

# NorthWestern<sup>TM</sup> Energy

**2009**  
**-Montana-**  
***Electric Distribution/Transmission***  
***Annual Reliability Report***



***March 2009***  
***Final Report***

## **1.0 Executive Summary**

The goal of this report is to provide information and insight into NorthWestern Energy's (NWE) 2009 Electric Distribution and Transmission System reliability indices for the Montana region, per the guidelines outlined within the Administrative Rules of Montana (Rule 38.5.8619). These indices include SAIDI (System Average Interruption Duration Index – in minutes), CAIDI (Customer Average Interruption Duration Index – in minutes), SAIFI (System Average Interruption Frequency Index – in frequency) and Outage Counts. By standard definition, these indices are for “sustained” interruptions lasting more than five minutes.

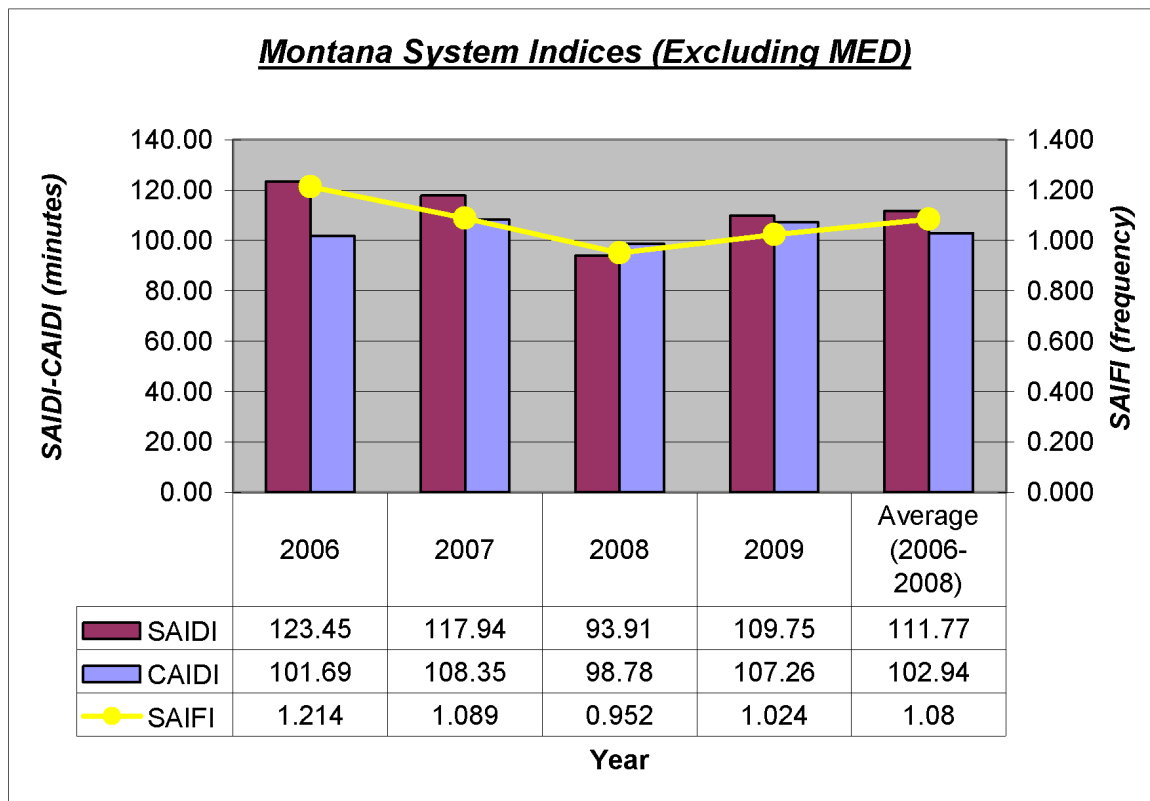
System indices will be given for the entire NorthWestern Energy Montana operating region, and will also be broken down into the eight operating areas of the state – Billings, Bozeman, Butte, Great Falls, Havre, Helena, Lewistown and Missoula. As with the previous years' annual reports, the Institute of Electrical and Electronics Engineers (IEEE) Standard 1366-2003 will again be followed. This standard is directly related to the use of a statistically based definition for classification of Major Event Days (MED) – also commonly referred to as the 2.5 Beta Method. Major Event Days are days in which the regional SAIDI exceeds a statistically derived threshold value and represent days in which the electric system experienced stresses beyond normal operating conditions (such as a severe weather storm).

