dry conditions. The Alaska Climate Research Center’s May 2013 Statewide Summary shows that Fairbanks recorded a record LOW temperature on May 20 of 27°F (previous 28°F, 1964) then only 10 days later on May 30, a record HIGH of 84°F (tied 1983 record). These extremes were the cause of numerous disasters in Interior Alaska as streams and rivers filled with huge blocks of ice and flooded many villages. <http://climate.gi.alaska.edu/Summary/Statewide/2013/May>.

These extremes also led to the early establishment of favorable fire weather conditions. The first 2/3 of the month were very cold and, in this case, cold equals dry. The monthly precipitation for May was only 0.15 inches, about 25% of normal. The late cold also meant that the ground did not thaw. With the very sudden warm-up after the 21st of May, the snow rapidly melted but since the land was still frozen, the water ran off into the streams and rivers.

<http://testclimate.gi.alaska.edu/city-summaries/2013/5>.

June 2013 continued to reinforce the favorable fire conditions. June in Fairbanks was warmer than normal, with a monthly mean of 66.8°F, or 6.4°F above the long-term mean of 60.4°F. On the 25th and 26th, a sweltering 92°F was observed on both days. June was also a very dry month with just 0.43 inches of precipitation, 31% of the expected amount of 1.37 inches. June was the tenth driest in the last 101 years. <http://testclimate.gi.alaska.edu/city-summaries/2013/6>.

July 2013 in Fairbanks was warmer than normal, with a monthly mean of 64.3°F, or 1.8°F above the long-term mean of 62.5°F for the month, and 2.5°F cooler than June. Like June, July's precipitation was lighter than normal, with 1.01 inches, just 47% of the expected amount of 2.16 inches, making it the 17th driest July in the last 101 years. The 0.51 inches that fell on the 18th was slightly more than half the monthly total. <http://akclimate.org/city-summaries/2013/7>.

August 2013 in Fairbanks was warmer than normal, with a monthly mean of 59.4°F, or 3.3°F above the long-term mean of 56.1°F for the month. The highest temperature was 85°F on the 1st and 7th. August was the only month this summer when precipitation was above normal, with 2.02 inches, just 7% above the expected amount of 1.88 inches. However, all significant rainfall occurred after the middle of the month (see Table 2 below). The 0.68 inches that fell on the 23rd was a new daily record, breaking the 0.50 inch record from 2003. <http://climate.gi.alaska.edu/city-summaries/2013/8>. No days of elevated PM_{2.5} concentrations were observed after the first significant rainfall event on August 15.

Table 2. Daily precipitation, Fairbanks, Alaska

| Day | Precip: inches | Day | Precip: inches | Day | Precip: inches | Day | Precip: inches | Day | Precip: inches |
|--------|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|-----|-------------------|
| 1 | 0 | 8 | 0 | 15 | 0.37 | 22 | 0.03 | 29 | 0.07 |
| 2 | 0 | 9 | 0.01 | 16 | 0 | 23 | 0.68 | 30 | 0.02 |
| 3 | T | 10 | T | 17 | 0 | 24 | 0 | 31 | 0 |
| 4 | T | 11 | T | 18 | T | 25 | 0 | | |
| 5 | 0 | 12 | 0 | 19 | 0.14 | 26 | 0 | | |
| 6 | 0 | 13 | 0 | 20 | 0.68 | 27 | 0 | | |
| 7 | T | 14 | T | 21 | 0.01 | 28 | 0.01 | | |
| Totals | 2.02 | | | | | | | | |

The Event was Natural

When the meteorological conditions are favorable and dry fuels are available as they were in 2013, wildfires are a common occurrence in Alaska. On average, 932,823 acres burn annually. More than 90% of the area consumed lies in Interior Alaska, where the summers are relatively warm and dry. Most wildland fires are ignited by lightning and periodically burn the spruce, birch, and cottonwood dominated forests. In 2013, some wildland fires were lightning-caused and some were human-caused – further discussion below. These fires were burning at the same time so it is not possible to determine how much of the increase in PM_{2.5} concentration is attributable to lightning-caused fires versus human-caused fires. However, the human-caused fires were closer to Fairbanks.

The Alaska Fire Service determines the cause of each fire at the time the fire occurs. In 2013, the smoke that caused poor air quality in Fairbanks was from fires that were caused by both lightning and humans. During the June/July period, there were numerous lightning-caused fires that contributed to area-wide smoke over Alaska. However, three of the fires that impacted Fairbanks air quality during that period were determined to be human-caused. Later, in August, two of the human-caused fires were again responsible for elevated PM_{2.5} values.

Two of the three fires close to Fairbanks, the Mississippi and Stuart Creek² fires, both started on military land and were caused by military ordinance used during live fire training. These unintentional fires occur several times a year during live fire military training and are normally controlled and do not usually cause air quality degradation. The remaining fire, the Skinny Road fire, occurred on Native Claims Act land and was caused by sparks from equipment. See the Clear Causal Relationship section below for further details.

In 2013, the acreage burned was the fifth highest of the past 14 years. The AFS 2013 Fire Season report described the 2013 fires season as follows:

“After a cold spring and snowy May, temperatures ramped up by June, and conditions stayed hot and dry till the end of August, with only a little precipitation. Fuel conditions reached near record dryness at some locations, spurring the issuance of three Fuels and Fire Behavior Advisories. Despite many record-setting hot temperatures, the stable high pressure kept thunderstorms at bay, and lightning to a minimum. The end of August heralded a cold and wet month, finally wetting fuels across the state.”

<http://fire.ak.blm.gov/content/weather/summaries/2013%20Fire%20Season.pdf>

Due to the late spring followed immediately by rapid warming and increased fire hazard, there were only 4,894 acres burned in May as part of the prescribed burn program. In 2013, most prescribed burns occurred in the last two weeks of May and were conducted by AFS for the military.

The Event was not Reasonably Controllable or Preventable

The events described above were not reasonably controllable or preventable by the State for several reasons. First, authority over fire protection areas is split into three major jurisdictions

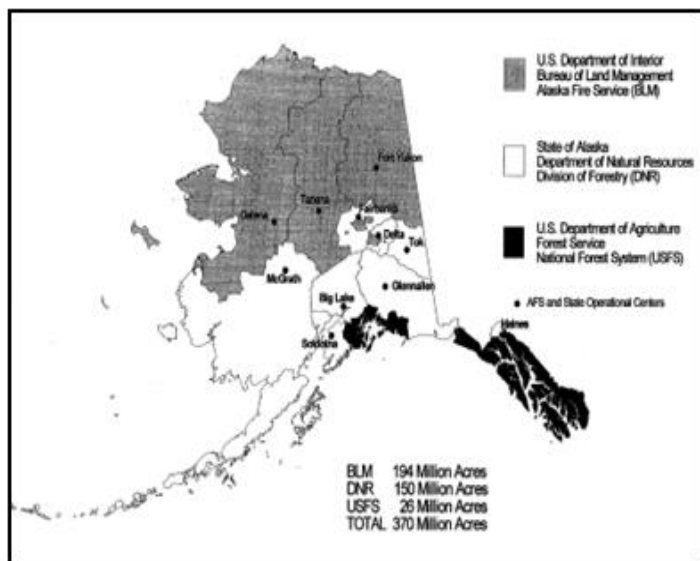


Figure 5. Alaska Wildland Fire Protection Areas

(Figure 5) so that smoke from fires outside of the state’s jurisdiction can impact state lands. Second, the events were caused by meteorological conditions (dry weather, high fuel load as described above in the 2013 Fire Season Summary from the Alaska Fire Service) and military training over which the State has no reasonable control. Figure 6 and Figure 7 show the breakdown of Landowners and Management Options for 2013.

AFS and military units work together on control measures as it is known that live fire training will occasionally ignite fires. Control measures include prescribed burns in the spring to reduce fuel loads and to “blackline” all the training areas, and, on days with live fire training, coordination with AFS and military responders.

Numbers by Landowner

| | | Critical | Full | Modified | Limited | Total |
|---------------------------|-------|----------|----------|-----------|-----------|-------------|
| Bureau of Indian Affairs | fires | | 1 | | | 1 |
| | acres | | 9.2 | | 456 | 465.3 |
| Bureau of Land Management | fires | | 1 | 8 | 26 | 35 |
| | acres | | 0.1 | 30,414.5 | 378,208.2 | 408,622.8 |
| Borough | fires | 10 | | | | 10 |
| | acres | 2.4 | | | | 2.4 |
| Fish and Wildlife Service | fires | | 8 | | 27 | 35 |
| | acres | | 1,107.4 | | 107,109.3 | 108,216.7 |
| Military Lands | fires | 7 | 16 | | 5 | 28 |
| | acres | 82.3 | 7.4 | | 97,533.5 | 97,623.2 |
| Native Claims Act Lands | fires | 23 | 34 | 9 | 7 | 73 |
| | acres | 867.8 | 8,244.7 | 3,947.1 | 57,970.5 | 71,030.1 |
| National Park Service | fires | | | | 26 | 26 |
| | acres | | | | 169,018.6 | 169,018.6 |
| Private | fires | 217 | 20 | 1 | | 238 |
| | acres | 579.0 | 281.5 | 0.1 | 1,438.3 | 2,298.9 |
| State of Alaska | fires | 42 | 39 | 13 | 64 | 158 |
| | acres | 745.8 | 20,064.3 | 24738.5 | 413,460.8 | 459,009.4 |
| U.S. Forest Service | fires | | 3 | 1 | 5 | 9 |
| | acres | | 0.3 | 0.2 | 0.6 | 1.1 |
| Total Fires | fires | 299 | 122 | 32 | 160 | 613 |
| Total Acres Burned | acres | 2,277.3 | 29,714.9 | 447,822.7 | 811,735.1 | 1,316,288.5 |

Number of fires is based on ownership and management option at point of origin. Acreage shown is actual acres burned by owner and management option, i.e. fires that burned on multiple ownerships are counted as fires based on the ownership at point of origin, but the acreage burned is divided and shown based on the owner where the acres burned.

Figure 6. Fires by Landowner and Management Option.
<http://fire.ak.blm.gov/content/aicc/stats/firestats.pdf>

Numbers by Management Option

| | Critical | | Full | | Modified | | Limited | |
|------------------|----------|-------|-------|----------|----------|----------|---------|-----------|
| | Fires | Acres | Fires | Acres | Fires | Acres | Fires | Acres |
| Galena | | | 1 | 4,685.6 | 6 | 12,834.9 | 26 | 31,113.7 |
| Military | 6 | 1 | 15 | 79,093.3 | | 42,541.8 | 6 | 33,218.4 |
| Tanana | 1 | .1 | 1 | 13,425.5 | 1 | 4,473.5 | 34 | 406,870.9 |
| Upper Yukon | 1 | .1 | 17 | 2,630.2 | 2 | 1,682.8 | 21 | 94,590.3 |
| Chugach | 3 | .7 | 2 | .8 | | | 1 | .1 |
| Tongass | 2 | .4 | 8 | .8 | 2 | .3 | 5 | .6 |
| Anchorage/Mat-Su | 74 | 58.7 | 17 | 50.6 | 4 | 67.9 | 1 | .1 |
| Copper River | 16 | 2.6 | 11 | 35.9 | 3 | .8 | 14 | 7,944.3 |
| Delta | 24 | 7.4 | 2 | 1.5 | | | | |
| Fairbanks | 86 | 224.4 | 13 | 2,424.4 | | | 8 | 2,191.4 |
| Haines | 3 | .4 | 1 | .1 | | | 1 | .1 |
| Kenai/Kodiak | 72 | 16.7 | 6 | 35.4 | | | | |
| Southwest | 1 | 80 | 12 | 36,195.1 | 13 | 98,050.5 | 27 | 318,754.3 |
| Tok | 10 | 8.4 | 16 | 3,514.5 | 1 | 33,421.4 | 16 | 86,035.8 |

Figure 7. Management Option Note that most Fairbanks Area fires are Critical or Full Option.
<http://fire.ak.blm.gov/content/aicc/stats/firestats.pdf>

The two major precursors to an extensive fire season in Alaska are dry meteorological conditions and ignition sources. The main precursor for fires in Alaska – dry meteorological conditions – cannot be reasonably controlled or prevented. The 2013 meteorology is noted for being one of extremes, from record cold, dry conditions to extreme hot, dry conditions. The winter of 2012-2013 left much of the eastern interior around Fairbanks with 150% of the average snow pack. Spring arrived very late with melt-out and river breakup at record or near record late dates. Most of the state received snowfall as late as May 18. However, around May 20, the pattern changed drastically. Record low temperatures suddenly became record high temperatures with highs over 80°F across the interior. In Fairbanks, the high temperature on May 18 was 35°F but only a week later on May 25 the high temperature was 77°F and continued to increase from then into early June. May was also extremely dry with only 0.15 inches of precipitation – normal precipitation is 0.60 inches. June continued the dry conditions with only 0.43 inches of precipitation versus the normal of 1.37 inches.

Control Efforts

Some prevention measures were completed in spite of the late season snow. The Alaska Fire Service was able to carry out mitigation in the Stuart Creek² and Mississippi fire areas. Prescribed burns were conducted in both areas in accordance with the Alaska Enhanced Smoke Management Plan (ESMP) and ADEC 18 AAC 50, Air Quality Control.

The Stuart Creek² and Mississippi areas are military training areas and live fire activities occur on training days throughout the year. Because this training can be an ignition source, these areas are burned and/or “black-lined” each spring. Black-lining is a procedure where the perimeter of an area is burned so if a fire is ignited within the training area it will be contained within the “black-line”. Unfortunately, in 2013 extreme dry conditions coupled with high winds allowed the fire to jump the black line. See discussion below about the Alaska Interagency Wildland Fire Management Plan (AIWFMP) requirements.

Figure 8 shows that the estimated amount of PM_{2.5} released during the prescribed burns is much smaller than the amount released during wildfire events.

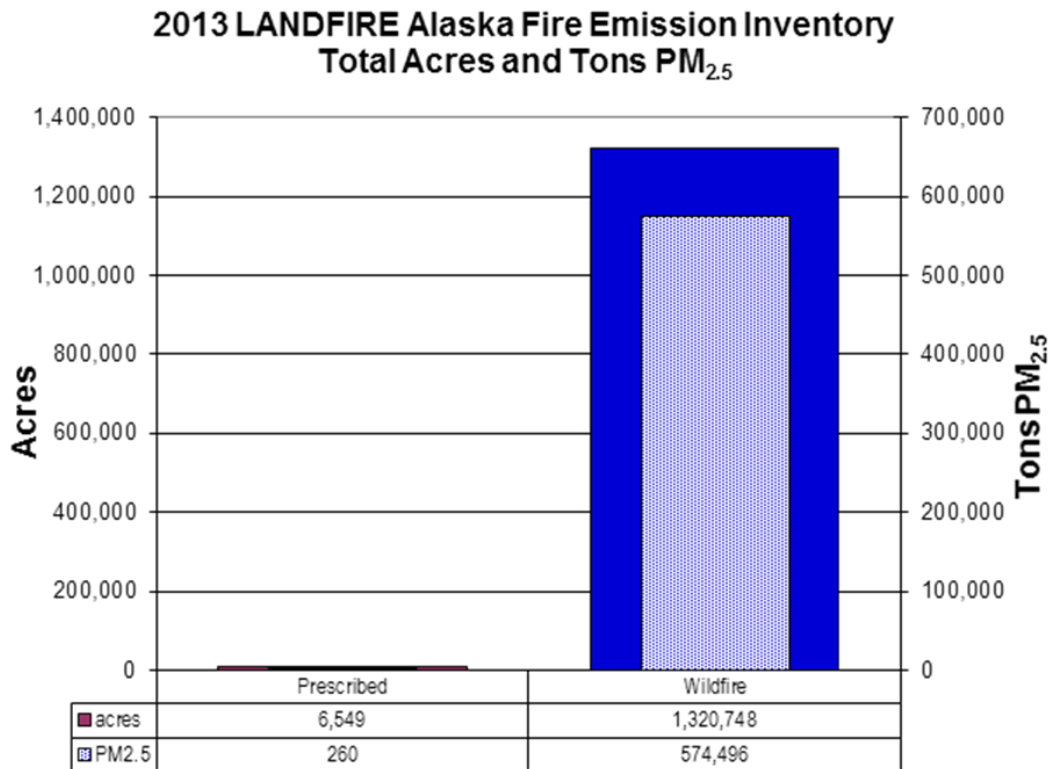


Figure 8. The number of acres burned and the tons of PM_{2.5} produced for both fire types (prescribed and wildfire) during the 2013 season. (ADEC, 2013 Alaska Wildfire Emissions Inventory, Figure 1)

Figure 9, Table 3, and Table 4 show that no prescribed burns were conducted during the period when the Fairbanks air quality was impacted.

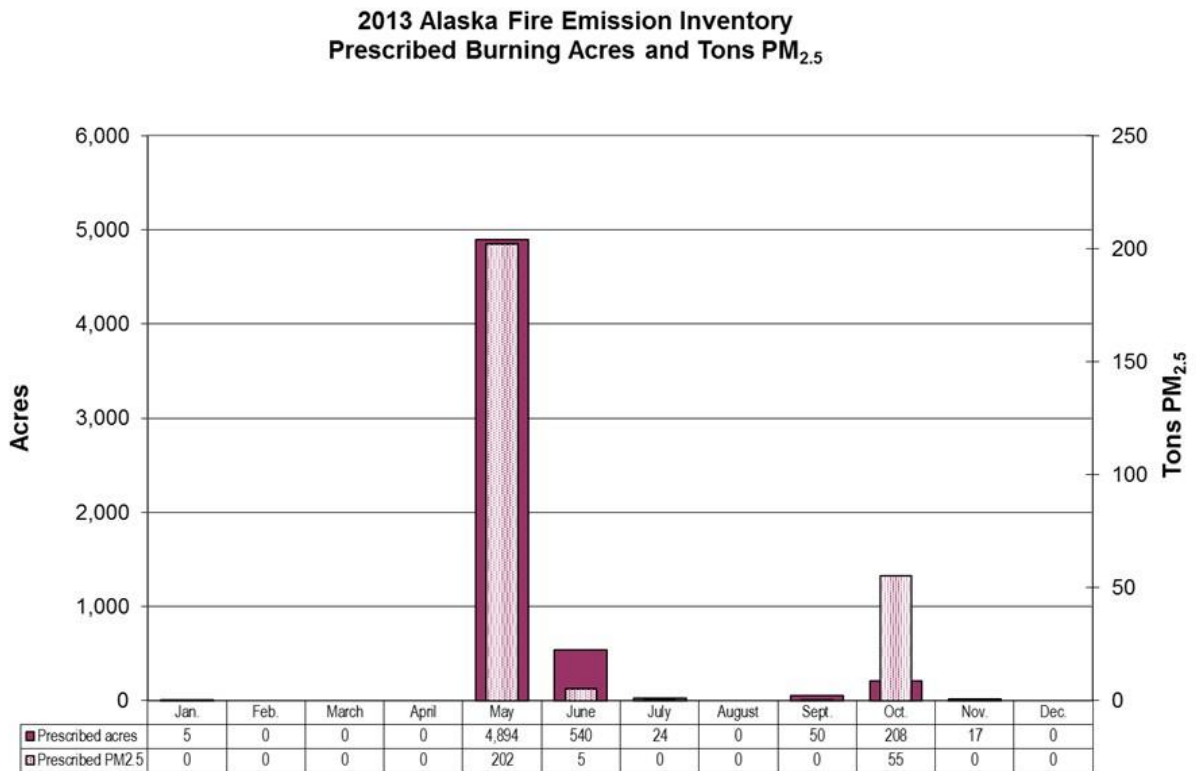


Figure 9. The total prescribed fire emissions in 2013, by month (ADEC, 2013 Alaska Wildfire Emissions Inventory, Figure 2).

Table 3. Data from 2013 Alaska Wildfire Emissions Inventory

| Wildfire Emissions | | | | | | | |
|---------------------------------|---------|--------|-----------|-----------|---------|---------|-----------|
| Calendar Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Wildfire Acres | 536,180 | 62,650 | 2,951,598 | 1,125,499 | 293,018 | 286,888 | 1,320,748 |
| Wildfire Tons PM _{2.5} | 207,428 | 35,785 | 1,597,149 | 549,494 | 180,976 | 89,560 | 574,496 |

| Prescribed Burn Emissions | | | | | | | |
|---------------------------|--------|-------|-------|--------|--------|--------|-------|
| Acres | 21,761 | 4,081 | 3,740 | 22,136 | 10,585 | 12,095 | 6,549 |
| Tons PM _{2.5} | 4,570 | 454 | 172 | 227 | 189 | 193 | 260 |

The Wildfire Emissions Inventory (ADEC, 2013) documents that most prescribed fires occurred in May 2013 and were conducted by/for the military (Figure 9, Table 3).

Table 4. Multi Year Average Fire Information

| | 1999 – 2008 | | 2007 – 2013 | | 2013 | |
|----------------|-------------|-----------|-------------|---------|---------|-----------|
| | # Fires | Acres | # Fires | Acres | # Fires | Acres |
| 6-year average | 512 | 2,451,813 | 476 | 875,972 | | |
| Annual | | | | | 613 | 1,316,288 |

The very dry conditions, the large number of ignition sources (lightning), and the remoteness of Alaska make it nearly impossible to control wildfires. Because of the remoteness and inaccessibility of most areas in Alaska, firefighting is very expensive and time consuming and fires are often monitored only (NOAA, Critical Weather patterns of US, 1999). In fact, many of these fires cannot be controlled or extinguished by human intervention and are only extinguished by the onset of wet weather.

The State of Alaska, the federal land management agencies, and Alaskan tribes developed an interagency plan, the Alaska Interagency Wildland Fire Management Plan (AIWFMP), to address controlling wildland fires. The AIWFMP requires an annual, pre-season land manager(s)/owner(s) review of the fire protection needs on lands under their management authority. Once fire protection needs are determined, the lands are placed in the Critical, Full, Modified, or Limited management option. Option selections are based on land manager/owner(s) values to be protected as well as land and resource management objectives.

The fire management strategies selected vary from initial attack and sustained suppression efforts in the critical and full management areas to surveillance in the limited management areas. This categorization and ensuing prioritization ensures that (1) human life, private property, and identified resources receive an appropriate level of protection with available firefighting resources, (2) the cost of the suppression effort is commensurate with values identified for protection, and (3) the ability of land manager(s)/owner(s) to achieve their individual management objectives is optimized.

The AIWFMP also stresses that lightning-caused wildland fires are an important component of the boreal forest and arctic tundra ecosystems, and the complete exclusion of these fires is neither ecologically sound nor economically feasible. The natural role of fire in the environment must be tempered by the need to protect human life and health, private property, developments, and certain valued natural and cultural resources.

During the fire season suppression resources may become limited due to commitments to numerous initial attack assignments and/or large fires. The pre-fire season assignment of management options establishes priorities for allocation of suppression forces and substantially improves the cost-effectiveness of wildland fire management.