NorthWestern Energy has an active relationship with the IEEE Power and Energy Society to ensure a consistent and accurate portrayal of our utility's ability to report and benchmark reliability indices. MEDs are identified through a monthly process for each region and can be included or excluded per the data required. Normally, this report would provide all information, including and excluding MEDs, for all three indices to better demonstrate and analyze normal versus emergency conditions. For 2009 though, there were no major events, so only graphs and data for the “excluding MED” group will be presented. By comparison, there were no MED events in 2003 or 2004, four in 2005, two in 2006, four in 2007 and five in 2008. The average for the period 2003-2008 is 2.5 per year. For Montana, it took more than 6.77 SAIDI minutes in 2009 to declare an MED. In recent years, MEDs have often added more than 50 SAIDI minutes to the year; representing around a 50% increase above the non-MED SAIDI. So a year without MEDs is always a reliable year.

## **2.0 General**

Although there were no Major Event Days in 2009, there were four days with a “Customer-Minutes Interrupted” (CMI) greater than one million. (An MED would have required over 2.2 million CMI). In order of magnitude, these were a snow and ice storm in the Great Falls area on April 28th with 1.9M CMI, a storm in Missoula on January second causing 1.4M CMI, a wet snowstorm affecting Bozeman, Livingston and Billings on October fifth (1.1M CMI), and a transmission outage on May 28th in the Bitterroot Valley (1.0M CMI).

### 3.0 Montana – System Reliability

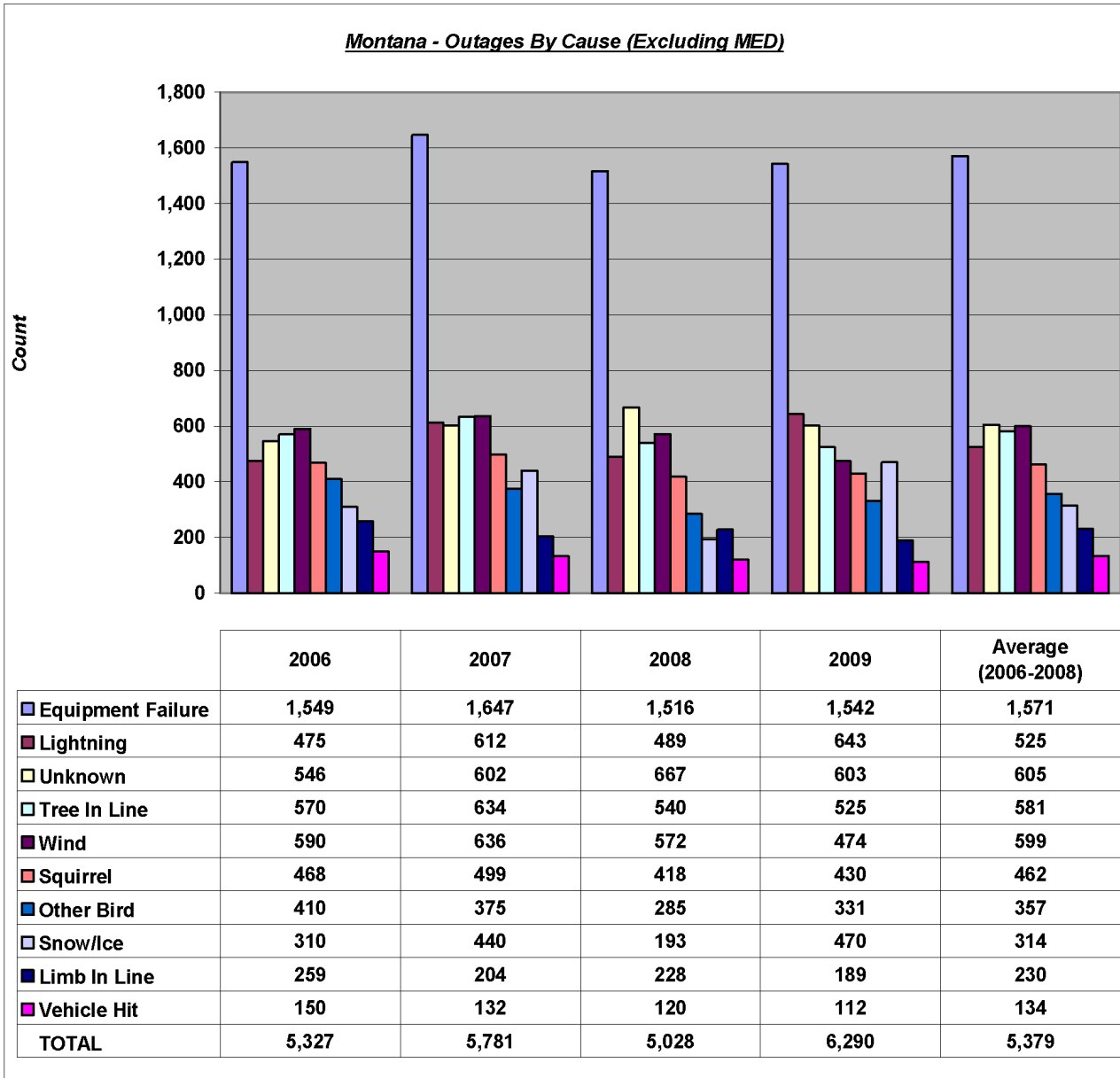


**Figure 3.0a – Montana – System Indices (Excluding MED)**

The figure above displays NorthWestern Energy’s Montana region indices for the years 2006-2009. Region indices shown for 2006 - 2008 data were taken from year-end audited data (excluding MEDs). Please note that SAIDI and CAIDI are given in minutes and SAIFI is given in the frequency of occurrence.

As can be seen by figure 3.0a, 2009 SAIDI, SAIFI, and CAIDI indices all increased from the 2008 year-end (Overall, 2008 was a very good year for reliability for the Montana region). Two indices though were lower than the previous three-year averages. The contributing factors to these indices will be discussed as each of the operating areas of the Montana region are examined and in the report conclusion.

Outages by cause (excluding MEDs) are shown in a following figure 3.0b of this section.



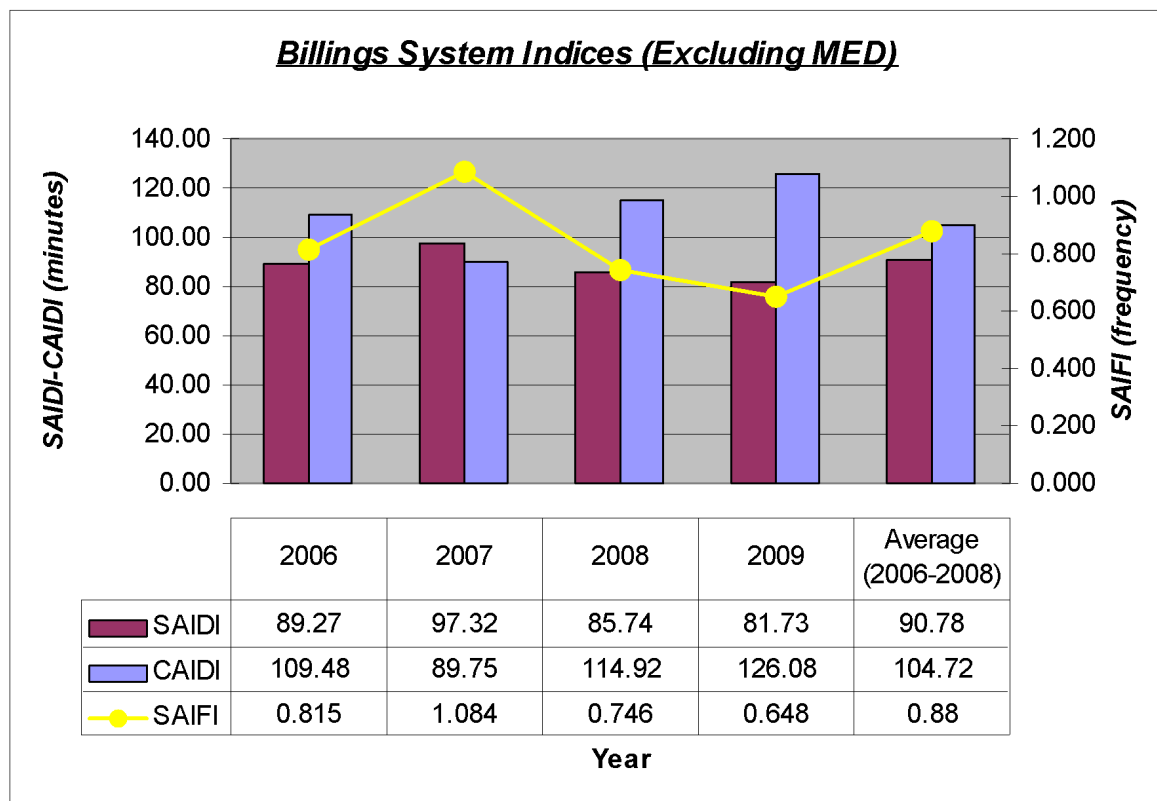
**Figure 3.0b – Montana – Outages By Cause (Excluding MED)**