A large portion of the state has been declared as Modified or Limited Maintenance. The Modified management option is intended to be the most flexible option available to land managers/owners. The intent of the Modified management option is to provide a higher level of protection when fire danger is high, the probability of significant fire growth is high, and the probability of containment is low. A lower level of protection is provided when fire danger decreases, potential for fire growth decreases, and the probability of containment increases. This option should reduce commitment of suppression resources when risks are low. This option also provides increased flexibility in the selection of suppression strategies when risks are high. The Modified option provides a management level between Full and Limited. Unlike Full management areas, the intent is not to minimize burned acres, but to balance acres burned with suppression costs and to accomplish land and resource management objectives.

The Limited management option allows for even less active fire intervention. This category recognizes areas where the cost of suppression may exceed the value of the resources to be protected, the environmental impacts of fire suppression activities may have more negative impacts on the resources than the effects of the fire, or the exclusion of fire may be detrimental to the fire-dependent ecosystem. The Limited management option reduces both long-term suppression risks and costs by reducing the frequency of large fires that may burn out of boundaries of Limited management regardless of the suppression effort. It also reduces current suppression costs and makes suppression goals more attainable in years of drought and intense fire activity. The Limited management option may also be chosen for areas where fire occurrence is essential to the biodiversity of the resources protected and the long-term ecological health of the land. Suppression actions may be initiated to keep a fire within the boundary of the management option or to protect identified higher value areas/sites. Site-specific areas that warrant higher levels of protection may occur within Limited management areas. Appropriate suppression actions to protect these sites will be taken when warranted, without compromising the intent of the Limited management area.

ADEC has implemented the following mitigation strategies to prevent fires and protect public health. Prior to the fire season, mitigation is carried out in accordance with the Alaska Enhanced Smoke Management Plan (ESMP) and ADEC 18 AAC 50, Air Quality Control. ADEC provides a clear and equitable regulatory basis for smoke management in Alaska through the ESMP. ADEC is responsible for reviewing controlled burns for resource management, for reviewing and approving land clearing applications, and for issuing controlled burn approvals. ADEC also ensures that controlled burn applications comply with state air quality regulations (18 AAC 50.065) and ESMP guidelines. While reduction of fuel loads is an important control factor, the ESMP clearly states that “Evaluating potential dispersion of smoke emissions from a project is the single most important component of an effective ESMP.” All controlled burns for resource management or land clearing that are greater than 40 acres in one year must have an approved burn permit. Further, the permit states that the Responsible Authority must notify ADEC at least

24 hours in advance, obtain a favorable dispersion forecast from the National Weather Service, and approval from the ADEC meteorologist. The ADEC meteorologist is responsible for ensuring that air quality standards are not violated during controlled burns. While these controlled burns reduce the fire fuels load, they cannot entirely eliminate the risk.

ADEC issues Air Quality Advisories in accordance with ADEC 18 AAC 50, Air Quality Control guidance to further protect public health during periods of poor air quality. The ADEC meteorologist issued 24 advisories related to wildland fire smoke between June 19 and August 15, 2013. Between June 27 and August 15, 2013, ADEC issued 17 advisories for the Central Interior region which includes Fairbanks. Other advisories were issued for the southwest portion of Alaska and the southeast area (Appendix B).

The Event Affected Air Quality

The PM_{2.5} 24-hour concentrations measured at the Fairbanks NCORE and SOB Primary monitors reflect the unusual fire conditions during the event. Table 5 lists the 24-hour PM_{2.5} concentrations of samples collected by the FRM monitors from June through August 2013. The PM_{2.5} concentrations were significantly higher than the normal average of 4.5 µg/m³ for summer days, June 1 through August 31 for each year, 1999-2013, without wildland fire smoke. See Appendix C. The concentrations (as measured by the FRM) exceeded the 24-hour NAAQS once on June 27, 2013 at the Fairbanks NCORE site. Six days had 24-hour average concentrations above the annual NAAQS of 12 µg/m³ but below the 24-hour NAAQS. During the months of June through August the PM_{2.5} concentration was fluctuating from higher than average to exceedance (12.1-58.0 µg/m³), with the highest value of 58.0 µg/m³ occurring on June 27, 2013 (Table 5).

Table 5. Fairbanks NCORE site Primary 24-hour PM_{2.5} concentrations 2013. Red font indicates an exceedance of the NAAQS, bold font indicates smoke impacted values flagged by ADEC.

| Date | PM _{2.5} concentration [µg/m ³] | Date | PM _{2.5} concentration [µg/m ³] | Date | PM _{2.5} concentration [µg/m ³] |
|------|--|------|--|--------|--|
| June | | July | | August | |
| 03 | 2.4 | 03 | 7.0 | 02 | 8.4 |
| 06 | 3.1 | 06 | 27.4 | 05 | 10.3 |
| 09 | 4.9 | 09 | 0.2 | 08 | 12.1 |
| 12 | 2.3 | 12 | 2.0 | 11 | 21.0 |
| 15 | 7.0 | 15 | 12.8 | 14 | 20.7 |
| 18 | 2.7 | 18 | 5.5 | 17 | 7.6 |
| 21 | 9.3 | 21 | 1.6 | 20 | 3.3 |
| 24 | 4.3 | 24 | 4.2 | 23 | 1.3 |
| 27 | 58.0 | 27 | 3.0 | 26 | 6.6 |
| 30 | 32.8 | 30 | 5.1 | 29 | 4.3 |

PM_{2.5} Concentrations Exceeded Historical Fluctuations (HF)

Summertime PM_{2.5} concentrations in the interior of Alaska are directly related to wildfires. Analysis of the FRM filter data from the State Office Building in Fairbanks showed an average summertime 24-HR concentration of 4.5 µg/m³ when wildfires were excluded. This value was computed by averaging all data for the months June through August 1999 through 2013 after removing any data flagged in AQS as exceptional event or unreliable. See Appendix C.

Wildfires occur in Alaska every year, primarily between June and September. In the last 14 years the average annual acreage burned by wildfire in Alaska is 1,566,969 acres. However, the annual acreage burnt can vary greatly, from as low as 43,965 in 1995, to 6,523,816 in 2004 (Table 7). The number of wildfires and the area burned each year vary with meteorological conditions and locations of fires. Wildfires are at a minimum during years of wet meteorological conditions and can be quite extensive in years with dry to exceptionally dry conditions. Long periods of dry conditions in May, June, and July 2013 set the system in motion by allowing extensive areas of wild lands to accumulate fire fuels. The high fuel loads and dry conditions led to wildfires when an ignition source was added.

Table 7. Wildfire History of Alaska 2000 – 2013, from the “Alaska Fire Season 2013 Wildland Fire Summary and Statistics Annual and Annual AICC situation Reports”⁵

| Year | Acres burned | # Fires |
|------|--------------|---------|
| 2000 | 756,296 | 369 |
| 2001 | 218,113 | 351 |
| 2002 | 2,186,682 | 544 |
| 2003 | 602,146 | 465 |
| 2004 | 6,523,816 | 696 |
| 2005 | 4,649,597 | 624 |
| 2006 | 270,539 | 305 |
| 2007 | 649,411 | 506 |
| 2008 | 103,299 | 368 |
| 2009 | 2,951,592 | 527 |
| 2010 | 1,125,419 | 688 |
| 2011 | 293,018 | 515 |
| 2012 | 286,888 | 418 |
| 2013 | 1,320,752 | 612 |

The fire potential outlook for the 2013 fire season was “below normal” for the southern 2/3^{ds} of the state in May, then “normal” statewide for the rest of the season. There were no significant fires in May due to the late snowmelt and cold temperatures up until the 20th. However, May was also a dry time in the Interior of Alaska.

⁵Wildland Fire Summary and Statistics Annual Report – AICC, Alaska Fire Season 2013

In the first week of June, the 2013 Fire Season looked like it would be an extremely busy one with dry hot weather. But despite many temperature and precipitation similarities to the record-breaking 2004 fire season, a lack of lightning kept the number of acres burned to a near-average 1.3 million acres.

The thing that stands out in the 2013 meteorology is how the early 2013 fire season varied from spacing one extreme to the other. This includes one of the latest snowfalls on record along with record cold through May 18 followed by record hot, dry conditions. Local news agencies published photos of thermometers showing temperatures in the upper-70s to mid-80s with four to five feet of snow still on the ground. This drastic change caused rapid snow melt and was responsible for one of the most devastating floods to ever occur on the Yukon River in the Interior of Alaska. Note that these floods were not caused by rainfall. These conditions enhanced the dryness of fire fuels as the snow was rapidly melted and the dry fuels left over winter did not have time to “green up” prior to the ignition of fires. The monthly climate summaries below are from the Geophysical Institute in Fairbanks⁶.

The May 2013 Climate Summary from the University of Fairbanks Geophysical Institute states: “For **Fairbanks** May was overall colder than normal, with below normal temperatures until the last 1/3 of the month. The average temperature was 44.3°F, a hefty - 5.1°F below the long-term mean of 49.4°F. The highest temperature for the month was recorded on the 30th, a warm 84°F, which tied the highest temperature for this day with over a century of observations. The minimum temperature occurred on the 6th, with a chilly 16°F. Further, two record low minimum temperature for May were broken, on the 18th 24°F was recorded, 3 degrees cooler than the old record set in 1943, and on the 20th the observed low of 27°F broke the old record set in 1964 by 1°F. Precipitation in May was a mere 0.15", or 25% of the normal amount.”

“June in **Fairbanks** was warmer than normal, with a monthly mean of 66.8°F, or 6.4°F above the long-term mean of 60.4°F for the month. Only four days had a negative deviation from normal. The highest temperature occurred on the 25th and 26th, a sweltering 92°F was observed both days, setting a new daily maximum record on the 25th, one degree warmer than in 1983. In addition, the minimum temperature of 70°F on the 25th was the warmest minimum daily temperature on record for any day in Fairbanks. Precipitation, however, was lighter than normal; 0.43" fell, just 31% of the expected amount of 1.37", making it the tenth driest in the last 101 years.”

Figure 10 is a comparison of the PM_{2.5} concentrations for each fire season for the years 2000 to 2013. ADEC defined the fire season as the period from June 1 through August 31 for each year

⁶<http://akclimate.org/city-summaries/2013/5>

since these dates included all PM_{2.5} exceedances and the major fire periods. See Appendix C. “Fire years” are those years where many fires occur on more than one occasion during the year. These fires impact the PM_{2.5} concentrations in Fairbanks, Alaska. The summer of 2004 was the worst fire year since record keeping began in Alaska. The data are not completely displayed on this graph since it is such an outlier. If the data were displayed the upper (green) box would be over 280 and the whisker would be well over 700. This would make all other years of data virtually unreadable due to the small size the other boxes would be when displayed.

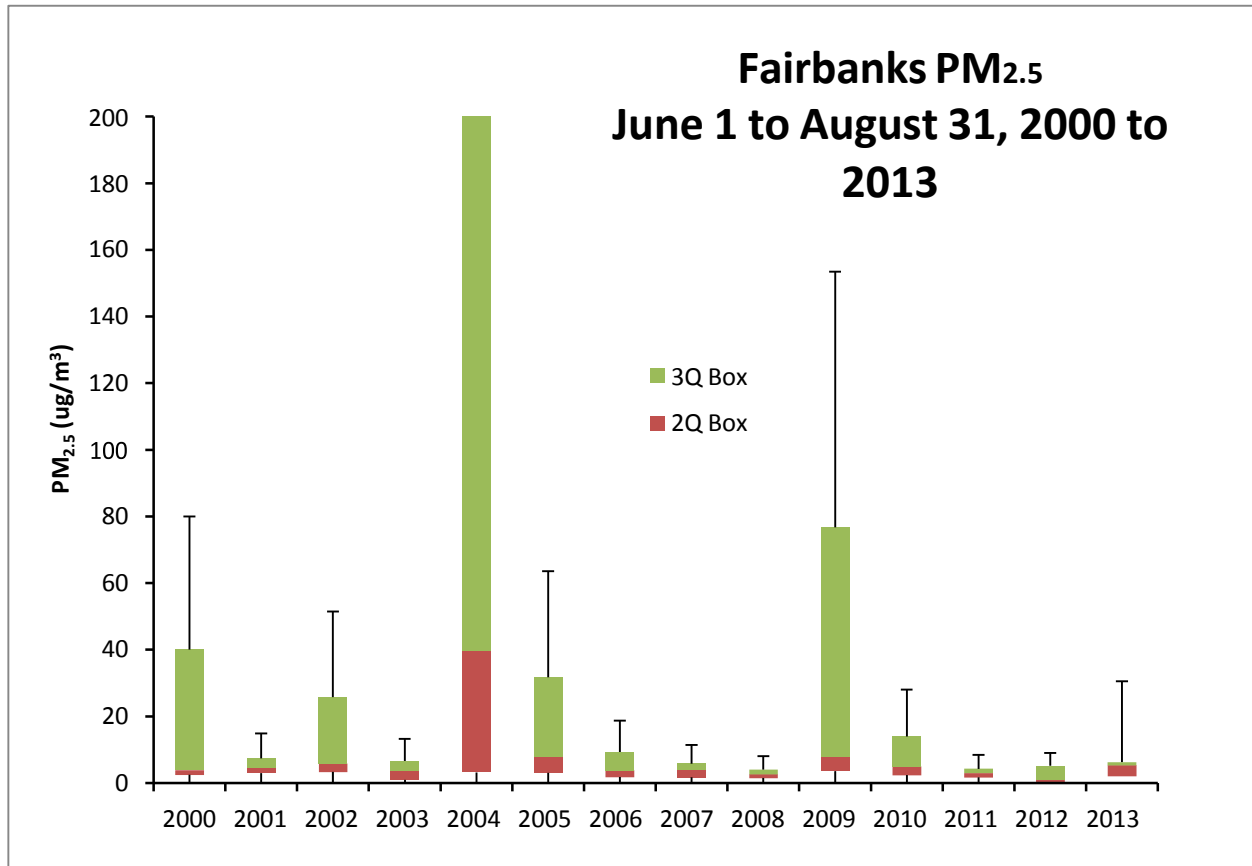


Figure 10. Fairbanks PM_{2.5} for the fire seasons for the years 2000 to 2013. The upper box (green) represents data from the median to the 90 percentile. The lower (red) boxes represent data from the median down to the 10th percentile. The “whiskers” indicate the values between the top (bottom) of the box, 90th (10th) percentile to the highest (lowest) values (supporting data in Appendix C7).

2013 had fewer fires and therefore lower PM_{2.5} concentrations than many other fire years during this period. 2001, 2003, 2008, and 2011 were years with few or small fires. The acreage burned in 2013 was slightly below average. However, of primary importance was the location of the fires in relationship to Fairbanks. This is especially true of the Skinny Road and Stuart Creek2 fires. The Skinny Road fire was a relatively small, short-lived fire but only 24.4 miles southwest of the Fairbanks International Airport runway and 27.7 miles west-southwest of downtown Fairbanks where the PM_{2.5} monitors are located. The Stuart Creek2 fire was a long duration fire located 34.7 miles east-southeast of downtown Fairbanks where the PM_{2.5} monitors are located and 37.4 miles

from the Fairbanks International Airport runway.

Clear Causal Relationship

This section establishes the clear causal relationship between the smoke from the wildland fires in the Interior of Alaska during the summer of 2013 and the PM_{2.5} concentrations in Fairbanks measured between June 27, 2013 and July 15, 2013 and then again between August 8 and August 14, 2013. The following section describes the major fires impacting air quality in Fairbanks during these periods. This includes a daily description of fire locations, measured PM_{2.5} concentrations, HYSPLIT backward trajectory forecasts, meteorological observations, and other pertinent data for each day as needed to show the origin and extent of fire smoke. These products are arranged in chronological order on a day-to-day basis and shown for each day of the event. Along with these products a narrative details the daily changes.

Description of Major Fires

There were a total of 612 wild land fires in Alaska in 2013 and a total of 1,320,752 acres burned. The total acreage is close to the average acreage burned annually in Alaska for the last 14 years. The elevated PM_{2.5} levels measured in Fairbanks in the summer of 2013 were more related to the location of the fires in relation to Fairbanks than the number of fires that occurred.

Figure 11 shows where the fires were located in relation to Fairbanks. The Mississippi fire and the Stuart Creek² fire were both started on military land during live-fire training operations. Although the Mississippi fire was the first fire started on May 31, 2013, it had minimal impact on Fairbanks air quality until August. The fire burned small areas off and on until August 10 when it grew very rapidly (Figure 12). The Stuart Creek² fire started on June 19 and impacted Fairbanks air quality in both the June/July and the August events. The Skinny Road fire started on June 25 and had a significant impact on the Fairbanks air quality during the June/July event, but was a short lived fire and had no impact on the Fairbanks August air quality. The other fires on the map contributed to the overall smoke in the Interior. Table 10 provides a summary of the dates the fires were burning and the total acreage burned by the end of the summer.



Figure 11. Fires that impacted Fairbanks in the summer of 2013. Even though further away, the Lime Hills fire is included on this map due to the large size of the fire.
http://afsmaps.blm.gov/imf_firehistory/imf.jsp?site=firehistory

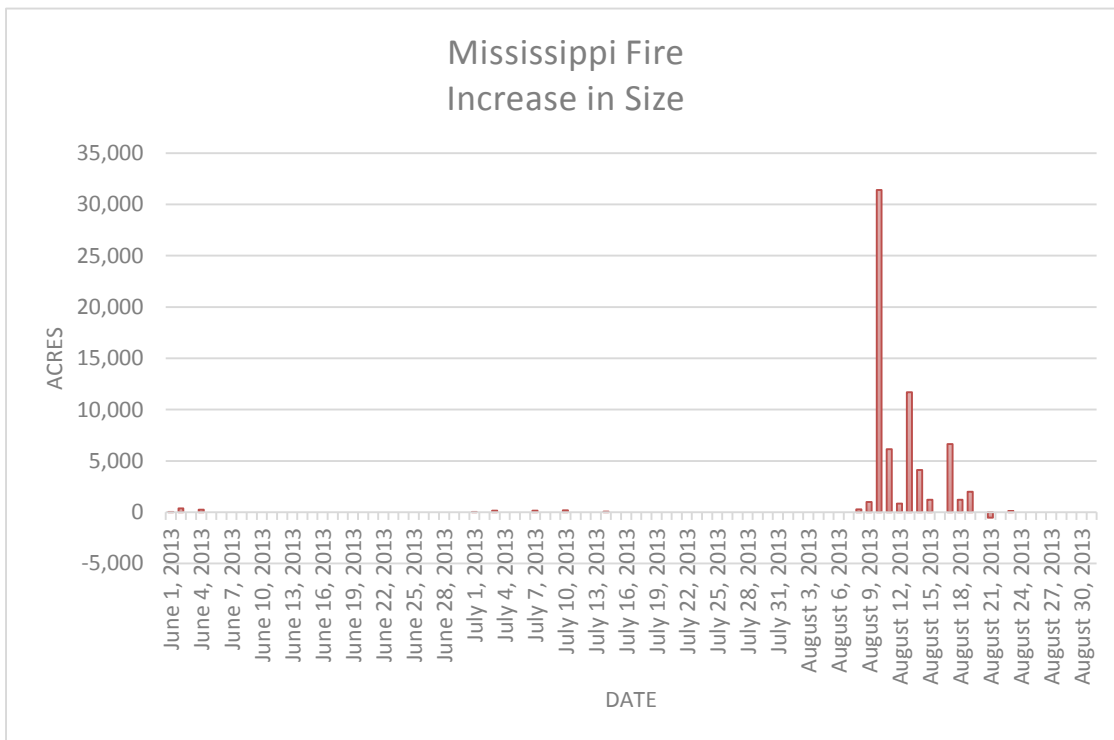


Figure 12. Growth of the Mississippi Fire, increase shown in acres.

Daily Breakdown of the Event

The daily changes in PM_{2.5} concentrations in Fairbanks for the period June 26 through July 8, July 14 and 15, and August 7 through 15, 2013 are described by terrain maps, satellite imagery, and modeling. The evidence presented for each day includes Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery, Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model backwards trajectory forecasts overlaid on terrain maps and MODIS imagery, and hourly PM_{2.5} concentrations. Supporting evidence from observational data, meteorology, and firefighting efforts are used to describe each day in the period.

Primary observational PM_{2.5} concentrations are from the Fairbanks NCORE Federal Reference Monitor (FRM). Secondary data are from the co-located NCORE Federal Reference Monitor (FRM). The primary FRM data are PM_{2.5} 24-hour averaged filters run on a 1-in-3 day schedule. The secondary FRM data are PM_{2.5} 24-hour averaged filters run on a 1-in-6 day schedule. The SOB FRM data are PM_{2.5} 24-hour averaged filters run on a 1-in-3 day schedule. The continuous data are from a co-located beta attenuation monitor (BAM). The co-located continuous BAM data are correlated hourly PM_{2.5} concentrations used on non-FRM days.

All weather observation data were downloaded from the National Climate Data Center (NCDC) and were subject to their quality control (<http://www7.ncdc.noaa.gov/CDO/dataproduct>). The MODIS imagery was downloaded from <http://www.gina.alaska.edu/modis-gallery?year=2010>. The HYSPLIT model information and model runs are available online (http://www.arl.noaa.gov/HYSPLIT_info.php).

PM_{2.5} data underwent quality assurance and control by FNSB and ADEC staff and meet the requirements as defined in the State Quality Assurance Plan. ADEC provides oversight of FNSB data collection, processing, and Quality Assurance and certifies all Fairbanks data entered into AQS, EPA's national ambient air monitoring database.

For this event, the first 24-hour PM_{2.5} FRM concentration that was flagged occurred on June 27, 2013. The PM_{2.5} 24-hour FRM filter sample data at the Fairbanks NCORE sampler was 58.0 µg/m³ on June 27, 2013. See Appendix C for all available PM_{2.5} data. Elevated 24-hour FRM PM_{2.5} concentrations were recorded on June 27 and 30, July 6 and 15, and August 8, 11, and 14.

All days with PM_{2.5} concentrations above 12 µg/m³ from June 26 through July 8, July 14 and 15, and August 7 through 15 2013 are being submitted as one exceptional event. The cause of the increased PM_{2.5} concentrations throughout the entire period was wildfire smoke. Daily PM_{2.5} concentrations varied with meteorological conditions and fire development or suppression. Wind direction (WD) and fire location were the most important components with which to predict high PM_{2.5} concentrations.

June/July Event

The dry and hot conditions as discussed in the meteorology section above set the stage for rapid spread of fires throughout Alaska. On June 19, 2013, the Alaska Fire Service, Predictive Services Branch issued a “Fuels and Fire Behavior Advisory” for all of Alaska excluding Coastal Areas and the Panhandle. Parts of this advisory are quoted below (Complete advisory is available in Appendix E):

Fuels and Fire Behavior Advisory

“Subject: Record heat and dry fuels for much of Alaska producing record-setting fire spread potential and rapidly rising resistance to suppression efforts across boreal spruce and tussock tundra fuels.

Discussion: With at least a week of intense high pressure residing over the state, record heat and dry weather are producing rapid spread rates, crown fire behavior, and extended burn periods. Temperatures now commonly approaching 90°F are drying fuels with over 20 hours of sun.

Surface fuel moisture conditions are represented by the Fine Fuel Moisture Code (FFMC), with most locations reporting values well above 92, the threshold for rapid ignition and initial spread. Deeper drying has lagged a little with spring beginning in many areas around Memorial Day. But with this string of hot dry days since, even the Duff Moisture Codes (DMC) for locations across this advisory area are above 80. Many reported DMC levels are setting new daily records.

Fires that lay dormant for several days earlier in the month have awakened, producing impressive growth in the eastern interior and the southwest of the state across a variety of fuels. Black Spruce, Tussock Tundra, and even mixed spruce and hardwood are demonstrating daily spread of 5-10 miles under the extreme heat and moderate winds.

Anticipating that conditions will continue to build for the rest of June, modest changes in the pressure patterns should bring lightning ignitions and local wind events to reinforce the problem pattern.

Difference from normal conditions: A very stable air mass led to extreme high temperatures and low humidity statewide lasting over a week, which have heated and dried fuels to extreme levels. Normally, this time of year brings a more unstable air mass, with afternoon showers across the Interior that serve to somewhat moderate surface heating.”

A week after this advisory was issued there were dramatic changes in the fires around Fairbanks (Table 8). The Skinny Road fire ignited on June 26, 2013. According to the June 26 AICC report this fire was “aggressively attacked by air and ground” yet it grew from 10 acres to 150 acres on June 26. By the 27th of June the fire was 509 acres and continued rapid growth resulted in 1,401 acres on the 28th of June.

At the same time, the Stuart Creek2 fire, which started on June 19 and had remained at 30 acres

since that time, began to increase in size. On June 26 the fire was reported as 50 acres and grew to 10,000 acres by the first of July.

Table 8. Rapid fire increase

| Date | Skinny Rd Fire (acres) | Stuart Creek2 Fire (acres) |
|-----------|------------------------|----------------------------|
| 26-Jun-13 | 10 | 50 |
| 27-Jun-13 | 509 | 400 |
| 28-Jun-13 | 1,401 | 500 |
| 29-Jun-13 | 1,401 | 2,000 |
| 30-Jun-13 | 1,401 | 2,000* |
| 1-Jul-13 | 1,401 | 10,000 |

*not flown that day

As seen in Table 9 and Figure 13 on June 26 the smoke was all around Fairbanks but was marginally impacting Fairbanks. The PM_{2.5} concentrations were slightly elevated above background.

Table 9. June 26, 2013 hourly PM_{2.5} values, NCORE site, Fairbanks, Alaska

| | | | | | |
|--------|------------|--------|------------|--------|------------|
| 26-Jun | HRLY PM2.5 | 26-Jun | HRLY PM2.5 | 26-Jun | HRLY PM2.5 |
| 0:00 | 4 | 8:00 | 4 | 16:00 | 10 |
| 1:00 | 6 | 9:00 | 4 | 17:00 | 17 |
| 2:00 | 7 | 10:00 | 3 | 18:00 | 12 |
| 3:00 | 6 | 11:00 | 3 | 19:00 | 10 |
| 4:00 | 5 | 12:00 | 4 | 20:00 | 7 |
| 5:00 | 4 | 13:00 | 5 | 21:00 | RS232 |
| 6:00 | 3 | 14:00 | 8 | 22:00 | 8 |
| 7:00 | 4 | 15:00 | 10 | 23:00 | 6 |

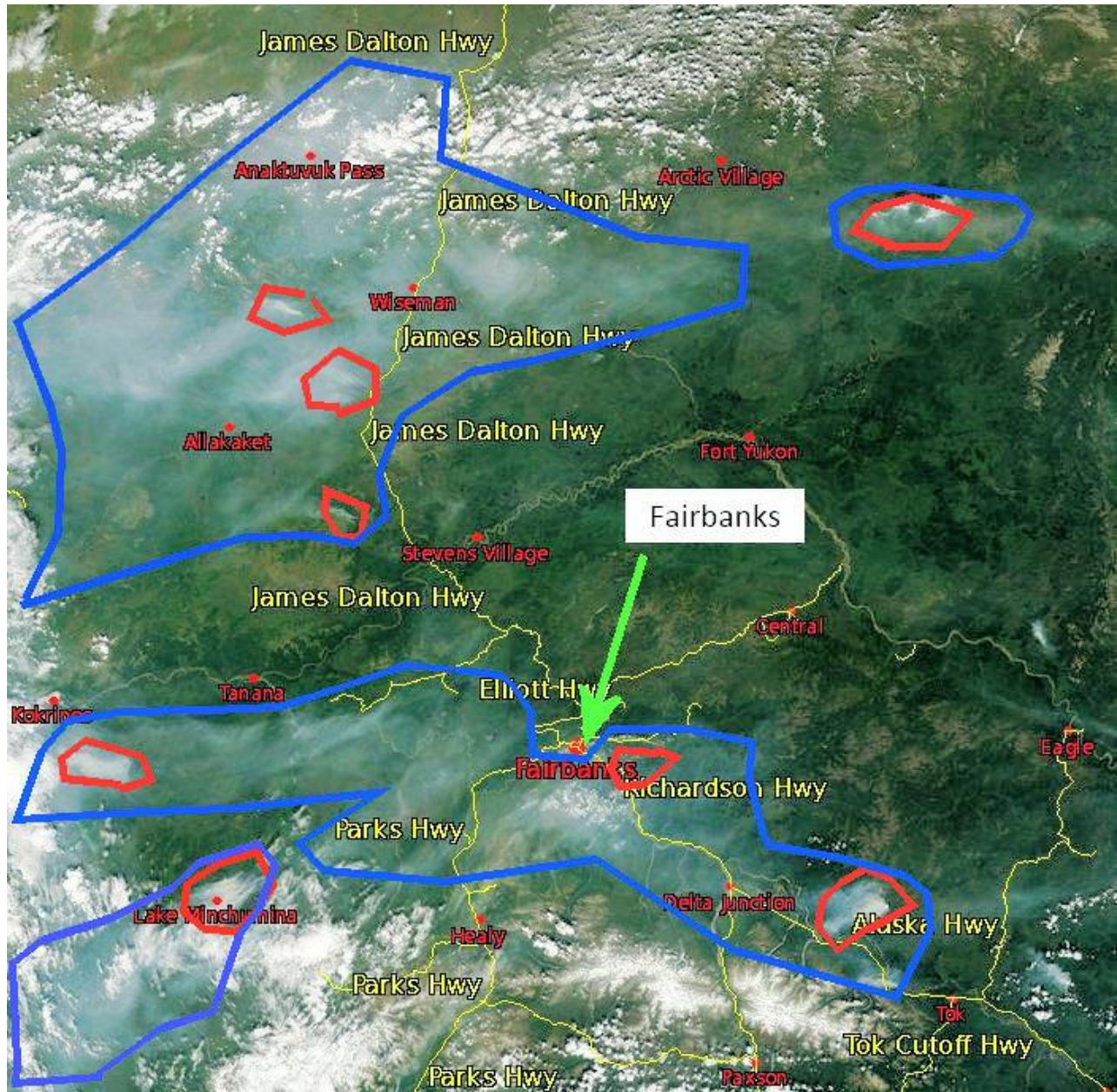


Figure 13. MODIS imagery June 26, 12:25 LST, with fires and smoke outlined (red outline is fire, blue is smoke).

While the Skinny Road and Stuart Creek2 fires were the closest to Fairbanks and had the largest impact on the $PM_{2.5}$ concentrations, numerous other fires were also undergoing explosive growth and contributed to the smoke and $PM_{2.5}$ concentrations recorded in Fairbanks in late June and early July. A sample of some of the fires in interior Alaska and their rapid growth is shown in Table 11 and Figure 12. Note the reported growth of over 75,000 acres in one day.

Table 10. Rapid growth of fires in the interior of Alaska

| Fire Name | Start Date | Acreage | | Growth (acres) |
|-----------------------|---------------|---------------|---------------|----------------|
| | | June 26, 2013 | June 27, 2013 | |
| Stuart Creek2 | June 19, 2013 | 400 | 500 | 100 |
| Mississippi | May 30, 2013 | 663 | 663 | 0 |
| Skinny Road | June 25, 2013 | 509 | 1,401 | 892 |
| Sulanta River | June 21, 2013 | 24,000 | 24,000 | 0 |
| Billy Creek | June 21, 2013 | 2,186 | 8,513 | 6,327 |
| Moon Lake | June 24, 2013 | 3,941 | 6,627 | 2,686 |
| Tetlin Junction Ridge | June 26, 2013 | 130 | 1,500 | 1,370 |
| Moving River | June 22, 2013 | 4,927 | 19,000 | 14,073 |
| Lime Hills* | May 31, 2013 | 169,049 | 219,280 | 50,231 |
| | | | | |
| | Total Acres | 205,805 | 281,484 | 75,679 |

*Lime Hills acreage in June 26 column is from June 25. Due to reporting error, June 26 data are not available.

June 27, 2013

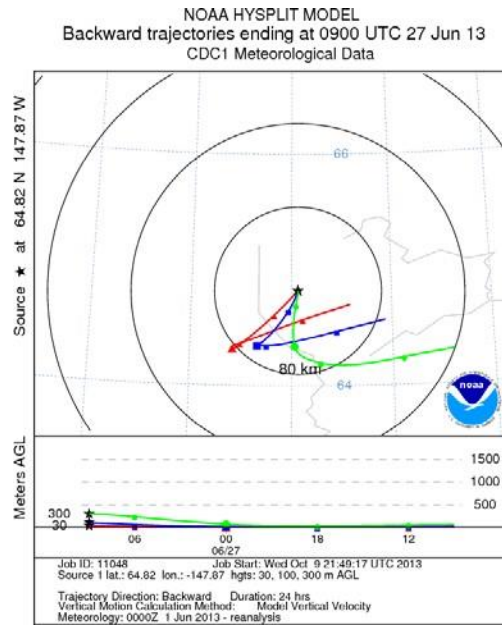
AICC Report Fire Information: Currently 1,401 acres, a 24-hr increase of 892 acres.

MODIS image: There is extensive smoke in the interior of Alaska surrounding Fairbanks. Many fires are contributing to this smoke but the fires closest to Fairbanks that contributed the most to the elevated PM_{2.5} concentrations are the Skinny Road fire (circled in red), 27 miles to the WSW of Fairbanks, and the Stuart Creek² fires (circled in red), 35 miles to the ESE of Fairbanks.

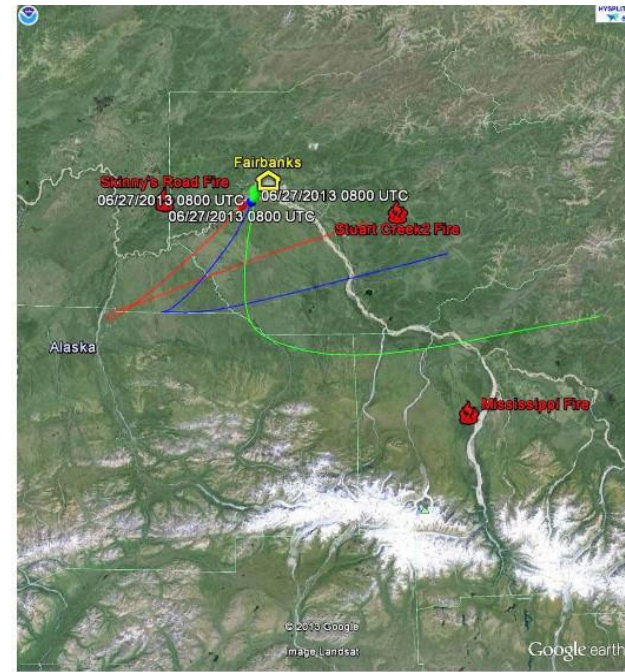
HYSPLIT trajectory: Indicates a flow from the Stuart Creek² fire traveling WSW to the south of Fairbanks and then turning to the NE back into Fairbanks and very near the Skinny Road fire. Both these fires experienced explosive growth during this period.

Surface observations: Beginning at 6:00 AM the wind direction reported at the Fairbanks Airport was from the WSW – directly from the Skinny Road fire. As soon as this wind direction is reported, the visibility dropped to one mile concurrent with this wind direction shift. Smoke is reported in the observations from the Fairbanks Airport between 6:00 AM and lasts until 1:00 PM.

PM_{2.5} data: Note: correlated data procedures are described in the Introduction section above. The hourly PM_{2.5} concentration increased rapidly beginning at 5:00 AM and remained very high through 1:00 PM. The maximum concentrations were above 200 µg/m³ for three consecutive hours. The primary NCORE 24-hour FRM PM_{2.5} concentration was 58.0 µg/m³. The secondary NCORE FRM PM_{2.5} concentration was 58.3 µg/m³. The SOB 24-hour FRM PM_{2.5} concentration was 58.7 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24 hour average concentration was 69.5 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from June 28, 2013, 00LST backward to June 27, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 300m.



C. June 27, 2013, 11:30 AM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 27- Jun | HRLY PM2.5 | 27- Jun | HRLY PM2.5 | 27- Jun | HRLY PM2.5 |
|---------|------------|---------|------------|---------|------------|
| 0:00 | 16 | 8:00 | 215 | 16:00 | 38 |
| 1:00 | 14 | 9:00 | 167 | 17:00 | 31 |
| 2:00 | 47 | 10:00 | 86 | 18:00 | 20 |
| 3:00 | 12 | 11:00 | 70 | 19:00 | 17 |
| 4:00 | RS232 | 12:00 | 49 | 20:00 | 16 |
| 5:00 | 120 | 13:00 | 45 | 21:00 | 13 |
| 6:00 | 268 | 14:00 | 26 | 22:00 | 10 |
| 7:00 | 280 | 15:00 | 29 | 23:00 | 10 |

D. Hourly PM_{2.5} for June 27, 2013.

Figure 14. June 27, 2014 All end points/arrow heads terminate at Fairbanks, Alaska

Table 11. Hourly observations for Fairbanks International Airport, June 27, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|---------------|----|
| 702610 | 26411 | 201306270053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306270153 | 250 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306270253 | 180 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306270353 | 990 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306270453 | 990 | 7 | *** | 2 | 61 (lgt rain) | 4 |
| 702610 | 26411 | 201306270553 | 250 | 10 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306270653 | 260 | 3 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306270753 | 200 | 6 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306270853 | 230 | 6 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306270953 | 250 | 6 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306271053 | 990 | 6 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306271153 | 250 | 11 | 20 | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306271253 | 290 | 10 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306271353 | 280 | 15 | 21 | 7 | ** | ** |
| 702610 | 26411 | 201306271453 | 280 | 11 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306271553 | 260 | 13 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306271653 | 280 | 9 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306271753 | 250 | 9 | *** | 7 | ** | ** |
| 702610 | 26411 | 201306271853 | 260 | 10 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306271953 | 250 | 10 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306272053 | 260 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306272153 | 250 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306272253 | 260 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306272353 | 250 | 3 | *** | 10 | ** | ** |

June 28, 2013

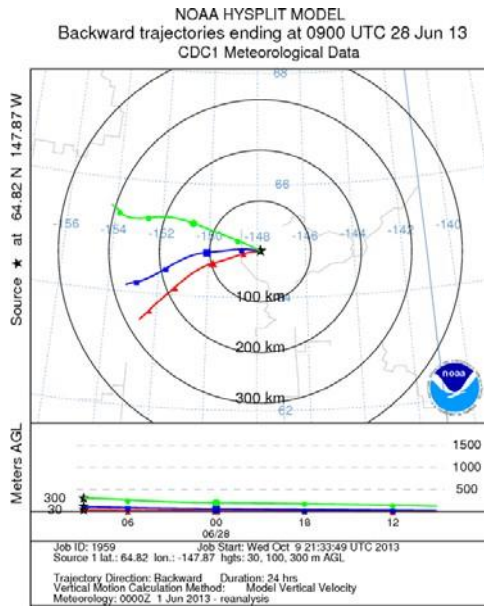
AICC Report Fire Information: Currently 1,401 acres, no increase in size the last 24 hours. Fire is 40% contained.

MODIS image: Imagery for June 28, 2013 shows the 30m trajectory passing directly through the Skinny Road fire into Fairbanks. Fire locations are obscured by clouds so fires were circled using locations from previous days. The Skinny Road fire is circled in pink so that it shows up on the trajectory arrow head.

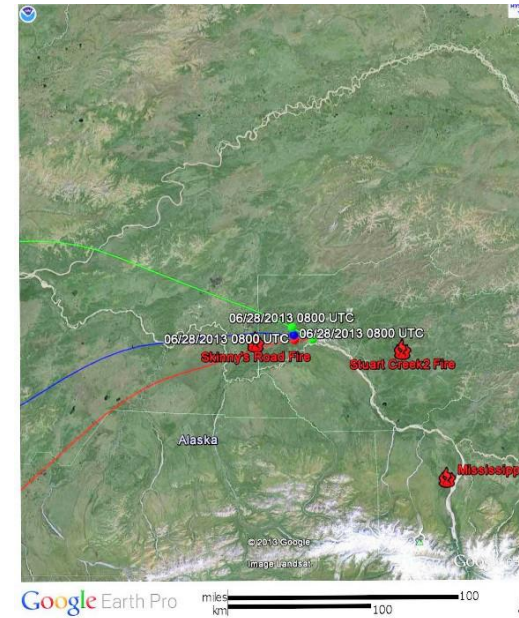
HYSPLIT trajectory: Indicates low level smoke advection directly from the Skinny Road fire towards Fairbanks.

Surface observations: The Fairbanks Airport observations report smoke as an obstruction to visibility in 12 of the 24 hourly observations.

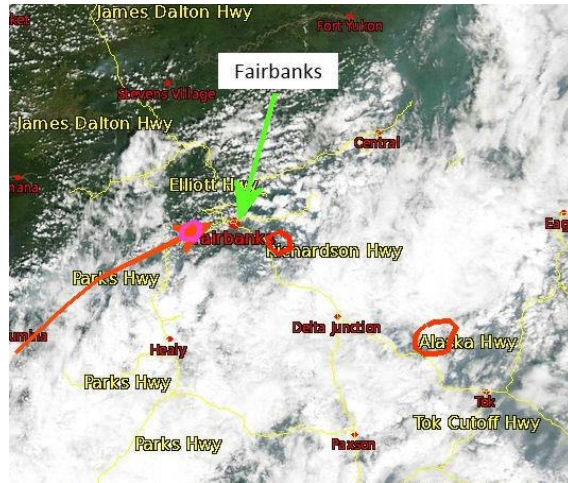
PM_{2.5} data: PM_{2.5} concentrations vary through the day with the highest concentrations between 7:00 and 8:00 AM and increasing to and remaining very high after 6:00 PM. This was not a 1-in-6 or 1-in-3 run day so the primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM data are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 43.5µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from June 29, 2013, 00LST backward to June 28, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. June 28, 2014, 2:07 PM LST MODIS imagery with 30m trajectory (red outline is fire). Red arrow is 30m trajectory. Skinny Road fire in purple on top of trajectory arrowhead.

| 28- Jun | HRLY PM2.5 | 28- Jun | HRLY PM2.5 | 28- Jun | HRLY PM2.5 |
|---------|------------|---------|------------|---------|------------|
| 0:00 | 13 | 8:00 | 111 | 16:00 | RS232 |
| 1:00 | 12 | 9:00 | InVld | 17:00 | 15 |
| 2:00 | 13 | 10:00 | 13 | 18:00 | 94 |
| 3:00 | 26 | 11:00 | 9 | 19:00 | 84 |
| 4:00 | 26 | 12:00 | 7 | 20:00 | 54 |
| 5:00 | RS232 | 13:00 | 22 | 21:00 | 58 |
| 6:00 | RS232 | 14:00 | 18 | 22:00 | 74 |
| 7:00 | 131 | 15:00 | 23 | 23:00 | 67 |

D. Hourly PM_{2.5} for June 28, 2013.

Figure 15. June 28, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 12. Hourly observations for Fairbanks International Airport, June 28, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|----------|----|
| 702610 | 26411 | 201306280053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306280153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306280253 | 210 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306280353 | 220 | 5 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306280453 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306280553 | *** | 0 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306280653 | 130 | 3 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306280753 | 150 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306280853 | 150 | 5 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306280953 | 290 | 5 | *** | 7 | ** | ** |
| 702610 | 26411 | 201306281053 | 350 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306281153 | 210 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306281253 | 190 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306281353 | 170 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306281453 | 220 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306281553 | 990 | 7 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306281653 | 250 | 8 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306281753 | 220 | 7 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306281853 | 220 | 6 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306281953 | 210 | 6 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306282053 | 210 | 3 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306282153 | 210 | 5 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306282253 | *** | 0 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306282353 | 240 | 6 | *** | 4 | 4(smoke) | ** |

June 29, 2013

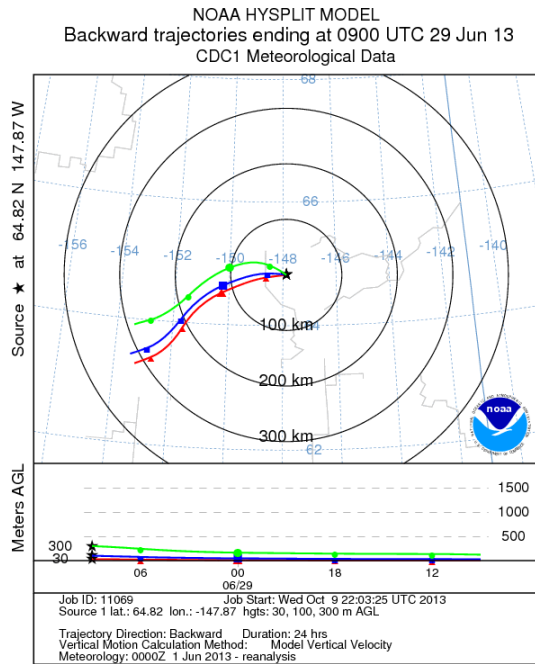
AICC Report Fire Information: Currently 1,401 acres, no increase in size the last 24 hours. Fire is 40% contained.

MODIS image: Imagery for June 29, 2013 shows the entire area around Fairbanks to be saturated with smoke.

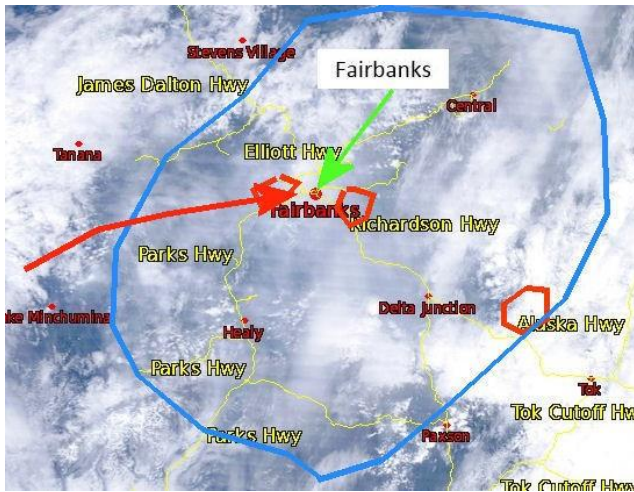
HYSPLIT trajectory: The HYSPLIT trajectory indicates low level smoke advection directly from the Skinny Road fire towards Fairbanks.