As can be seen in the figure above, outages increased by 1262 from the 2008 operating year to the 2009 operating year which was also above the three year average (2006-2008) by 911. The outage causes represented in this table are the top ten major contributors for outages on the NorthWestern Energy Electric Distribution and Transmission system. Five outage cause categories increased in the number of outages and five decreased. Causes increasing significantly in outage numbers are lightning and snow/ice, both storm related factors. None are down appreciably. Equipment Failure is the most common of the outage causes due to its broad and all-inclusive category nature. Outages can be

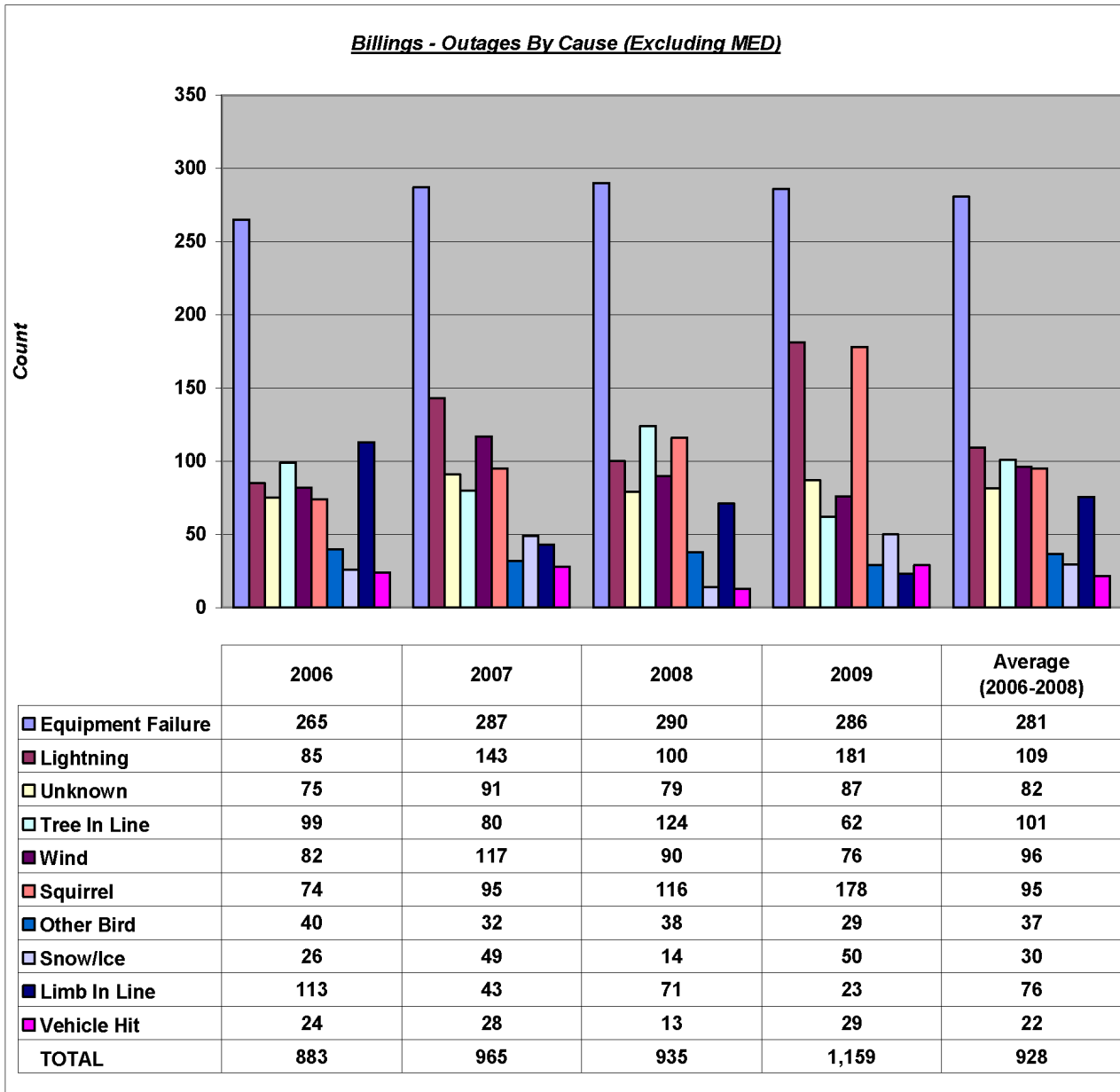
related back to Equipment Failure in many different ways and it is the responsibility of the operations personnel to correctly identify the cause.