Surface observations: The Fairbanks Airport observations report smoke as an obstruction to visibility in all 24 hourly observations. The lowest visibility report is one mile which equated to the “UNHEALTHY” category on the Air Quality Index chart.

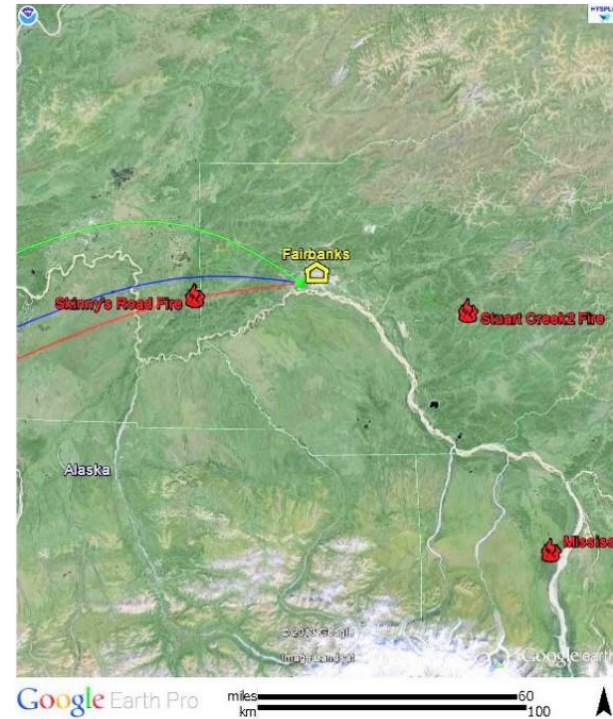
PM_{2.5} data: The hourly PM_{2.5} concentrations are very high for the entire 24-hour period. This was not a 1-in-6 or 1-in-3 run day so the primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 87.6 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from June 30, 2013, 00LST backward to June 29, 2013, 00LST.



C. June 29, 2013, 11:08 AM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

| 29-Jun | HRLY PM2.5 |
|--------|------------|
| 0:00 | 62 |
| 1:00 | RS232 |
| 2:00 | 34 |
| 3:00 | 31 |
| 4:00 | 28 |
| 5:00 | 28 |
| 6:00 | 27 |
| 7:00 | 31 |

| 29-Jun | HRLY PM2.5 |
|--------|------------|
| 8:00 | 56 |
| 9:00 | 54 |
| 10:00 | 88 |
| 11:00 | 103 |
| 12:00 | 161 |
| 13:00 | 221 |
| 14:00 | 274 |
| 15:00 | 182 |

| 29-Jun | HRLY PM2.5 |
|--------|------------|
| 16:00 | 120 |
| 17:00 | 101 |
| 18:00 | 81 |
| 19:00 | 66 |
| 20:00 | 64 |
| 21:00 | 66 |
| 22:00 | 70 |
| 23:00 | 67 |

D. Hourly PM_{2.5} for June 2013.

Table 13. Hourly observations for Fairbanks International Airport, June 29, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|-----------|--------------|----------|----------|----|
| 702610 | 26411 | 201306290053 | *** | 0 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306290153 | 130 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290253 | 260 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290353 | 40 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290453 | 360 | 3 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306290553 | *** | 0 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306290653 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290753 | 180 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290853 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306290953 | 190 | 3 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306291053 | 200 | 3 | *** | 2.5 | 4(smoke) | ** |
| 702610 | 26411 | 201306291153 | 200 | 7 | *** | 1.8 | 4(smoke) | ** |
| 702610 | 26411 | 201306291253 | 210 | 5 | *** | 1 | 4(smoke) | ** |
| 702610 | 26411 | 201306291353 | 990 | 3 | *** | 1.5 | 4(smoke) | ** |
| 702610 | 26411 | 201306291453 | *** | 0 | *** | 1.8 | 4(smoke) | ** |
| 702610 | 26411 | 201306291553 | *** | 0 | *** | 2 | 4(smoke) | ** |
| 702610 | 26411 | 201306291653 | *** | 0 | *** | 2.5 | 4(smoke) | ** |
| 702610 | 26411 | 201306291753 | 120 | 7 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306291853 | 100 | 5 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201306291953 | 100 | 3 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306292053 | 90 | 3 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306292153 | 90 | 3 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306292253 | 20 | 6 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306292353 | 320 | 3 | *** | 4 | 4(smoke) | ** |

June 30, 2013

SPECIAL NOTE: An important change to the origin of the main smoke component began to occur on this date. The Skinny Road fire was suppressed and no longer a major contributor to the smoke. The Stuart Creek2 fire continued to increase and became the major smoke source. The diurnal, easterly, downslope early morning flow became the primary cause of smoke advection into the Fairbanks area. This inversion and easterly flow is shown on the Fairbanks June 30, 2013 Skew-T- lower levels in Figure 17. Entire Skew-T is available in Appendix D.

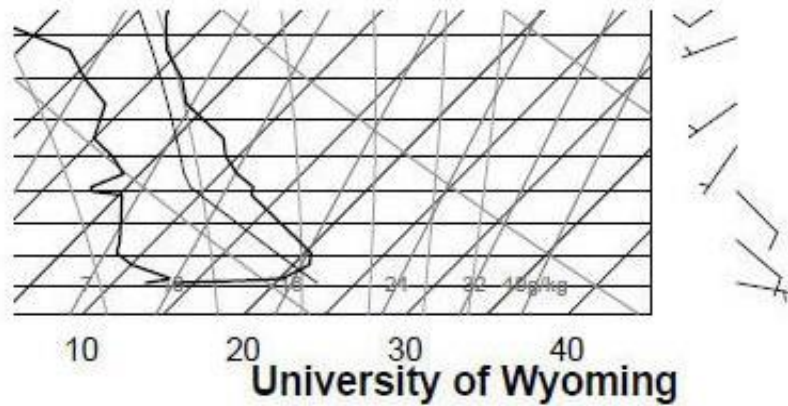


Figure 17. Fairbanks Skew-T June 30, 2013, 12Z, lower levels.

AICC Report Fire Information: Currently 1,401 acres, no increase in size the last 24 hours. Fire behavior was isolated torching and short range spotting.

MODIS image: There is a plume of smoke from the Stuart Creek2 fire visible to the WSW and some smoke still lingers in the area but not as dense as the smoke yesterday.

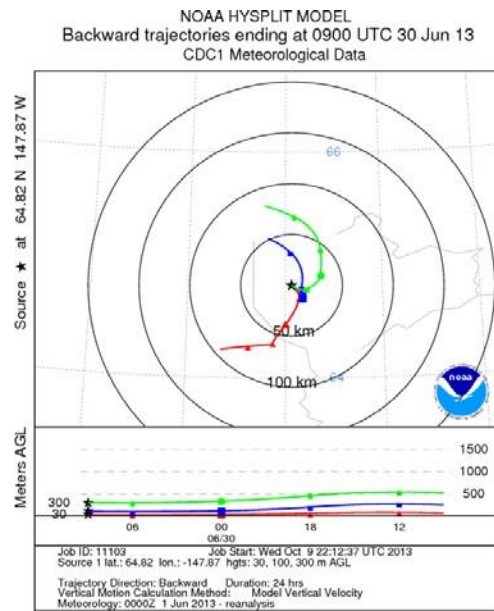
HYSPLIT trajectory: The HYSPLIT trajectory indicates low level flow turning more southerly so it is not directly from the Skinny Road fire towards Fairbanks but instead is coming from between the Skinny Road and the Stuart Creek2 fires.

Surface observations: The Fairbanks Airport observations report smoke overnight and into the morning hours then indicate clearing.

PM_{2.5} data: Values remain high until the wind shifts from easterly due to the diurnal cold air drainage off the mountains to a more southerly direction when the concentrations drop rapidly. Primary NCORE 24-hour FRM PM_{2.5} concentration was 32.9 µg/m³. This was not a 1-in-6 run day so the secondary NCORE FRM PM_{2.5} data are not available for this date. The SOB 24-hour FRM PM_{2.5} concentration was 32.6 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 33.8 µg/m³.

| AK Std Time | FAI Wind Dir | FAI Vis Restriction | PM _{2.5} |
|-------------|--------------|---------------------|-------------------|
| 0 | *** | ** | 3 |
| 1 | *** | ** | 4 |
| 2 | 10 | ** | 5 |
| 3 | *** | smoke | 10 |
| 4 | *** | smoke | 11 |
| 5 | 40 | smoke | 55 |
| 6 | 40 | smoke | 48 |
| 7 | 50 | smoke | 110 |
| 8 | *** | smoke | 119 |
| 9 | 30 | smoke | 147 |
| 10 | 140 | smoke | 116 |
| 11 | *** | smoke | 45 |
| 12 | *** | smoke | 28 |
| 13 | *** | ** | 4 |
| 14 | 170 | ** | 3 |
| 15 | *** | ** | 2 |
| 16 | 990 | ** | 2 |
| 17 | *** | ** | 1 |
| 18 | 250 | ** | 0 |
| 19 | *** | ** | 0 |
| 20 | *** | ** | 1 |
| 21 | 230 | ** | 5 |
| 22 | *** | ** | 5 |
| 23 | *** | ** | 2 |

Figure 18. Relationship of wind diurnal wind direction and smoke form Stuart Creek2 fire.



A. HYSPLIT Backwards Trajectory Forecast from July 1, 2013, 00LST backward to June 30, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. June 30, 2013, 12:01 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 30-Jun | HRLY PM2.5 | 30-Jun | HRLY PM2.5 | 30-Jun | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 70 | 8:00 | 55 | 16:00 | 18 |
| 1:00 | 67 | 9:00 | 46 | 17:00 | 13 |
| 2:00 | 64 | 10:00 | 34 | 18:00 | 9 |
| 3:00 | 64 | 11:00 | 32 | 19:00 | 5 |
| 4:00 | 65 | 12:00 | 15 | 20:00 | 5 |
| 5:00 | 68 | 13:00 | 18 | 21:00 | 0 |
| 6:00 | 64 | 14:00 | 20 | 22:00 | 0 |
| 7:00 | 59 | 15:00 | 18 | 23:00 | 2 |

D. Hourly PM_{2.5} for June 30, 2013.

Figure 19. June 30, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 14. Hourly observations for Fairbanks International Airport, June 30, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|----------|----|
| 702610 | 26411 | 201306300053 | 40 | 5 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306300153 | 40 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306300253 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306300353 | 40 | 5 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306300453 | 30 | 6 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306300553 | 40 | 5 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306300653 | 150 | 3 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306300753 | *** | 0 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201306300853 | 80 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201306300953 | 990 | 5 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306301053 | 990 | 3 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201306301153 | 990 | 5 | *** | 8 | ** | ** |
| 702610 | 26411 | 201306301253 | *** | 0 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201306301353 | 220 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306301453 | 240 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306301553 | 120 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306301653 | 240 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306301753 | 250 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306301853 | 240 | 10 | 17 | 10 | ** | ** |
| 702610 | 26411 | 201306301953 | 250 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306302053 | 990 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201306302153 | 990 | 8 | 21 | 10 | ** | ** |
| 702610 | 26411 | 201306302253 | 240 | 11 | 17 | 10 | ** | ** |
| 702610 | 26411 | 201306302353 | 270 | 8 | *** | 10 | ** | ** |

July 1, 2013

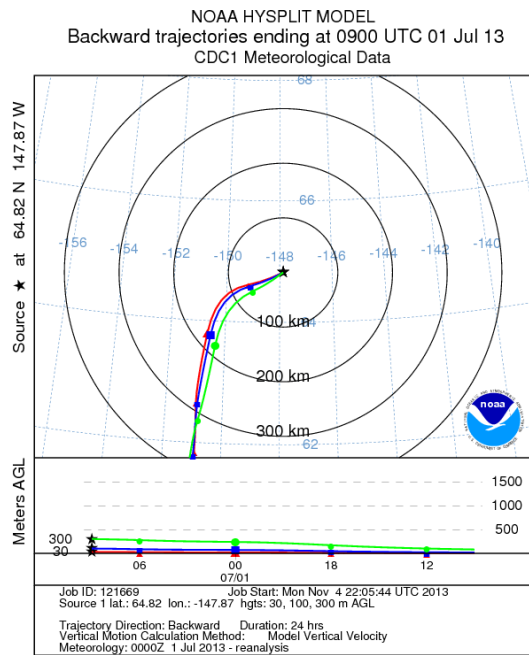
AICC Report Fire Information: The Stuart Creek2 fire began to rapidly increase in size. Thunderstorm down rush caused fire to grow by 10,000 acres.

MODIS imagery: The main area of smoke is upwind to the east of Fairbanks. According to the AICC Daily Situation Report, there are over 400 firefighters on the fire on this day "...who continue to improve control lines and mop up...". Although the fire is still burning, it is no longer spreading.

HYSPLIT trajectory: Indicates that flow is from the west to east – through the Skinny Road fire area. However, the Skinny Road fire is no longer growing and is under control so the smoke is less and less each day. Although the trajectory is not through the Stuart Creek2 fire, this larger fire is increasing in size and is beginning to contribute to the overall smoke in the interior of Alaska. The diurnal flow characterized by easterly flow from roughly midnight to early morning (around 9 AM) could be advecting smoke from the Stuart Creek2 fire.

Surface observations: The Fairbanks Airport observations show no obstruction to visibility due to smoke.

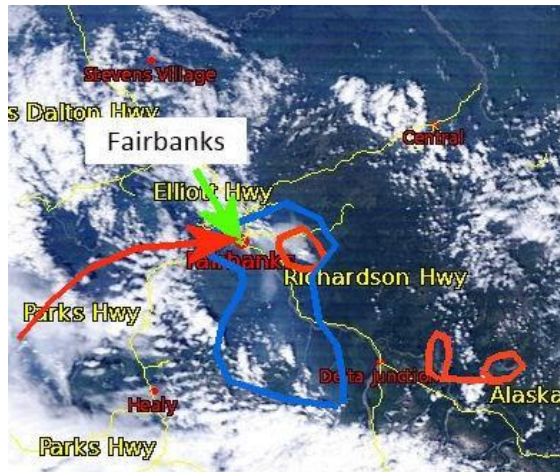
PM_{2.5} data: Values drop early in the morning and remain low for most of the day. This was not a 1-in-6 or 1-in-3 run day so Primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2- hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 8.2 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 2, 2013, 00LST backward to July, 1 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 1, 2013, 11:06 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 1-Jul | HRLY PM2.5 | 1-Jul | HRLY PM2.5 | HRLY PM2.5 | |
|-------|------------|-------|------------|------------|----|
| 0:00 | 27 | 8:00 | 3 | 16:00 | 10 |
| 1:00 | 18 | 9:00 | 4 | 17:00 | 8 |
| 2:00 | 12 | 10:00 | 4 | 18:00 | 25 |
| 3:00 | 11 | 11:00 | 3 | 19:00 | 0 |
| 4:00 | 6 | 12:00 | 7 | 20:00 | 2 |
| 5:00 | 5 | 13:00 | 8 | 21:00 | 6 |
| 6:00 | 5 | 14:00 | 9 | 22:00 | 5 |
| 7:00 | 3 | 15:00 | 11 | 23:00 | 4 |

D. Hourly PM_{2.5} for July 1, 2013

Figure 20. July 1, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 15. Hourly observations for Fairbanks International Airport, July 1, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|--------|--------|
| 702610 | 26411 | 201307010053 | 990 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010153 | 310 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010253 | 330 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010353 | 40 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010453 | 40 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010553 | 40 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010653 | 350 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010753 | 360 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010853 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307010953 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011053 | 40 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011253 | 240 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011453 | 210 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011553 | 290 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011653 | 240 | 20 | 28 | 10 | ** | ** |
| 702610 | 26411 | 201307011753 | 240 | 13 | 20 | 10 | 95(TS) | 80(RW) |
| 702610 | 26411 | 201307011853 | 10 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307011953 | 280 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307012053 | 260 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307012153 | 260 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307012253 | 280 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307012353 | 300 | 5 | *** | 10 | ** | ** |

July 2, 2013

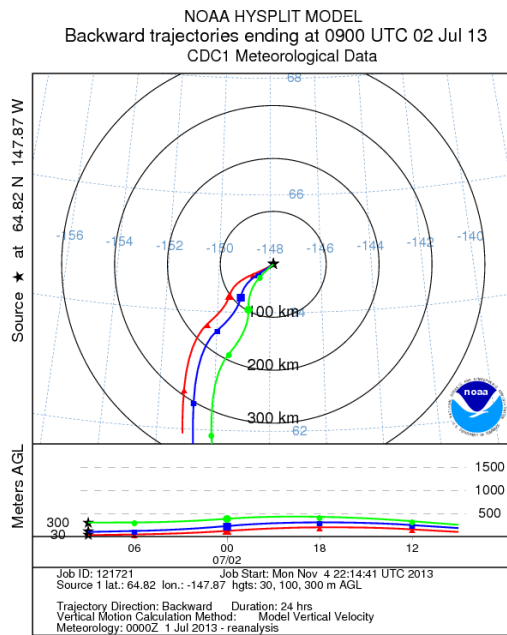
AICC Report Fire Information: The Stuart Creek2 fire continues to grow with an increase in size of 5,000 acres.

MODIS imagery: Not available for this day.

HYSPLIT trajectory: Indicates flow is from the southwest to northeast – through the Skinny Road fire area. Although the Skinny Road fire is no longer growing and is under control, there is still some smoke being produced but less than the previous few days. The diurnal flow characterized by easterly flow from roughly midnight to early morning (around 9:00 AM) could be advecting smoke from the Stuart Creek2 fire.

Surface observations: The Fairbanks Airport has a short period in the late morning with smoke reported as a restriction to visibility. This coincides with the observed increase in winds from the south.

PM_{2.5} data: Values increase at the same time the Fairbanks Airport reports smoke in the observation. This was not a 1-in-6 or 1-in-3 run day so Primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2- hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 9.4 µg/m³.

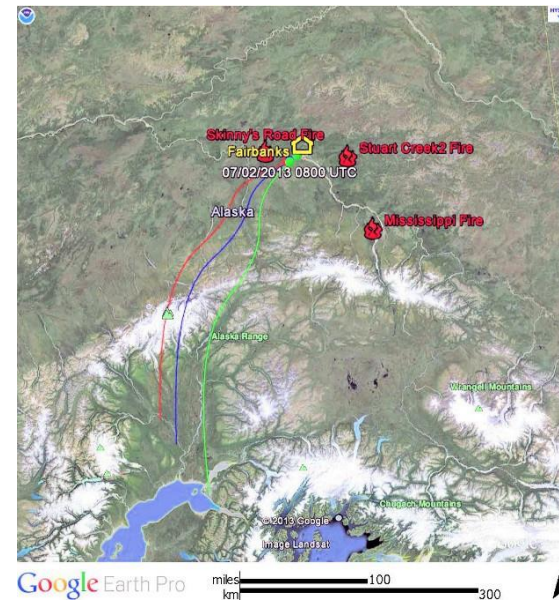


A. HYSPLIT Backwards Trajectory Forecast from July 3, 2013, 00LST backward to July 2, 2013, 00LST.

MODIS image not available

C. July 2, 2013 MODIS image not available.

Figure 21. July 2, 2013 All end points/arrow heads terminate at Fairbanks, Alaska



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

| 2-Jul | HRLY PM2.5 | 2-Jul | HRLY PM2.5 | 2-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 3 | 8:00 | 6 | 16:00 | RS232 |
| 1:00 | 1 | 9:00 | 4 | 17:00 | 5 |
| 2:00 | 0 | 10:00 | 9 | 18:00 | 6 |
| 3:00 | 4 | 11:00 | 63 | 19:00 | 9 |
| 4:00 | 5 | 12:00 | 22 | 20:00 | 8 |
| 5:00 | 4 | 13:00 | 5 | 21:00 | 6 |
| 6:00 | 5 | 14:00 | 22 | 22:00 | 5 |
| 7:00 | 6 | 15:00 | 13 | 23:00 | 5 |

D. Hourly PM_{2.5} for July 2, 2013.

Table 16. Hourly observations for Fairbanks International Airport, July 2, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|----|
| 702610 | 26411 | 201307020053 | 270 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020153 | 300 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020353 | 90 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020453 | 90 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020653 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307020953 | 200 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307021053 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307021153 | 170 | 9 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201307021253 | 990 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307021353 | 190 | 10 | 16 | 10 | ** | ** |
| 702610 | 26411 | 201307021453 | 250 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307021553 | 200 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307021653 | 210 | 10 | 17 | 10 | ** | ** |
| 702610 | 26411 | 201307021753 | 250 | 9 | 17 | 10 | ** | ** |
| 702610 | 26411 | 201307021853 | 130 | 10 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307021953 | 990 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307022053 | *** | 0 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201307022153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307022253 | 200 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307022353 | *** | 0 | *** | 10 | ** | ** |

July 3, 2013

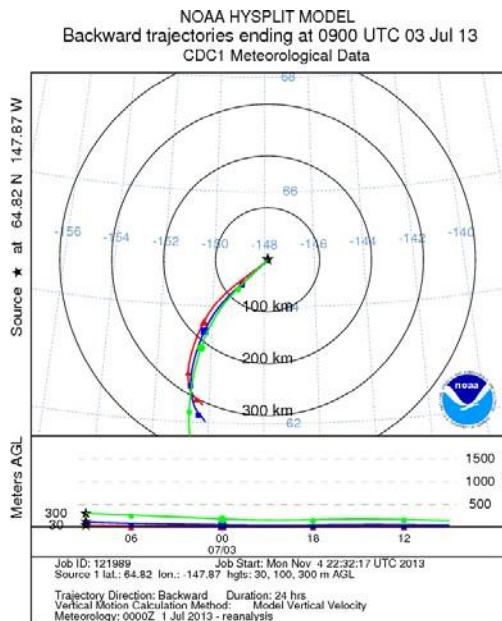
AICC Report Fire Information: The Stuart Creek2 fire continues to grow and again increased in size by 5,000 acres.

MODIS imagery: Clouds in the area so the Skinny Road fire is not visible. The Stuart Creek2 fire to the southeast of Fairbanks is visible.

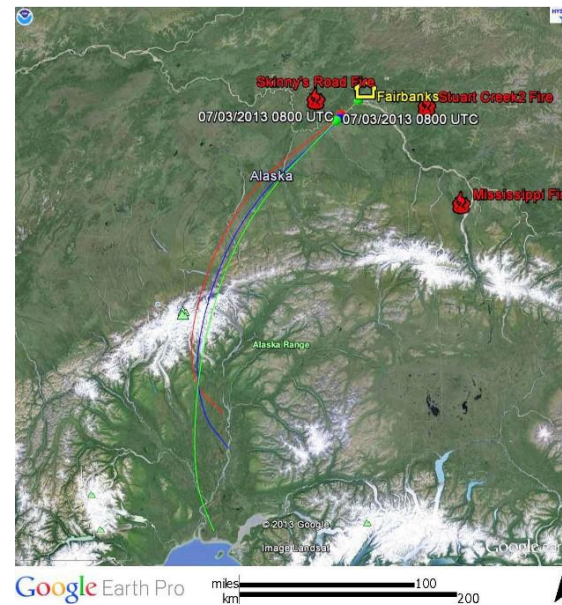
HYSPLIT trajectory: Indicates flow is becoming more southerly and not directly through the Skinny Road fire from the west to east – through the Skinny Road fire area. The diurnal flow characterized by easterly flow from roughly midnight to early morning (around 9 AM) appears to be advecting smoke from the Stuart Creek2 fire.

Surface observations: There are periods of easterly winds reported at the surface. This indicates that some smoke may be moving in from the Stuart Creek2 fire.

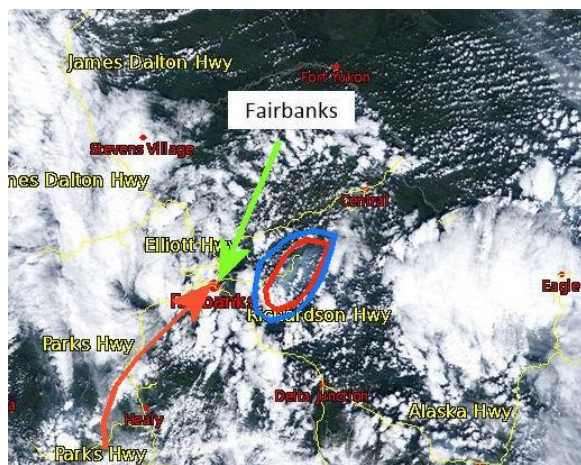
PM_{2.5} data: Concentrations elevated in the early morning hours when the winds are more westerly – through the Skinny Road fire. Primary NCORE 24-hour FRM PM_{2.5} concentration was 7.0 µg/m³. The secondary NCORE 24-hour FRM PM_{2.5} concentration was 8.0 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 6.6 µg/m³. The SOB 24-hour FRM PM_{2.5} concentration was 7.5 µg/m³.



A. HYSPLIT Backwards Trajectory forecast from July 4, 2013, 00LST backward to July 3, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 3, 2014, 12:32 PM LST MODIS imagery with 300m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 3-Jul | HRLY PM2.5 | 3-Jul | HRLY PM2.5 | 3-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 3 | 8:00 | 11 | 16:00 | 2 |
| 1:00 | 21 | 9:00 | 8 | 17:00 | 3 |
| 2:00 | 22 | 10:00 | 6 | 18:00 | 3 |
| 3:00 | 16 | 11:00 | 4 | 19:00 | 2 |
| 4:00 | 7 | 12:00 | 3 | 20:00 | 2 |
| 5:00 | 9 | 13:00 | 2 | 21:00 | 1 |
| 6:00 | 16 | 14:00 | 2 | 22:00 | 2 |
| 7:00 | NoData | 15:00 | 1 | 23:00 | 6 |

D. Hourly PM_{2.5} for July 3, 2013.

Figure 22. July 3, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 17. Hourly observations for Fairbanks International Airport, July 3, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|---------------|----|
| 702610 | 26411 | 201307030053 | 210 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030153 | 230 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030253 | 230 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030353 | 220 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030453 | 270 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030653 | 30 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030753 | 110 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030853 | 120 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307030953 | 140 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031053 | 250 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031153 | 250 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031253 | 320 | 7 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307031353 | 70 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031453 | 10 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031553 | 80 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031653 | 110 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031753 | 100 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307031953 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307032053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307032153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307032253 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307032353 | 30 | 3 | *** | 10 | ** | ** |

July 4, 2013

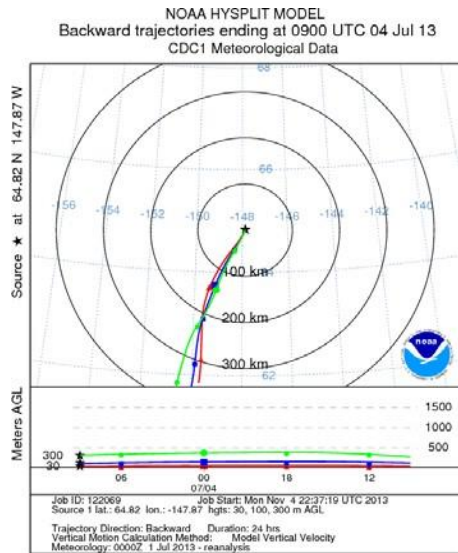
AICC Report Fire Information: The Stuart Creek2 fire continues to grow and increased in size by 978 acres.

MODIS imagery: Clouds in the area obscure the fires.

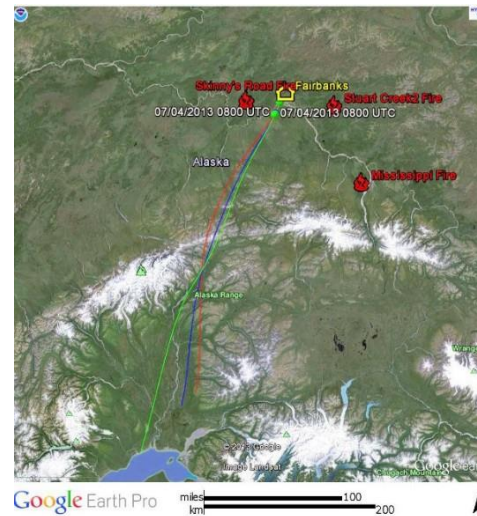
HYSPLIT trajectory: Indicates flow is southerly and not through either fire.

Surface observations: There are periods of easterly winds reported during the early morning hours. These are typical of diurnal effects in Fairbanks.

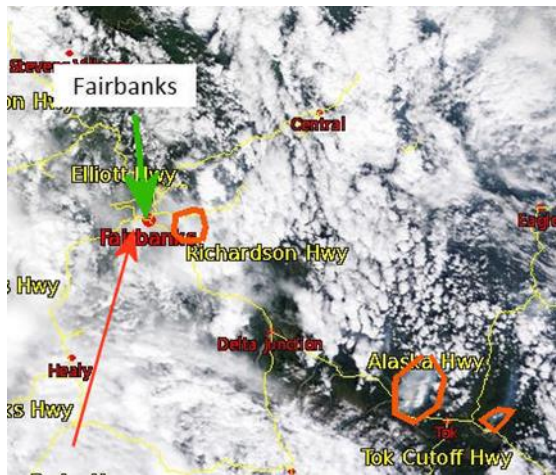
PM_{2.5} data: Elevated concentrations in the early morning hours coincide with easterly wind flow reported at the airport. This was not a 1-in-6 or 1-in-3 run day so Primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 8.3 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 5, 2013, 00LST backward to July 4, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 4, 2013, 13:14 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke but obscured by clouds). Red arrow is 30m trajectory.

| 4-Jul | HRLY PM2.5 | 4-Jul | HRLY PM2.5 | 4-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 6 | 8:00 | 35 | 16:00 | 1 |
| 1:00 | 3 | 9:00 | 53 | 17:00 | 0 |
| 2:00 | 4 | 10:00 | 20 | 18:00 | 0 |
| 3:00 | 7 | 11:00 | 5 | 19:00 | 0 |
| 4:00 | 6 | 12:00 | 3 | 20:00 | 0 |
| 5:00 | 2 | 13:00 | -1 | 21:00 | 0 |
| 6:00 | 26 | 14:00 | -2 | 22:00 | 1 |
| 7:00 | 30 | 15:00 | 0 | 23:00 | 1 |

D. Hourly PM_{2.5} for July 4, 2013.

Figure 23. July 4, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 18. Hourly observations for Fairbanks International Airport, July 4, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|----|----|
| 702610 | 26411 | 201307040053 | 50 | 5 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040153 | 30 | 6 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040253 | 10 | 5 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040353 | *** | 0 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040453 | 50 | 5 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040553 | *** | 0 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040653 | 70 | 5 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040753 | 100 | 3 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040853 | 60 | 3 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307040953 | 120 | 6 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041053 | 990 | 6 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041153 | 230 | 9 | 17 | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041253 | 220 | 10 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041353 | 990 | 7 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041453 | 230 | 7 | *** | 10 | 61 (lgt rain) | ** | ** |
| 702610 | 26411 | 201307041553 | 240 | 14 | 20 | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041653 | 230 | 8 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041753 | 190 | 10 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041853 | 280 | 13 | 24 | 10 | ** | ** | ** |
| 702610 | 26411 | 201307041953 | 290 | 10 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307042053 | 270 | 9 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307042153 | 270 | 8 | *** | 10 | ** | ** | ** |
| 702610 | 26411 | 201307042253 | 250 | 9 | *** | 10 | 61 (lgt rain) | ** | ** |
| 702610 | 26411 | 201307042353 | 270 | 7 | *** | 10 | 61 (lgt rain) | ** | ** |

July 5, 2013

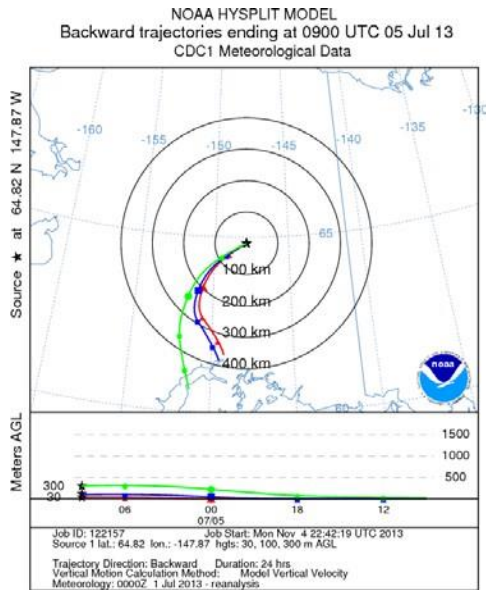
AICC Report Fire Information: The Stuart Creek2 fire continues to grow and increased in size by 1,014 acres. The Skinny Road fire is 65% contained.

MODIS imagery: Showers through the area. Smoke from the Stuart Creek2 fire is visible.

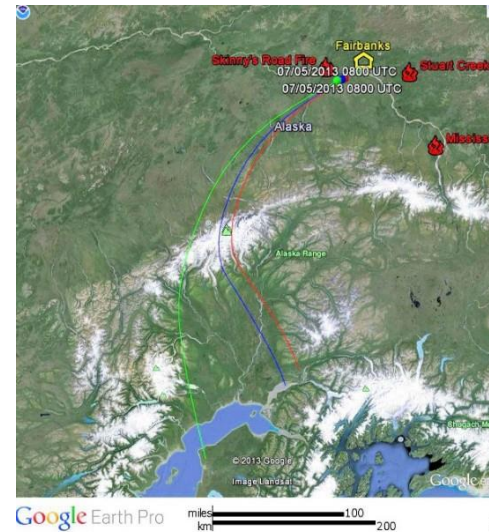
HYSPLIT trajectory: Indicates flow is southwesterly through the Skinny Road fire area however, this fire is not as active as the Stuart Creek2 fire.

Surface observations: The diurnal easterly winds are more prevalent today. Rain showers and high humidity help dissipate the smoke.

PM_{2.5} data: No significant elevated concentrations in this 24-hour period. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 1.9 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 6, 2013, 00LST backward to July 5, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 5, 2013, 12:19 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 5-Jul | HRLY PM2.5 | 5-Jul | HRLY PM2.5 | 5-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 5 | 8:00 | 2 | 16:00 | 0 |
| 1:00 | 26 | 9:00 | 2 | 17:00 | 1 |
| 2:00 | -1 | 10:00 | 0 | 18:00 | 1 |
| 3:00 | -2 | 11:00 | -1 | 19:00 | 1 |
| 4:00 | 0 | 12:00 | 0 | 20:00 | 2 |
| 5:00 | 1 | 13:00 | 0 | 21:00 | 3 |
| 6:00 | 0 | 14:00 | 2 | 22:00 | 1 |
| 7:00 | 0 | 15:00 | 2 | 23:00 | 1 |

D. Hourly PM_{2.5} for July 5, 2013.

Figure 24. July 5, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 19. Hourly observations for Fairbanks International Airport, July 5, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|-------------------|----|
| 702610 | 26411 | 201307050053 | 170 | 5 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307050153 | 990 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050453 | 20 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050553 | 30 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050653 | 10 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307050853 | 10 | 3 | *** | 10 | 40(fog at a dist) | ** |
| 702610 | 26411 | 201307050953 | 350 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051053 | 330 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051253 | 90 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051353 | 120 | 11 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307051453 | 290 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051553 | 290 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051653 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051753 | 140 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051853 | 990 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307051953 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307052053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307052153 | 250 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307052253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307052353 | *** | 0 | *** | 10 | ** | ** |

July 6, 2013

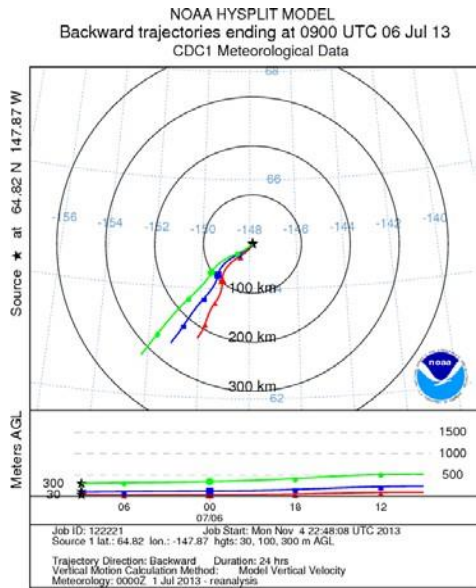
AICC Report Fire Information: The Stuart Creek² fire experienced “intensified fire intensity” due to increase temperature and decreased humidity. This fire was so intense that suppressant efforts were limited. This fire increased in size by 8,223 acres. The Skinny Road fires is 65% contained.

MODIS imagery: Not available for this day.

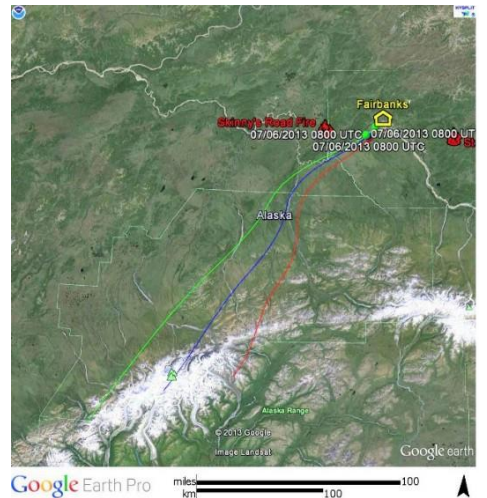
HYSPLIT trajectory: Indicates southwesterly flow through the Skinny Road fire area. However, this fire is not as active as the Stuart Creek² fire. Note that the HYSPLIT does not pick up the diurnal easterly surface wind.

Surface observations: As previously discussed, Figure 18 provides an excellent example of the relationship of the diurnal drainage winds and smoke from the Stuart Creek² fire. Note that the easterly wind direction resulted in smoke being reported as a restriction to visibility and increases in PM_{2.5} concentrations. When the wind shifted to southerly just after noon, the smoke cleared and PM_{2.5} concentrations dropped rapidly.

PM_{2.5} data: As discussed above, the diurnal wind flow resulted in high PM_{2.5} concentrations today. Primary NCORE 24-hour FRM PM_{2.5} concentration was 27.5 μg/m³. This was not a 1-in-6 run day so the secondary NCORE FRM PM_{2.5} data are not available for this date. The SOB 24-hour FRM PM_{2.5} concentration was 34.4 μg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 30.2 μg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 7, 2013, 00LST backward to July 6, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

MODIS image not available

C. July 6, 2013 MODIS image not available.

| 6-Jul | HRLY PM2.5 | 6-Jul | HRLY PM2.5 | 6-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 3 | 8:00 | 119 | 16:00 | 2 |
| 1:00 | 4 | 9:00 | 147 | 17:00 | 1 |
| 2:00 | 5 | 10:00 | 116 | 18:00 | 0 |
| 3:00 | 10 | 11:00 | 45 | 19:00 | 0 |
| 4:00 | 11 | 12:00 | 28 | 20:00 | 1 |
| 5:00 | 55 | 13:00 | 4 | 21:00 | 5 |
| 6:00 | 48 | 14:00 | 3 | 22:00 | 5 |
| 7:00 | 110 | 15:00 | 2 | 23:00 | 2 |

D. Hourly PM_{2.5} for July 6, 2013.

Figure 25. July 6, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 20. Hourly observations for Fairbanks International Airport, July 6, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|----------|----|
| 702610 | 26411 | 201307060053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307060153 | 10 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307060253 | *** | 0 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201307060353 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201307060453 | 40 | 5 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201307060553 | 40 | 3 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201307060653 | 50 | 6 | *** | 2.5 | 4(smoke) | ** |
| 702610 | 26411 | 201307060753 | *** | 0 | *** | 2 | 4(smoke) | ** |
| 702610 | 26411 | 201307060853 | 30 | 5 | *** | 2 | 4(smoke) | ** |
| 702610 | 26411 | 201307060953 | 140 | 6 | *** | 2 | 4(smoke) | ** |
| 702610 | 26411 | 201307061053 | *** | 0 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201307061153 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201307061253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061353 | 170 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061553 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061653 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061753 | 250 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307061953 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307062053 | 230 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307062153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307062253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307062353 | 360 | 3 | *** | 10 | ** | ** |

July 7, 2013

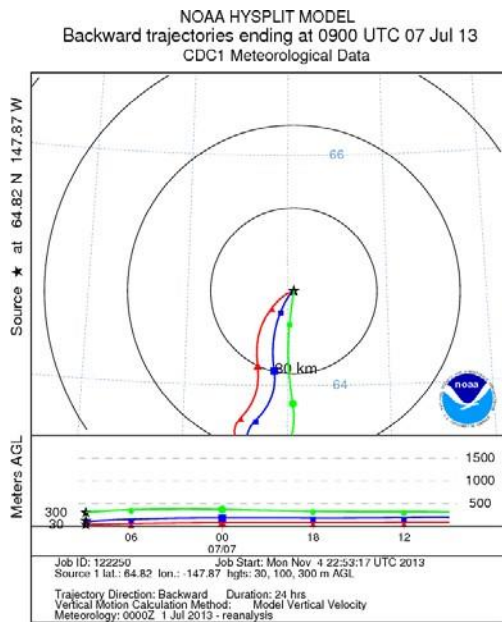
AICC Report Fire Information: The Stuart Creek2 fire increased in size by 24,323 acres. The AICC report concentrates on reporting the evacuation of two nearby communities. Skinny Road fire is 100% contained.

MODIS imagery: Smoke is visible to the east and north east of Fairbanks.

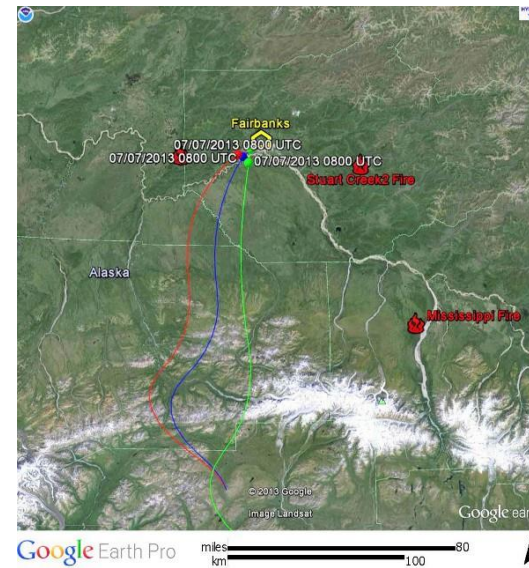
HYSPLIT trajectory: Indicates the 30 meter flow is southwesterly through the Skinny Road fire area. However, the Skinny Road Fire is contained and is most likely producing only small amounts of smoke. The main smoke producer from this day forward is the Stuart Creek2 fire.

Surface observations: It is clear that when winds are from the north or east, the smoke at the monitor site increases. This is another example of the impact of diurnal flow.

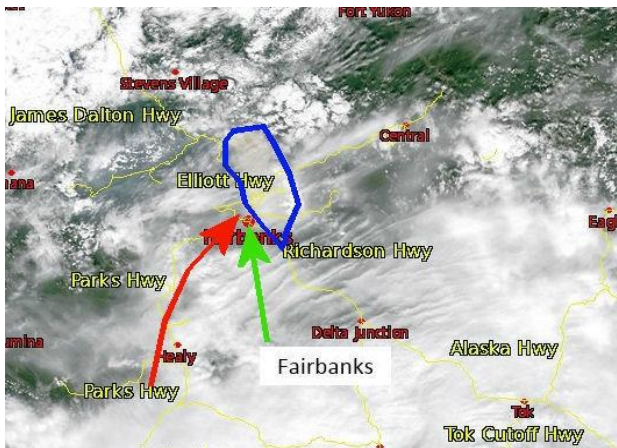
PM_{2.5} data: This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 23.3 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 8, 2013, 00LST backward to July 7, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 7, 2013, 12:07 PM LST MODIS imagery with 30m trajectory (red outline is fire but obscured by clouds, blue is smoke). Only one dense area of smoke is visible. Red arrow is 30m trajectory.

| 7-Jul | HRLY PM2.5 | 7-Jul | HRLY PM2.5 | 7-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 2 | 8:00 | 182 | 16:00 | 2 |
| 1:00 | 3 | 9:00 | 7 | 17:00 | 2 |
| 2:00 | 5 | 10:00 | 4 | 18:00 | 1 |
| 3:00 | 45 | 11:00 | 1 | 19:00 | 1 |
| 4:00 | 5 | 12:00 | 1 | 20:00 | 27 |
| 5:00 | 49 | 13:00 | 2 | 21:00 | 82 |
| 6:00 | 21 | 14:00 | 3 | 22:00 | 22 |
| 7:00 | 68 | 15:00 | 1 | 23:00 | 24 |

D. Hourly PM_{2.5} for July 7, 2013.

Figure 26. July 7, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 21. Hourly observations for Fairbanks International Airport, July 7, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|----------|----|
| 702610 | 26411 | 201307070053 | 270 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307070153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307070253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307070353 | 40 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307070453 | 160 | 3 | *** | 3 | 4(smoke) | ** |
| 702610 | 26411 | 201307070553 | 30 | 3 | *** | 2 | 4(smoke) | ** |
| 702610 | 26411 | 201307070653 | 20 | 6 | *** | 4 | 4(smoke) | ** |
| 702610 | 26411 | 201307070753 | *** | 0 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201307070853 | 90 | 10 | *** | 2.5 | 4(smoke) | ** |
| 702610 | 26411 | 201307070953 | 130 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071053 | 160 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071153 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071253 | 120 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071353 | 140 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071453 | 120 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071553 | 160 | 11 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071653 | 240 | 13 | 18 | 10 | ** | ** |
| 702610 | 26411 | 201307071753 | 240 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071853 | 130 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307071953 | 20 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307072053 | 350 | 5 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201307072153 | 290 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307072253 | 260 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307072353 | *** | 0 | *** | 10 | ** | ** |

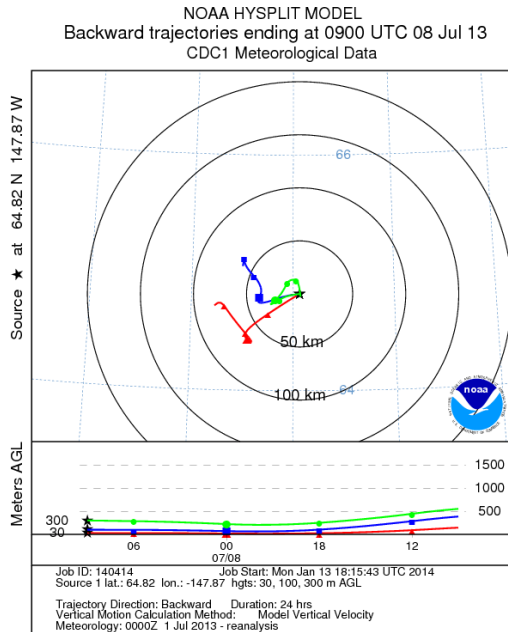
July 8, 2013

AICC Report Fire Information: The Stuart Creek2 fire increased in size by 157,704 acres. Rain and clouds impacted the fire today and “moderated (fire activity) late in the morning.”

MODIS imagery: Smoke and fires are obscured by clouds.

HYSPLIT trajectory: Indicates that the 30 meter flow is not through the fire area. This flow contributed to the decrease in PM_{2.5} by late morning.

PM_{2.5} data: This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 19.7 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 9, 2013, 00LST backward to July 8, 2013, 00LST.



C. July 8, 2013, 12:50 PM LST MODIS imagery with 30m trajectory (red outline is fire but obscured by clouds, blue is smoke). Smoke and fires obscured by clouds. Red arrow is 30m trajectory.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

| 8-Jul | HRLY PM2.5 | 8-Jul | HRLY PM2.5 | 8-Jul | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 49 | 8:00 | 11 | 16:00 | -1 |
| 1:00 | 64 | 9:00 | 6 | 17:00 | 0 |
| 2:00 | 72 | 10:00 | 4 | 18:00 | -1 |
| 3:00 | 78 | 11:00 | 3 | 19:00 | 0 |
| 4:00 | 71 | 12:00 | 2 | 20:00 | 4 |
| 5:00 | 64 | 13:00 | 0 | 21:00 | 3 |
| 6:00 | 26 | 14:00 | 1 | 22:00 | 3 |
| 7:00 | 14 | 15:00 | 1 | 23:00 | 0 |

D. Hourly PM_{2.5} for July 8, 2013.

Figure 27. July 8, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 22. Hourly observations for Fairbanks International Airport, July 8, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|----|
| 702610 | 26411 | 201307080053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080253 | *** | 0 | *** | 8 | ** | ** |
| 702610 | 26411 | 201307080353 | *** | 0 | *** | 8 | ** | ** |
| 702610 | 26411 | 201307080453 | 150 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080553 | 190 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080653 | 250 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080753 | 270 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080853 | 240 | 11 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307080953 | 280 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081053 | 300 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081153 | 250 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081253 | 260 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081353 | 280 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081453 | 180 | 3 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307081553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081653 | 180 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081753 | 220 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307081853 | 220 | 5 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307081953 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307082053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307082153 | *** | 0 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201307082253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307082353 | 220 | 5 | *** | 10 | ** | ** |

July 14, 2013

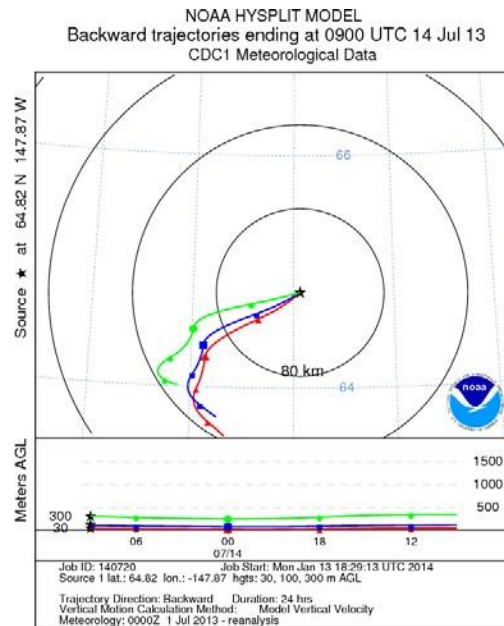
AICC Report Fire Information: Today's report states: "Fire activity increased with warmer temperatures." Slightly elevated PM_{2.5} concentrations were again reported with the diurnal easterly flow from the mountains.

MODIS imagery. Smoke is visible at the Stuart Creek2 fire to the east of Fairbanks.

HYSPLIT trajectory: Indicates that the 30 meter flow is southwesterly through the Skinny Road fire area. However, the Skinny Road Fire is contained and is most likely producing only small amounts of smoke. The main smoke producer from this day forward is the Stuart Creek2 fire.

Surface observations: Indicate the morning diurnal easterly flow.

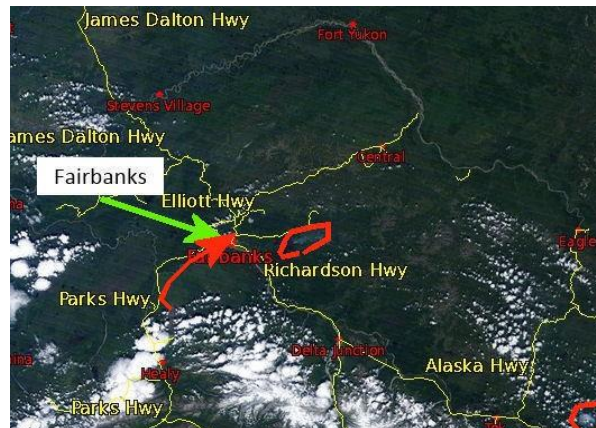
PM_{2.5} data: This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 7.8 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 15, 2010, 00LST backward to July 14, 2010, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 14, 2013, 12:13 PM LST MODIS imagery with 30m trajectory (red outline is fire but obscured by clouds, blue is smoke). Red arrow is 30m trajectory.

Figure 28. July 14, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

| 14-Jul | HRLY PM2.5 | 14-Jul | HRLY PM2.5 | 14-Jul | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 6 | 8:00 | 23 | 16:00 | 1 |
| 1:00 | RS232 | 9:00 | 20 | 17:00 | 3 |
| 2:00 | 8 | 10:00 | 15 | 18:00 | 5 |
| 3:00 | 6 | 11:00 | 9 | 19:00 | 4 |
| 4:00 | 3 | 12:00 | 3 | 20:00 | 2 |
| 5:00 | 3 | 13:00 | 2 | 21:00 | 6 |
| 6:00 | 9 | 14:00 | 4 | 22:00 | 8 |
| 7:00 | 28 | 15:00 | 3 | 23:00 | 8 |

D. Hourly PM_{2.5} for July 14, 2013.

Table 23. Hourly observations for Fairbanks International Airport, July 14, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|----|----|
| 702610 | 26411 | 201307140053 | 10 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140153 | 70 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140253 | 40 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140353 | 70 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140453 | 40 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307140653 | *** | 0 | *** | 8 | ** | ** |
| 702610 | 26411 | 201307140753 | *** | 0 | *** | 8 | ** | ** |
| 702610 | 26411 | 201307140853 | 170 | 5 | *** | 8 | ** | ** |
| 702610 | 26411 | 201307140953 | *** | 0 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201307141053 | 220 | 6 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201307141153 | 240 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141253 | 990 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141353 | 260 | 14 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141453 | 330 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141553 | 230 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141653 | 990 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141753 | 220 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141853 | 250 | 13 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307141953 | 270 | 13 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307142053 | 300 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307142153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307142253 | *** | 0 | *** | 10 | ** | ** |

July 15, 2013

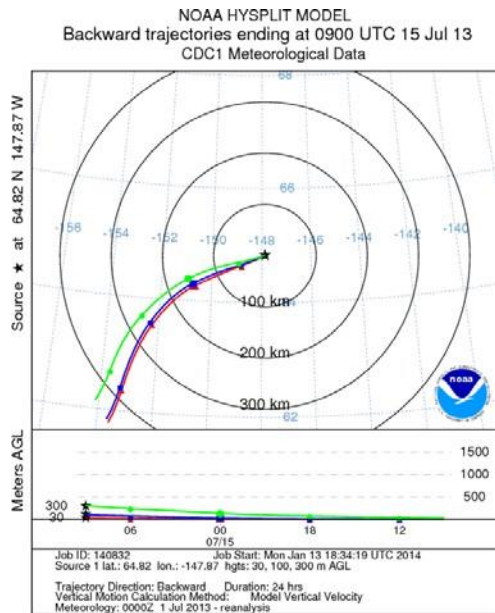
AICC Report Fire Information: No new information is provided in today's report. The fire was not flown. However, the fire was flown tomorrow and 1,200 acres added. Yet another day when the diurnal wind brings smoke into Fairbanks, then clears in the morning. Smoke was cleared out by 9AM when the winds shifted from easterly to southwesterly.

MODIS imagery: Smoke is visible at the Stuart Creek² fire to the east of Fairbanks.

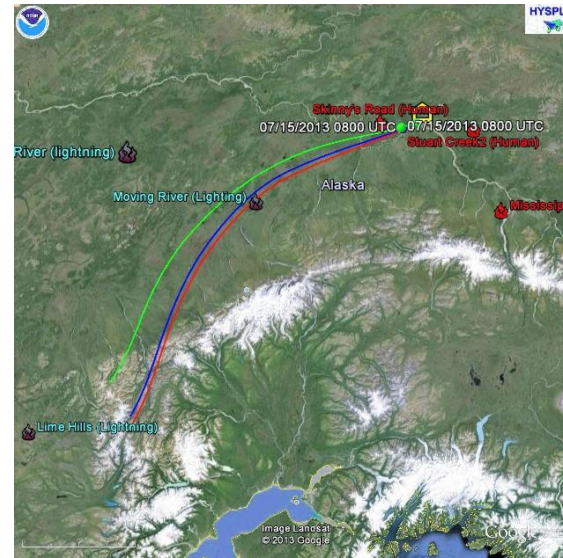
HYSPLIT trajectory: Indicates that the 30 meter flow is west-southwest.

Surface observations: Indicate the morning diurnal easterly flow.

PM_{2.5} data: Primary NCORE 24-hour FRM PM_{2.5} concentration was 12.9 µg/m³. The secondary NCORE 24-hour FRM PM_{2.5} concentration was 0.2 µg/m³. The SOB 24-hour FRM PM_{2.5} concentration was 11.9 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 12.7 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from July 16, 2013, 00LST backward to July 15, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. July 15, 2013, 11:08 AM LST MODIS imagery with 30m trajectory (red outline is fire but obscured by clouds, blue is smoke). Red arrow is 30m trajectory.

Figure 29. July 15, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

| 15-Jul | HRLY PM2.5 |
|--------|------------|
| 0:00 | 7 |
| 1:00 | 8 |
| 2:00 | 10 |
| 3:00 | 9 |
| 4:00 | 11 |
| 5:00 | 49 |
| 6:00 | 104 |
| 7:00 | RS232 |

| 15-Jul | HRLY PM2.5 |
|--------|------------|
| 8:00 | 22 |
| 9:00 | 4 |
| 10:00 | 4 |
| 11:00 | 6 |
| 12:00 | 6 |
| 13:00 | 5 |
| 14:00 | 4 |
| 15:00 | 4 |

| 15-Jul | HRLY PM2.5 |
|--------|------------|
| 16:00 | 6 |
| 17:00 | 4 |
| 18:00 | 5 |
| 19:00 | 6 |
| 20:00 | 6 |
| 21:00 | 4 |
| 22:00 | 3 |
| 23:00 | 5 |

D. Hourly PM_{2.5} for July 15, 2013.

Table 24. Hourly observations for Fairbanks International Airport, July 15, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|----|----|
| 702610 | 26411 | 201307150053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150153 | 170 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150353 | 50 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150653 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150853 | 240 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307150953 | 250 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151053 | 250 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151153 | 250 | 14 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151253 | 310 | 11 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151353 | 250 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151453 | 270 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151553 | 260 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151653 | 280 | 13 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151753 | 290 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151853 | 280 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307151953 | 280 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307152053 | 280 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307152153 | 260 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307152253 | 270 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201307152353 | 290 | 6 | *** | 10 | ** | ** |

Summary of the June/July Event Period

The late June/early July event can best be summarized as fire location with sustained southwest wind flow through the Skinny Road fire followed by a diurnal wind pattern that worked to advect smoke from the Stuart Creek2 fire into Fairbanks in the early hours of the day. The smoke, and therefore the PM_{2.5} concentrations, during this period also varied due to increases and decreases in fire spread, suppression efforts, and shallow, surface-based inversions. Smoke continued in the area through the period and resulted in a 24-hr PM_{2.5} exceedance on one day, June 27, 2013 and two other days that were very close to exceedances, June 30 (32.9 µg/m³) and July 6 (27.5 µg/m³).

August Event

There were many fires that led to increases in PM_{2.5} concentrations in Fairbanks from August 8 to August 15, 2013. Two of the closest fires were the Stuart Creek² and Mississippi fires. Both these fires experienced a lull in activity in late July and the first few days of August. However, dry conditions led to increased activity beginning August 7, 2013. Other large fires impacting the PM_{2.5} concentrations included Discovery Creek fire and Birch Creek fire to the northeast of Fairbanks and the Tetlin Junction Ridge fire to the southeast. Other smaller fires contributed to the smoky conditions over much of eastern and central interior Alaska.

August 7, 2013

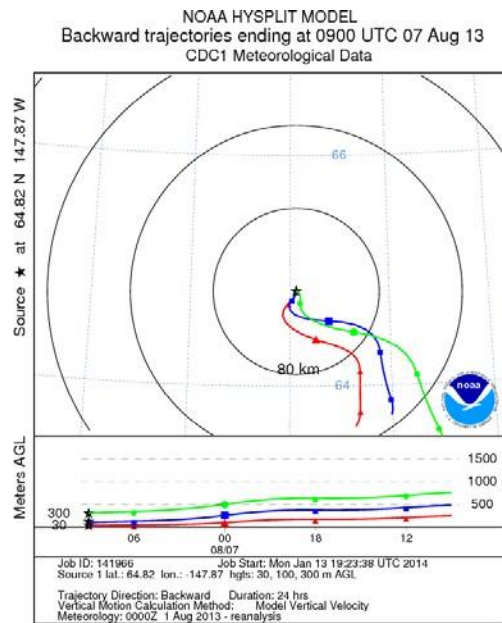
AICC Report Fire Information: Both the Mississippi and Stuart Creek2 fires have isolated torching on this date, but no significant growth in area is reported.

MODIS imagery: Smoke is visible at the Stuart Creek2 fire to the east of Fairbanks. A large area of smoke is visible to the north along the Brooks Range. This smoke is from fires further north and also from very large fires in Canada near Great Bear Lake.

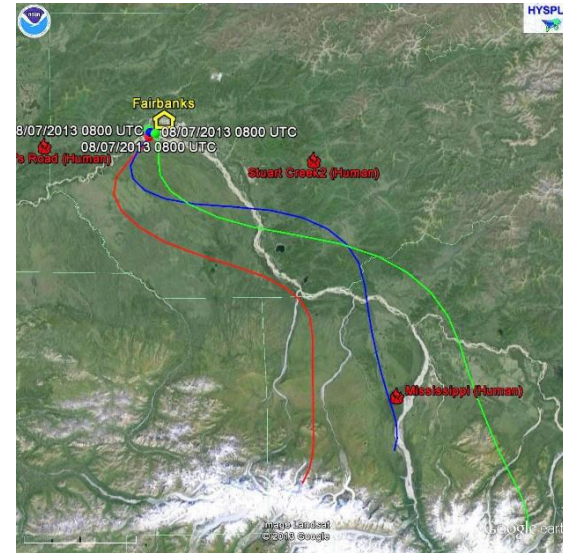
HYSPLIT trajectory: Indicates that the 30 meter flow is southeast.

Surface observations: Indicate the morning diurnal easterly flow.

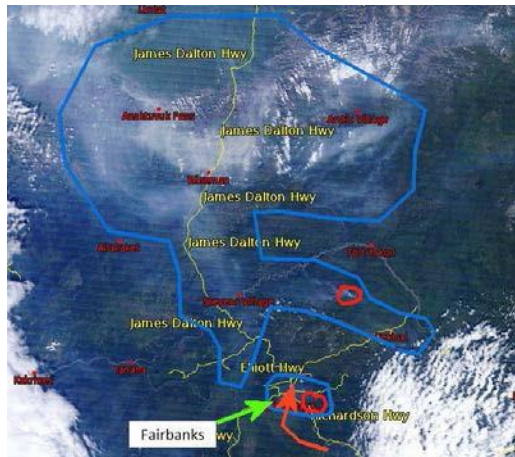
PM_{2.5} data: There is an increase in PM_{2.5} concentrations during the morning diurnal flow as happens on most days. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 14.0 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 8, 2013, 00LST backward to August 7, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 7, 2013, 11:25 AM LST MODIS imagery with 30m trajectory (red outline is fire but obscured by clouds, blue is smoke). Red arrow is 30m trajectory.

| 7-Aug | HRLY PM2.5 | 7-Aug | HRLY PM2.5 | 7-Aug | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 6 | 8:00 | 23 | 16:00 | 2 |
| 1:00 | 8 | 9:00 | 17 | 17:00 | 3 |
| 2:00 | 8 | 10:00 | 23 | 18:00 | 5 |
| 3:00 | 17 | 11:00 | 27 | 19:00 | 5 |
| 4:00 | 22 | 12:00 | 23 | 20:00 | 10 |
| 5:00 | 20 | 13:00 | 15 | 21:00 | 12 |
| 6:00 | 26 | 14:00 | 12 | 22:00 | 11 |
| 7:00 | 24 | 15:00 | 8 | 23:00 | 10 |

D. Hourly PM_{2.5} for August 7, 2013.

Figure 30. August 7, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 25. Hourly observations for Fairbanks International Airport, August 7, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|-----------------|----|
| 702610 | 26411 | 201308070053 | 30 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070153 | 40 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070253 | 50 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070453 | 360 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070653 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308070953 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071053 | 80 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071153 | 180 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071253 | 990 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071353 | 280 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071453 | 250 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071553 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071653 | 140 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071753 | 110 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308071853 | 90 | 6 | *** | 10 | ** 61(lgt Rain) | ** |
| 702610 | 26411 | 201308071953 | 70 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308072053 | 10 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308072153 | 310 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308072253 | 180 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308072353 | 30 | 8 | *** | 10 | ** | ** |

August 8, 2013

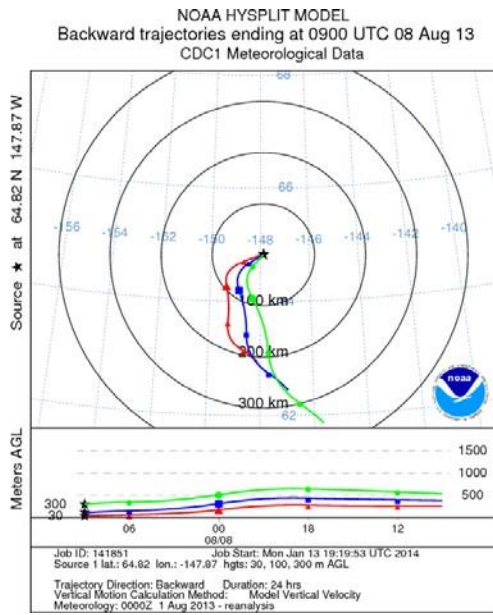
AICC Report Fire Information: Air attack was conducted on both the Mississippi and Stuart Creek2 fires. The Mississippi Fire grew by 980 acres. Although no growth was reported on the Stuart Creek2 Fire, widespread activity was reported within the fire area.

MODIS imagery. No image available this date.

HYSPLIT trajectory: Indicates that the 30 meter flow is from the south-southwest.

Surface observations: Indicate easterly flow from the fire throughout most of the day.

PM_{2.5} data: PM_{2.5} concentrations were elevated the first half of the day and led to an overall elevated value. Primary NCORE 24-hour FRM PM_{2.5} concentration was 12.1 µg/m³. The SOB 24-hour FRM PM_{2.5} concentration was 12.1 µg/m³. The secondary NCORE 24-hour FRM PM_{2.5} concentration was 11.9 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24 hour average concentration was 12.4 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 9, 2013, 00LST backward to August 8, 2013, 00LST.

MODIS image not available

C. August 8, 2013 MODIS not available.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

| 8-Aug | HRLY PM2.5 |
|-------|------------|
| 0:00 | 18 |
| 1:00 | 17 |
| 2:00 | 17 |
| 3:00 | 11 |
| 4:00 | 18 |
| 5:00 | 14 |
| 6:00 | 11 |
| 7:00 | 16 |

| 8-Aug | HRLY PM2.5 |
|-------|------------|
| 8:00 | 18 |
| 9:00 | 20 |
| 10:00 | 28 |
| 11:00 | 29 |
| 12:00 | 10 |
| 13:00 | 6 |
| 14:00 | 3 |
| 15:00 | 4 |

| 8-Aug | HRLY PM2.5 |
|-------|------------|
| 16:00 | 7 |
| 17:00 | 7 |
| 18:00 | 7 |
| 19:00 | 8 |
| 20:00 | 6 |
| 21:00 | 5 |
| 22:00 | 6 |
| 23:00 | RS232 |

D. Hourly PM_{2.5} for August 8, 2013.

Figure 31. August 8, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 26. Hourly observations for Fairbanks International Airport, August 8, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|--------------------|------------|-----------|-----------|----------|----|----|
| 702610 | 26411 | 201308080053 | 30 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080153 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080353 | 40 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080453 | 50 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080553 | 330 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080653 | 130 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080753 | 340 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080853 | 80 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308080953 | 100 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081053 | 990 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081153 | 100 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081353 | 110 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081453 | 140 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081653 | 280 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308081953 | 100 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308082053 | 230 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308082153 | 240 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308082253 | 360 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308082353 | *** | 0 | *** | 10 | ** | ** |

August 9, 2013

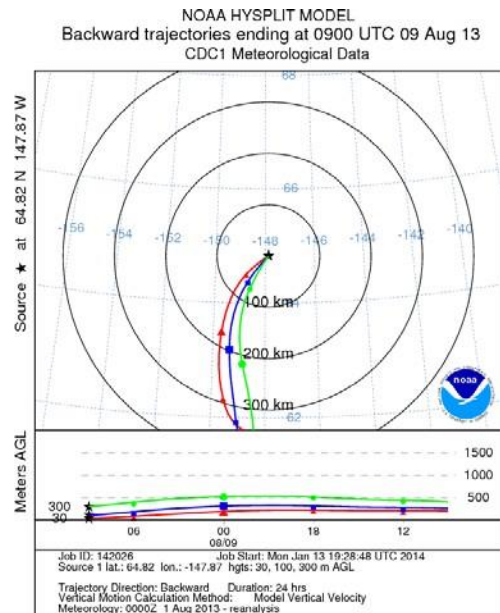
AICC Report Fire Information: Between August 7 and today, the Mississippi Fire grew from 1,208 acres to 33,853 acres. At the Stuart Creek² Fire visibility was reduced by smoke and hampered firefighter monitoring work.

MODIS imagery: Although cloudy, smoke can be seen from the fire to the northwest through Fairbanks and beyond.

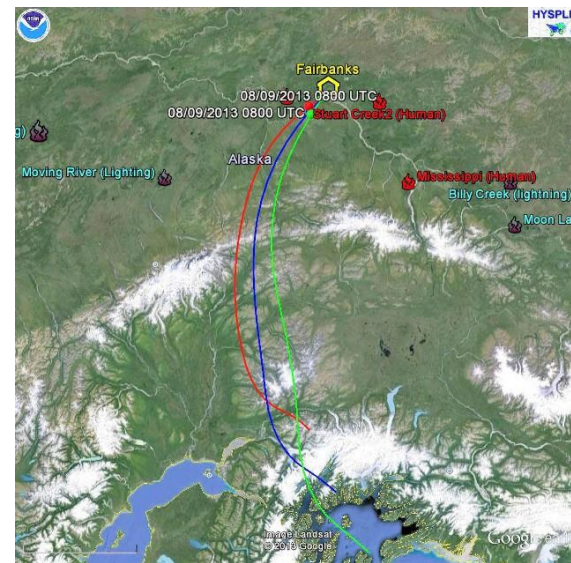
HYSPLIT trajectory: Indicates that the 30 meter flow is from the south-southwest. However, this varied with the passage of a weak frontal system.

Surface observations: Although the wind direction varies throughout the day, the surface observations report a predominant easterly flow from the fire.

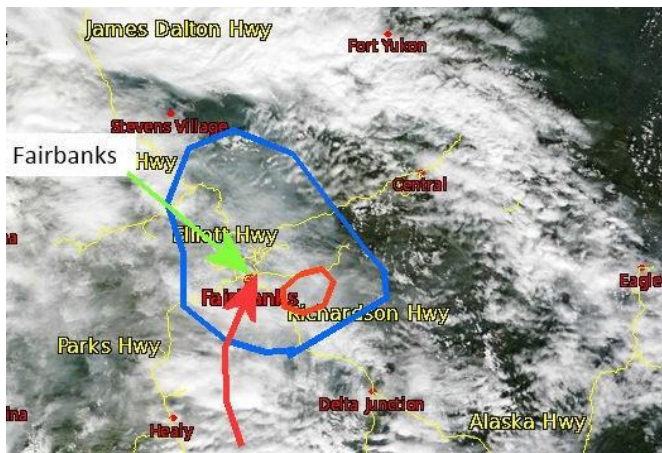
PM_{2.5} data: The PM_{2.5} concentrations increased after 7:00 AM local time and remained elevated throughout the day. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 35.6 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 10, 2013, 00LST backward to August 9, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 9, 2013, 12:50 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 9-Aug | HRLY PM2.5 | 9-Aug | HRLY PM2.5 | 9-Aug | HRLY PM2.5 |
|-------|------------|-------|------------|-------|------------|
| 0:00 | 11 | 8:00 | 48 | 16:00 | 40 |
| 1:00 | 13 | 9:00 | 23 | 17:00 | 40 |
| 2:00 | 10 | 10:00 | 62 | 18:00 | 32 |
| 3:00 | 4 | 11:00 | 46 | 19:00 | 34 |
| 4:00 | 3 | 12:00 | 64 | 20:00 | 27 |
| 5:00 | 6 | 13:00 | 61 | 21:00 | 47 |
| 6:00 | 9 | 14:00 | 70 | 22:00 | 54 |
| 7:00 | 27 | 15:00 | 84 | 23:00 | 39 |

D. Hourly PM_{2.5} for August 9, 2013.

Figure 32. August 9, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 27. Hourly observations for Fairbanks International Airport, August 9, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|----|
| 702610 | 26411 | 201308090053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090153 | 10 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090353 | 20 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090653 | 310 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308090753 | 340 | 8 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201308090853 | 10 | 5 | *** | 6 | 4(smoke) | ** |
| 702610 | 26411 | 201308090953 | 160 | 6 | *** | 6 | 5(haze) | 4 |
| 702610 | 26411 | 201308091053 | 250 | 3 | *** | 5 | 5(haze) | 4 |
| 702610 | 26411 | 201308091153 | 100 | 3 | *** | 4 | 5(haze) | 4 |
| 702610 | 26411 | 201308091253 | 990 | 3 | *** | 5 | 5(haze) | 4 |
| 702610 | 26411 | 201308091353 | 120 | 3 | *** | 5 | 5(haze) | 4 |
| 702610 | 26411 | 201308091453 | 60 | 5 | *** | 5 | 5(haze) | 4 |
| 702610 | 26411 | 201308091553 | 90 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201308091653 | 100 | 3 | *** | 5 | 4(smoke) | ** |
| 702610 | 26411 | 201308091753 | *** | 0 | *** | 5 | 5 | 4 |
| 702610 | 26411 | 201308091853 | *** | 0 | *** | 5 | 5 | 4 |
| 702610 | 26411 | 201308091953 | 260 | 3 | *** | 5 | 5 | 4 |
| 702610 | 26411 | 201308092053 | 250 | 3 | *** | 5 | 6l (lgt rain) | 5 |
| 702610 | 26411 | 201308092153 | 80 | 6 | *** | 5 | 6l (lgt rain) | 5 |
| 702610 | 26411 | 201308092253 | 310 | 5 | *** | 6 | 5(haze) | 4 |
| 702610 | 26411 | 201308092353 | 40 | 5 | *** | 9.1 | ** | ** |

August 10, 2013

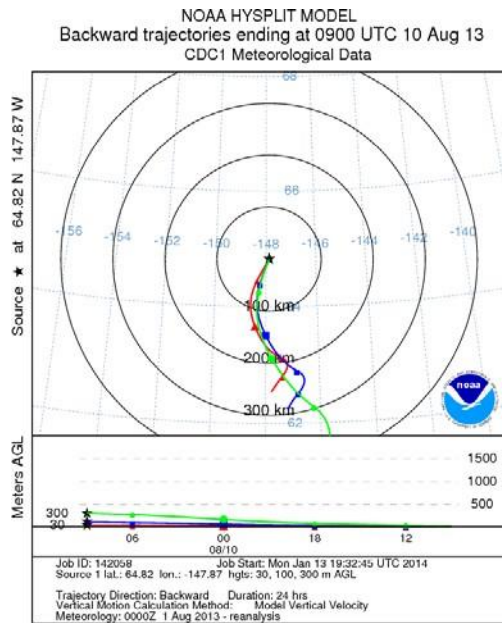
AICC Report Fire Information: The Mississippi Fire grew another 6,167 acres today and is now 40,000 acres. The fire escaped the military area and exhibited running, spotting, and torching. The Stuart Creek² Fire increased another 468 acres and is now 87,358 total acres. Gusty winds occurred over the area and increased fire behavior.

MODIS imagery: Clouds obscure the area.

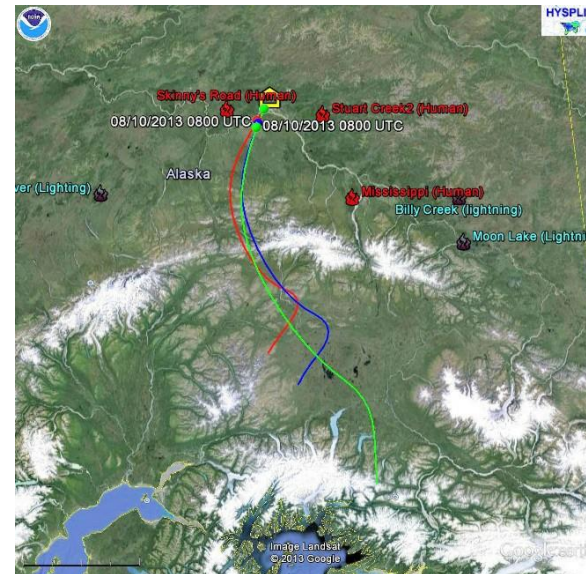
HYSPLIT trajectory: Indicates the 30 meter flow is from the south-southwest.

Surface observations: The surface observations start the day with northwest to northeast winds, change to westerly mid-day and then revert back to northwest-northeast in the later part of the day.

PM_{2.5} data: PM_{2.5} concentrations mirrored the wind direction. With the northerly wind component, the concentrations increased, then decreased in midday with the westerly wind, but increased again in the later part of the day when the winds reverted back to the northerly direction. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 71.6 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 11, 2013, 00LST backward to August 10, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 10, 2013, 11:55 AM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke but obscured by clouds). Red arrow is 30m trajectory.

| 10-Aug | HRLY PM2.5 | 10-Aug | HRLY PM2.5 | 10-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 41 | 8:00 | 164 | 16:00 | 88 |
| 1:00 | 80 | 9:00 | 159 | 17:00 | 5 |
| 2:00 | 89 | 10:00 | 49 | 18:00 | RS232 |
| 3:00 | 89 | 11:00 | 34 | 19:00 | 6 |
| 4:00 | 143 | 12:00 | 7 | 20:00 | 6 |
| 5:00 | 138 | 13:00 | 2 | 21:00 | 28 |
| 6:00 | 121 | 14:00 | 121 | 22:00 | 32 |
| 7:00 | 118 | 15:00 | 89 | 23:00 | 38 |

D. Hourly PM_{2.5} for August 10, 2013.

Figure 33. August 10, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 28. Hourly observations for Fairbanks International Airport, August 10, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|----------|----------|
| 702610 | 26411 | 201308100553 | 310 | 3 | *** | 3 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100653 | 330 | 3 | *** | 2.5 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100753 | 360 | 6 | *** | 1.8 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100853 | 360 | 6 | *** | 1.3 | 4(smoke) | ** |
| 702610 | 26411 | 201308100953 | 10 | 5 | *** | 1.3 | 4(smoke) | ** |
| 702610 | 26411 | 201308101053 | 20 | 7 | *** | 2.5 | 5(haze) | 4 |
| 702610 | 26411 | 201308101153 | 360 | 3 | *** | 6 | 5(haze) | 4 |
| 702610 | 26411 | 201308101253 | m | m | m | m | m | m |
| 702610 | 26411 | 201308101353 | m | m | m | m | m | m |
| 702610 | 26411 | 201308101453 | m | m | m | m | m | m |
| 702610 | 26411 | 201308101553 | 250 | 5 | *** | 5 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308101653 | 250 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308101753 | 260 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308101853 | 320 | 8 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308101953 | 320 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308102053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308102153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308102253 | 320 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308102353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308100553 | 310 | 3 | *** | 3 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100653 | 330 | 3 | *** | 2.5 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100753 | 360 | 6 | *** | 1.8 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308100853 | 360 | 6 | *** | 1.3 | 4(smoke) | ** |
| 702610 | 26411 | 201308100953 | 10 | 5 | *** | 1.3 | 4(smoke) | ** |

August 11, 2013

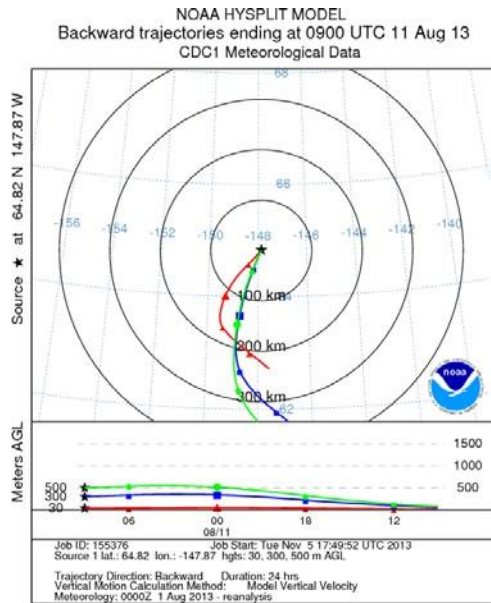
AICC Report Fire Information: The Mississippi Fire grew 841 acres to 40,841 acres. Improving weather conditions allowed aerial operations to resume but also lead to expectations of large fire growth. No growth was reported at the Stuart Creek² Fire. However, drier conditions lead to increased activity within the fire. Crews worked to control hot spots near the edge of the fire.

MODIS imagery: Unavailable on this date.

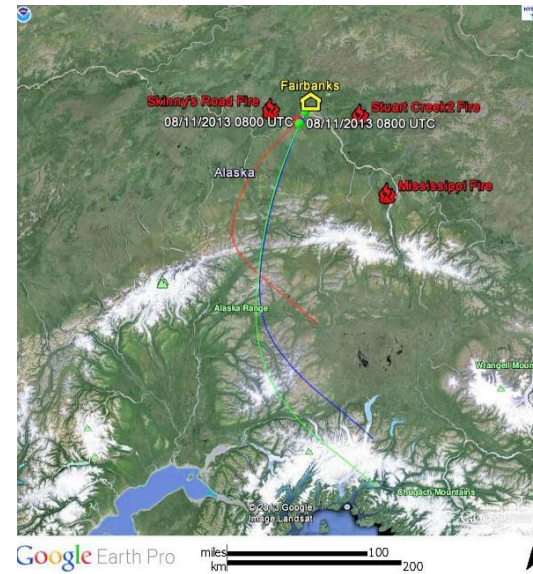
HYSPLIT trajectory: Indicates the 30 meter flow is from the south-southwest.

Surface observations: Easterly winds until 2:00 PM then westerly winds the remainder of the day.

PM_{2.5} data: PM_{2.5} concentrations again mirrored the wind direction. With the easterly winds early, the concentrations remained high. In the afternoon when the winds shifted to the west the smoke began to clear a little but concentrations still remaine^{3d} above normal. Primary NCORE 24-hour FRM PM_{2.5} concentration was 21.0 µg/m³. This was not a 1-in-6 run day so the secondary NCORE FRM PM_{2.5} is not available for this date. The SOB 24-hour FRM PM_{2.5} concentration was 20.6 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 21.2 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 12, 2013, 00LST backward to August 11, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.

MODIS image not available

C. August 11, 2013, 13:21 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 11-Aug | HRLY PM2.5 | 11-Aug | HRLY PM2.5 | 11-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 46 | 8:00 | 17 | 16:00 | 21 |
| 1:00 | 42 | 9:00 | 13 | 17:00 | 16 |
| 2:00 | 30 | 10:00 | 11 | 18:00 | 13 |
| 3:00 | 33 | 11:00 | 9 | 19:00 | 17 |
| 4:00 | 25 | 12:00 | 11 | 20:00 | RS232 |
| 5:00 | 28 | 13:00 | 21 | 21:00 | 20 |
| 6:00 | 16 | 14:00 | 16 | 22:00 | 24 |
| 7:00 | 20 | 15:00 | 20 | 23:00 | 19 |

D. Hourly PM_{2.5} for August 11, 2013.

Figure 34. August 11, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 29: Hourly observations for Fairbanks International Airport, August 11, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|----|
| 702610 | 26411 | 201308110053 | 50 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110153 | 110 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110253 | 20 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110553 | 10 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110653 | 70 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308110753 | 30 | 6 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201308110853 | 50 | 3 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201308110953 | 20 | 6 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201308111053 | 10 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111153 | 20 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111353 | 360 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111553 | 250 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111653 | 290 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111753 | 310 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308111853 | 280 | 5 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308111953 | m | m | m | m | m | m |
| 702610 | 26411 | 201308112053 | 260 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308112153 | 260 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308112253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308112353 | 210 | 6 | *** | 10 | ** | ** |

August 12, 2013

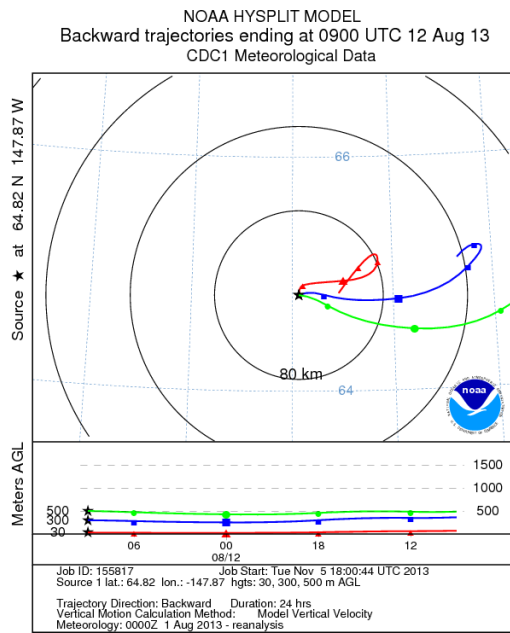
AICC Report Fire Information: The Mississippi Fire grew by 11,698 acres to 52,539 acres. The fire is described as wind driven with large growth expected. The Stuart Creek2 Fire experienced higher humidity, but still expected growth due to extremely dry fuels.

MODIS imagery: Smoke cover the eastern interior of Alaska. Five major fires are visible on the satellite image. Three are near Fairbanks and two are on the Alaska/Canada border to the east.

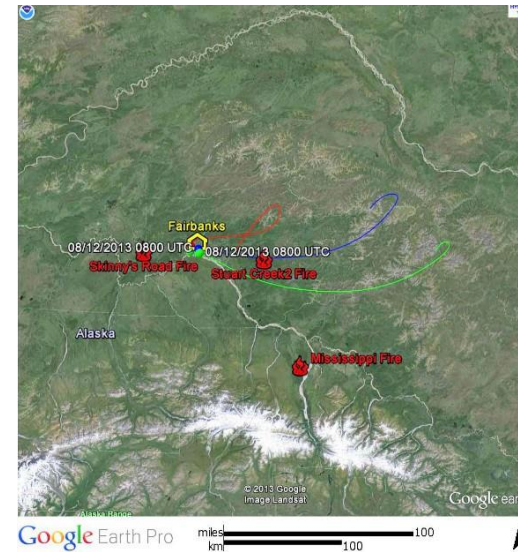
HYSPLIT trajectory: The trajectory indicates the 30 meter flow has changed to an easterly direction.

Surface observations: Easterly winds dominate most of the day, changing to westerly at 8:00 PM LST.

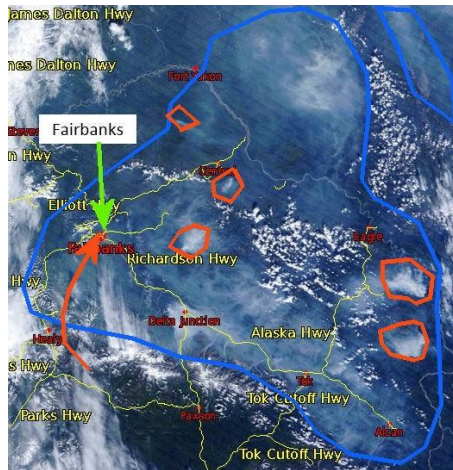
PM_{2.5} data: PM_{2.5} concentrations remained high throughout the day, dropping slightly after the westerly winds began in the evening. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 38.5 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 13, 2013, 00LST backward to August 12, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 12, 2013, 13:21 PM LST MOIDS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 12-Aug | HRLY PM2.5 | 12-Aug | HRLY PM2.5 | 12-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 17 | 8:00 | 84 | 16:00 | 17 |
| 1:00 | 26 | 9:00 | 81 | 17:00 | 15 |
| 2:00 | 33 | 10:00 | 72 | 18:00 | 17 |
| 3:00 | 48 | 11:00 | 53 | 19:00 | 16 |
| 4:00 | 42 | 12:00 | 53 | 20:00 | 21 |
| 5:00 | 66 | 13:00 | 33 | 21:00 | 14 |
| 6:00 | 72 | 14:00 | 25 | 22:00 | 17 |
| 7:00 | 71 | 15:00 | 18 | 23:00 | 14 |

D. Hourly PM_{2.5} for August 12, 2013.

Figure 35. August 12, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 30. Hourly observations for Fairbanks International Airport, August 12, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------|----------|
| 702610 | 26411 | 201308120053 | 210 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308120153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308120253 | 190 | 3 | *** | 9.1 | ** | ** |
| 702610 | 26411 | 201308120353 | 210 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120453 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120553 | 30 | 3 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120653 | 40 | 5 | *** | 3 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120753 | *** | 0 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120853 | *** | 0 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308120953 | *** | 0 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308121053 | 990 | 3 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308121153 | 150 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308121253 | 990 | 3 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308121353 | 180 | 5 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308121453 | 190 | 6 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308121553 | m | m | m | m | m | m |
| 702610 | 26411 | 201308121653 | 210 | 6 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308121753 | m | m | m | m | m | m |
| 702610 | 26411 | 201308121853 | m | m | m | m | m | m |
| 702610 | 26411 | 201308121953 | 260 | 6 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308122053 | 260 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308122153 | 250 | 5 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308122253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308122353 | *** | 0 | *** | 10 | ** | ** |

August 13, 2013

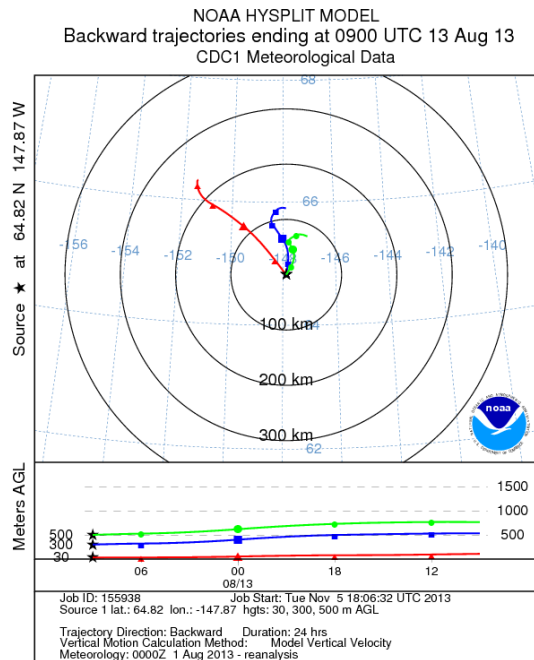
AICC Report Fire Information: The Mississippi Fire grew by 4,127 acres. The report states that smoke is having an impact on community and aviation resources. The Stuart Creek² Fire was no longer increasing in size. However, unburned areas within the fire were burned as the winds shifted.

MODIS imagery: Smoke cover the eastern interior of Alaska. Four major fires are visible on the satellite image today. Three are near Fairbanks and one near the Alaska/Canada border.

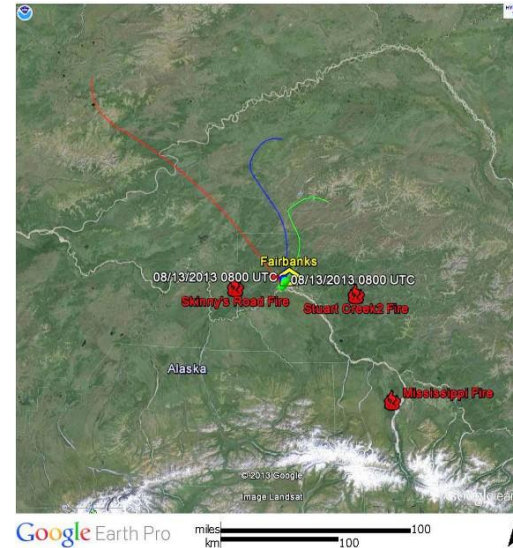
HYSPLIT trajectory: Indicates the 30 meter flow has changed to the north westerly direction. Although not through a fire area, the smoke is so prevalent that the wind direction is not the primary factor for increased smoke and PM_{2.5} concentrations.

Surface observations: Easterly winds in the morning hours but southerly winds in the afternoon.

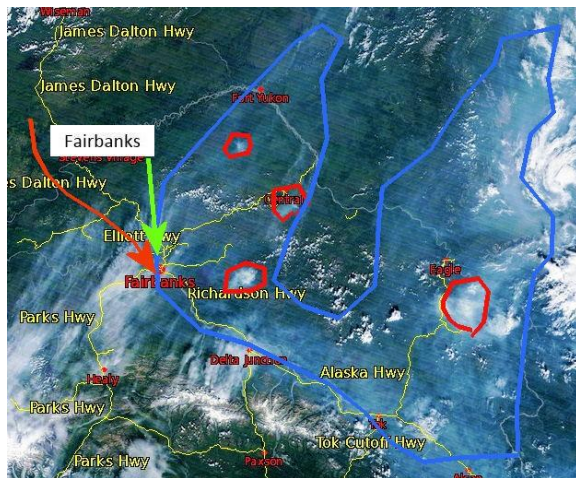
PM_{2.5} data: PM_{2.5} concentrations remained high no matter what the wind flow as smoke has saturated the entire area around Fairbanks. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 24-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 32.0 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 14, 2013, 00LST backward to August 13, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 13, 2013, 12:26 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 13-Aug | HRLY PM2.5 | 13-Aug | HRLY PM2.5 | 13-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 19 | 8:00 | RS232 | 16:00 | 34 |
| 1:00 | 21 | 9:00 | 36 | 17:00 | 43 |
| 2:00 | 14 | 10:00 | 40 | 18:00 | 47 |
| 3:00 | 19 | 11:00 | 24 | 19:00 | 42 |
| 4:00 | 20 | 12:00 | 26 | 20:00 | 49 |
| 5:00 | 17 | 13:00 | 26 | 21:00 | 52 |
| 6:00 | 24 | 14:00 | 29 | 22:00 | 48 |
| 7:00 | 31 | 15:00 | 29 | 23:00 | 45 |

D. Hourly PM_{2.5} for August 13, 2013.

Figure 36. August 13, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 29. Hourly observations for Fairbanks International Airport, August 13, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------|----------|
| 702610 | 26411 | 201308130053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308130153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308130253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308130353 | 50 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308130453 | 50 | 5 | *** | 8 | ** | ** |
| 702610 | 26411 | 201308130553 | 40 | 3 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308130653 | 80 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308130753 | *** | 0 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308130853 | 990 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308130953 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308131053 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308131153 | 150 | 5 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308131253 | *** | 0 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308131353 | *** | 0 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308131453 | 180 | 3 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308131553 | 170 | 3 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308131653 | 180 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308131753 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308131853 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308131953 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308132053 | 190 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308132153 | *** | 0 | *** | 5 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308132253 | *** | 0 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308132353 | *** | 0 | *** | 7 | ** | ** |

August 14, 2013

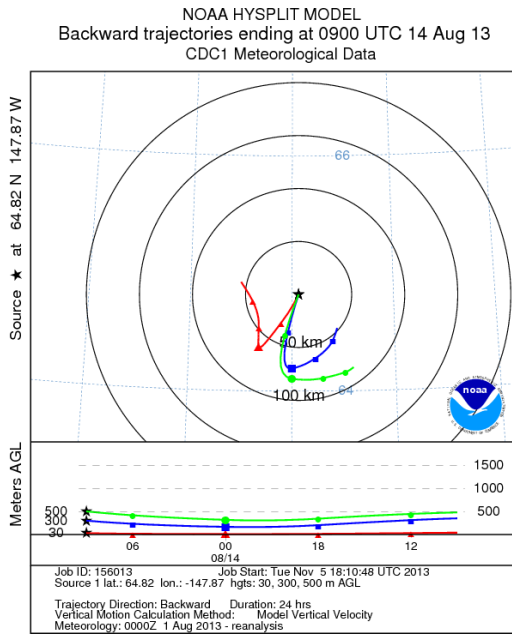
AICC Report Fire Information: The Mississippi Fire grew by 1,204 acres. Fire crews reported a strong inversion with heavy smoke until noon. The Stuart Creek² Fire, the closer of the two fires to Fairbanks, is no longer increasing in size. Unburned areas within the fire continued to burn.

MODIS imagery: Clouds obscure most of the area around Fairbanks. Some fires are visible further away to the east.

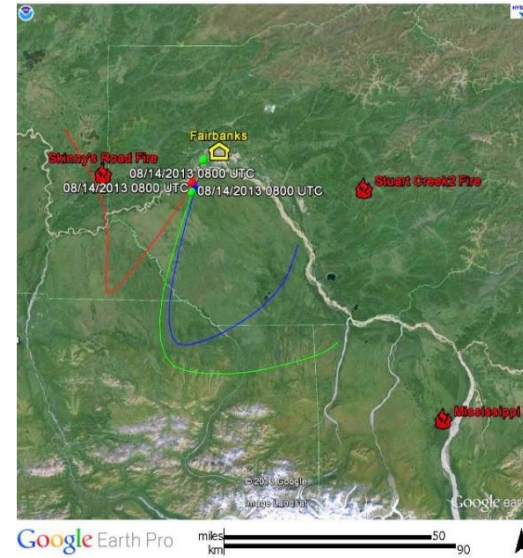
HYSPLIT trajectory: Indicates the 30 meter flow varies from northwest to southwest.

Surface observations: Easterly winds in the morning hours becoming westerly in the afternoon.

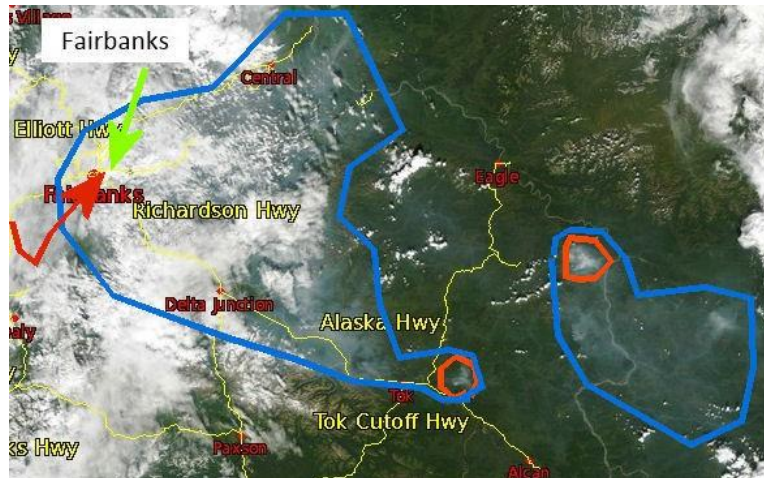
PM_{2.5} data: PM_{2.5} concentrations again varied with wind direction. Concentrations remained high in the morning but began clearing when the winds shifted to westerly. Primary NCORE 24-hour FRM PM_{2.5} concentration was 20.8 µg/m³. The secondary NCORE 24-hour FRM PM_{2.5} concentration was 22.6 µg/m³. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 21.3 µg/m³. The SOB 24-hour FRM PM_{2.5} concentration was 23.5 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 15, 2013, 00LST backwards to August 14, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 14, 2013, 11:30 AM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 14-Aug | HRLY PM2.5 | 14-Aug | HRLY PM2.5 | 14-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 44 | 8:00 | 17 | 16:00 | 0 |
| 1:00 | 39 | 9:00 | RS232 | 17:00 | -1 |
| 2:00 | 40 | 10:00 | 0 | 18:00 | 0 |
| 3:00 | 42 | 11:00 | 2 | 19:00 | 2 |
| 4:00 | 46 | 12:00 | 3 | 20:00 | 6 |
| 5:00 | 40 | 13:00 | 3 | 21:00 | 37 |
| 6:00 | 39 | 14:00 | 2 | 22:00 | 33 |
| 7:00 | 79 | 15:00 | 0 | 23:00 | 17 |

D. Hourly PM_{2.5} for August 14, 2013.

Figure 37. August 14, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 31. Hourly observations for Fairbanks International Airport, August 14, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------|----------|
| 702610 | 26411 | 201308140053 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140153 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140253 | 30 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140353 | *** | 0 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140453 | 340 | 3 | *** | 5 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140553 | 220 | 5 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140653 | 230 | 3 | *** | 4 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140753 | 990 | 3 | *** | 6 | 5(haze) | 4(smoke) |
| 702610 | 26411 | 201308140853 | 260 | 14 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308140953 | 260 | 13 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141053 | 260 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141153 | 260 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141253 | 250 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141353 | 240 | 9 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141453 | 260 | 10 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141553 | 290 | 7 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141653 | 280 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141753 | 230 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141853 | 210 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308141953 | 210 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308142053 | 200 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308142153 | 230 | 3 | *** | 7 | ** | ** |
| 702610 | 26411 | 201308142253 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308142353 | *** | 0 | *** | 10 | ** | ** |

August 15, 2013

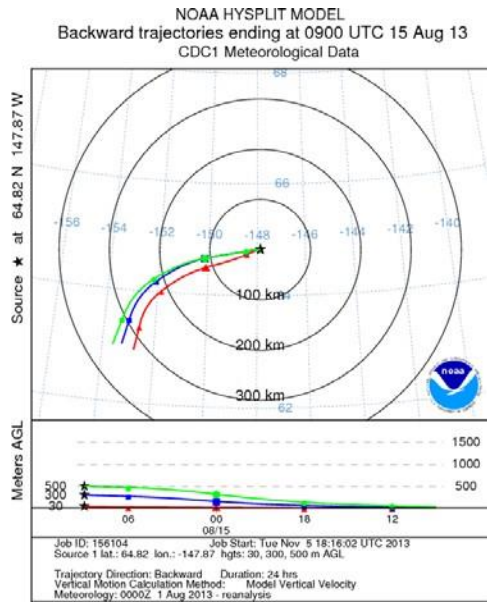
AICC Report Fire Information: The Mississippi Fire did not grow today. Over the next three days the winds reported in the AICC Daily Situation Report were from the west or northwest which would move the smoke away from the fire. The Stuart Creek² Fire was in a mop-up mode at this point and crews were made available for reassignment.

MODIS imagery: Smoke is visible in the Delta Junction area, to the southeast of Fairbanks.

HYSPLIT trajectory: Indicates the 30 meter flow varies west-southwest.

Surface observations: Easterly winds in the morning hours becoming westerly in the afternoon.

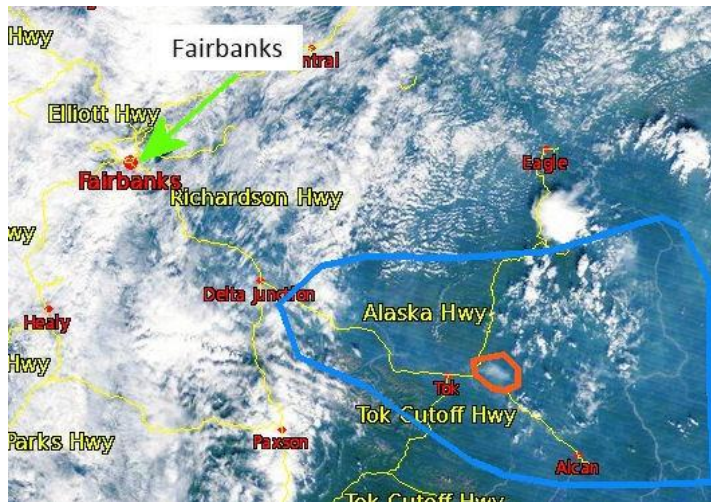
PM_{2.5} data: Although PM_{2.5} concentrations were slightly elevated at times during this period, light rainfall began to dissipate the smoke. This was not a 1-in-6 or 1-in-3 run day so primary NCORE 24-hour FRM, secondary NCORE 24-hour FRM, and SOB 2-hour FRM are not available for this date. The correlated NCORE continuous BAM PM_{2.5} 24-hour average concentration was 8.4 µg/m³.



A. HYSPLIT Backwards Trajectory Forecast from August 16, 2013, 00LST backward to August 14, 2013, 00LST.



B. HYSPLIT Trajectory forecast on Google Earth map. Red = 30m, Blue = 100m, Green = 500m.



C. August 15, 2013, 12:23 PM LST MODIS imagery with 30m trajectory (red outline is fire, blue is smoke). Red arrow is 30m trajectory.

| 15-Aug | HRLY PM2.5 | 15-Aug | HRLY PM2.5 | 15-Aug | HRLY PM2.5 |
|--------|------------|--------|------------|--------|------------|
| 0:00 | 16 | 8:00 | 13 | 16:00 | 3 |
| 1:00 | 12 | 9:00 | 13 | 17:00 | 15 |
| 2:00 | 8 | 10:00 | 10 | 18:00 | 19 |
| 3:00 | 5 | 11:00 | 8 | 19:00 | 12 |
| 4:00 | 7 | 12:00 | 6 | 20:00 | 10 |
| 5:00 | 7 | 13:00 | 2 | 21:00 | 4 |
| 6:00 | 10 | 14:00 | 2 | 22:00 | 1 |
| 7:00 | 16 | 15:00 | 2 | 23:00 | 1 |

D. Hourly PM_{2.5} for August 15, 2013.

Figure 38. August 15, 2013 All end points/arrow heads terminate at Fairbanks, Alaska

Table 32. Hourly observations for Fairbanks International Airport, August 15, 2013

| USAF | WBAN | YR--MODAHRMN (LST) | DIR (From) | SPD (MPH) | GUS (MPH) | VSB (SM) | WW | WW |
|--------|-------|-----------------------|---------------|--------------|--------------|-------------|---------------|-----------|
| 702610 | 26411 | 201308150053 | 70 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150253 | 340 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150353 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150553 | 50 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150653 | 40 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308150753 | *** | 0 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308150853 | *** | 0 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308150953 | *** | 0 | *** | 7 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308151053 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151153 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151253 | 200 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151353 | 210 | 3 | *** | 10 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308151453 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151553 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151653 | 200 | 3 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151753 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151853 | *** | 0 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308151953 | 990 | 5 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308152053 | 250 | 8 | *** | 7 | 61 (lgt rain) | ** |
| 702610 | 26411 | 201308152153 | 360 | 6 | *** | 4 | 61 (lgt rain) | 10 (mist) |
| 702610 | 26411 | 201308152253 | 220 | 6 | *** | 10 | ** | ** |
| 702610 | 26411 | 201308152353 | *** | 0 | *** | 10 | ** | ** |

Summary of the August Event Period

Two major processes led to the repeated smoke intrusion into Fairbanks during the August 2013 event. The first was the dry conditions that led to increased fire behavior. The second was the diurnal wind flow that brought smoke almost daily from the Stuart Creek² fire. High PM_{2.5} concentrations were observed on all days from August 8 through 14. Highest concentrations occurred on August 10. No FRM days exceeded the NAAQS 24-HR standard in the August event but some of these days could impact the annual design value in the future.

There would have been no exceedance except for the event

As outlined in the June through August Event daily discussion above, the June 27, 2013 exceedance was caused by a combination of smoke from Stuart Creek² and the nearby Skinny Road fire. Southwest wind flow through the Skinny Road fire was a primary contributor along with diurnal downslope flow from the Stuart Creek² fire. Both fires experienced explosive growth beginning on June 27.

Typical summertime PM_{2.5} concentrations are in the single digits (Figure 8). In 2013, the 24-hr average PM_{2.5} concentrations were below 11 µg/m³ for the period April 1, 2013 through September 30, 2013 except for the days when smoke impacted Fairbanks (Figure 4).

There were minimal emissions from prescribed burns in June 2013, and no emissions from prescribed burns in July or August (Figure 9). The major stationary sources operate year round and only marginally contribute to the PM_{2.5} concentrations. A model run for the entire 2009 summer season showed no to low contribution of these sources to the summer time fine particulate matter levels. (Exceptional Events Waiver Request for Exceptional PM_{2.5} Events between July 6 and August 8, 2009 at the State Office Building in Fairbanks, Alaska). Due to the high cost of the modeling analysis, ADEC decided not to contract another analysis for 2013. Area or local sources also do not create large enough emissions during the summer to reach concentrations near or above the NAAQS. Note: Wintertime exceedances in Fairbanks consist of 60% - 80% of wood smoke from home heating devices⁷.

⁷Ward, Tony et. al 2012

Mitigation

ADEC continues to work closely with Alaska Fire Service, the AICC, and the Fire Weather Forecasters to ensure Air Quality Advisory Notifications are sent to the public as rapidly as possible. In-place procedures allow ADEC to send Air Quality Advisories via Twitter and email, greatly reducing the time required to contact government agencies and the general public. See Appendix B Advisories

ADEC, the federal land management agencies, and Alaskan tribes developed an interagency plan, the Alaska Interagency Wildland Fire Management Plan (AIWFMP), to address controlling wildland fires. The AIWFMP requires an annual, pre-season land manager(s)/owner(s) review of the fire protection needs on lands under their management authority. In addition, responsibilities and actions taken to mitigate impacts of wildfire smoke are outlined in the “Alaska’s Enhanced Smoke Management Plan for Prescribed Fire, Procedures Manual April 10, 2006.” The purpose of the Enhanced Smoke Management Plan (ESMP) is to provide a clear and equitable regulatory basis for smoke management in Alaska. The ESMP also outlines procedures for monitoring ambient air quality in the event of a wildfire.

Procedural Requirements

In accordance with the exceptional events rule 40 CFR §50.14(c)(2)(iii), seven data points (June 27, June 30, July 6, July 15, August 8, August 11, and August 14) were flagged in the state’s AQS data submission. ADEC requests that EPA exclude these flagged data points when determining compliance with the PM_{2.5} NAAQS for the Fairbanks State Office Building site.

Conclusions

This document describes the wildfires in Alaska in the summer of 2013 by location and acreage burned. The cause of the major fires was military live-fire training or lightning ignition of very dry fuels caused by drought conditions. Live-fire training is a human activity that occurs frequently in the military training areas. However, large fires do not occur unless meteorological conditions are favorable. The second cause, lightning, also occurs frequently in Interior Alaska but only leads to large fires in very dry conditions.

The smoke from these fires impacted the Fairbanks area and resulted in several days of increased smoke and PM_{2.5} concentrations. On only one of these days, June 27, 2013, did an

exceedance of the 24-HR $PM_{2.5}$ NAAQS occur. These smoke impacted, natural event data should not be used in the determination of compliance with the NAAQS for Fairbanks and surrounding areas. It is clear that without the wildfires, $PM_{2.5}$ concentrations at the Fairbanks NCORE and SOB sites would have been much lower. Data from low fire years provide an estimate of background summer time $PM_{2.5}$ concentrations in the range of 3-6 $\mu g/m^3$ (Table 7), less than 20% of the $PM_{2.5}$ NAAQS.

These wildfires will reoccur and are not controllable. State of Alaska ESMP and Air Quality Advisory procedures adequately cover actions to be taken when these events occur.

References

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- Draxler, R.R., and G.D. Hess, 1998: An overview of the HYSPLIT_4 modeling system of trajectories, dispersion, and deposition. *Aust. Meteor. Mag.*, **47**, 295-308.
- Draxler, R.R., 1999: HYSPLIT4 user's guide. NOAA Tech. Memo. ERL ARL-230, NOAA Air Resources Laboratory, Silver Spring, MD.
- G.Wendler, et, Climatology of Alaskan wildfires with special emphasis on the extreme year 2004, Springer-Verlag 2010
- NOAA, Critical Weather patterns of US, 1999
- Wildland Fire Summary and Statistics Annual Report – AICC , Alaska Fire Season 2010
- http://dec.alaska.gov/air/anpms/comm/fbks1_pm.htm
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- <http://www.epa.gov/ttnnaqs/standards/pm/data/HanleyandReff040711.pdf>
- http://climate.gi.alaska.edu/AkCityClimo/2010/Jun/Jun_2010.html
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- 2010 Alaska Wildfire Emissions Inventory , BLM
- 2010 Alaska Fire Statistics , BLM
- Ward, Tony, et al., 2012. Source Apportionment of PM_{2.5} in a Subarctic Airshed – Fairbanks, AK, *Aerosol and Air Quality Research* **12**, 536-543.

If the paper used results from the online version of HYSPLIT, please include the following references:

- Draxler, R.R. and Rolph, G.D., 2011. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website (<http://ready.arl.noaa.gov/HYSPLIT.php>). NOAA Air Resources Laboratory, Silver Spring, MD.
- Rolph, G.D., 2011. Real-time Environmental Applications and Display sYstem (READY) Website (<http://ready.arl.noaa.gov>). NOAA Air Resources Laboratory, Silver Spring, MD.
- Rolph, G.D., et al., 2009. Description and Verification of the OA Smoke Forecasting System: The 2007 Fire Season, *Weather and Forecasting*, **24**, 361-378.
- Stein, A.F., et al., 2009. Verification of the NOAA Smoke Forecasting System: Model Sensitivity to the Injection Height, *Weather and Forecasting*, **24**, 379-394.

Abbreviations

| | |
|---------|---|
| AICC | Alaska Interagency Coordination Center |
| BL | Boundary Layer |
| GDAS | Global Data Assimilation System |
| GFS | Global Forecast System |
| HYSPLIT | HYbrid Single-Particle Lagrangian Integrated Trajectory |
| MODIS | Moderate Resolution Imaging Spectroradiometer satellite imagery |
| NCEP | National Centers for Environmental Prediction |
| AIWFMP | Alaska Interagency Wildland Fire Management Plan |
| NAAQS | National Ambient Air Quality Standard |
| FRM | Federal Reference Method |
| FEM | Federal Equivalent Method |
| WD | Wind Direction |
| WS | Wind Speed |