#### 4.0 **Billings – System Reliability**

Discussion: Billings Division had a more reliable year in 2009 than 2008. SAIDI was less than half of what it was with the two major event snowstorms in 2008. One October storm did cause several outages, but outages were nothing like the previous year's October storm. Excluding MED data, two indices are improved from 2008, but CAIDI is somewhat higher. This is not uncommon, since a lower SAIDI and SAIFI often indicate fewer urban outages and more rural ones that may take longer to locate and repair. Tree related outages were down considerably. Significant vegetation work has been done over the last five years in this division, which appears to be paying off. Lightning, squirrels and vehicle hits are up and may need further analysis.



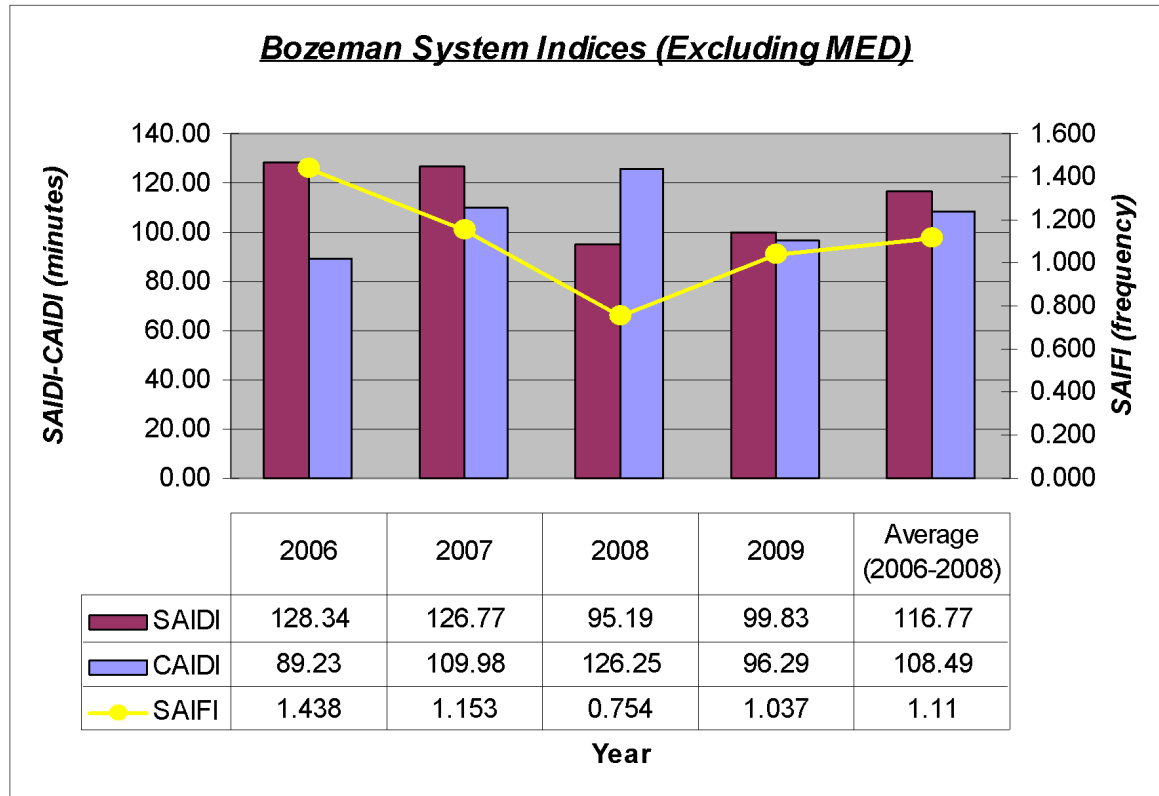
**Figure 4.0a – Billings – System Indices (Excluding MED)**



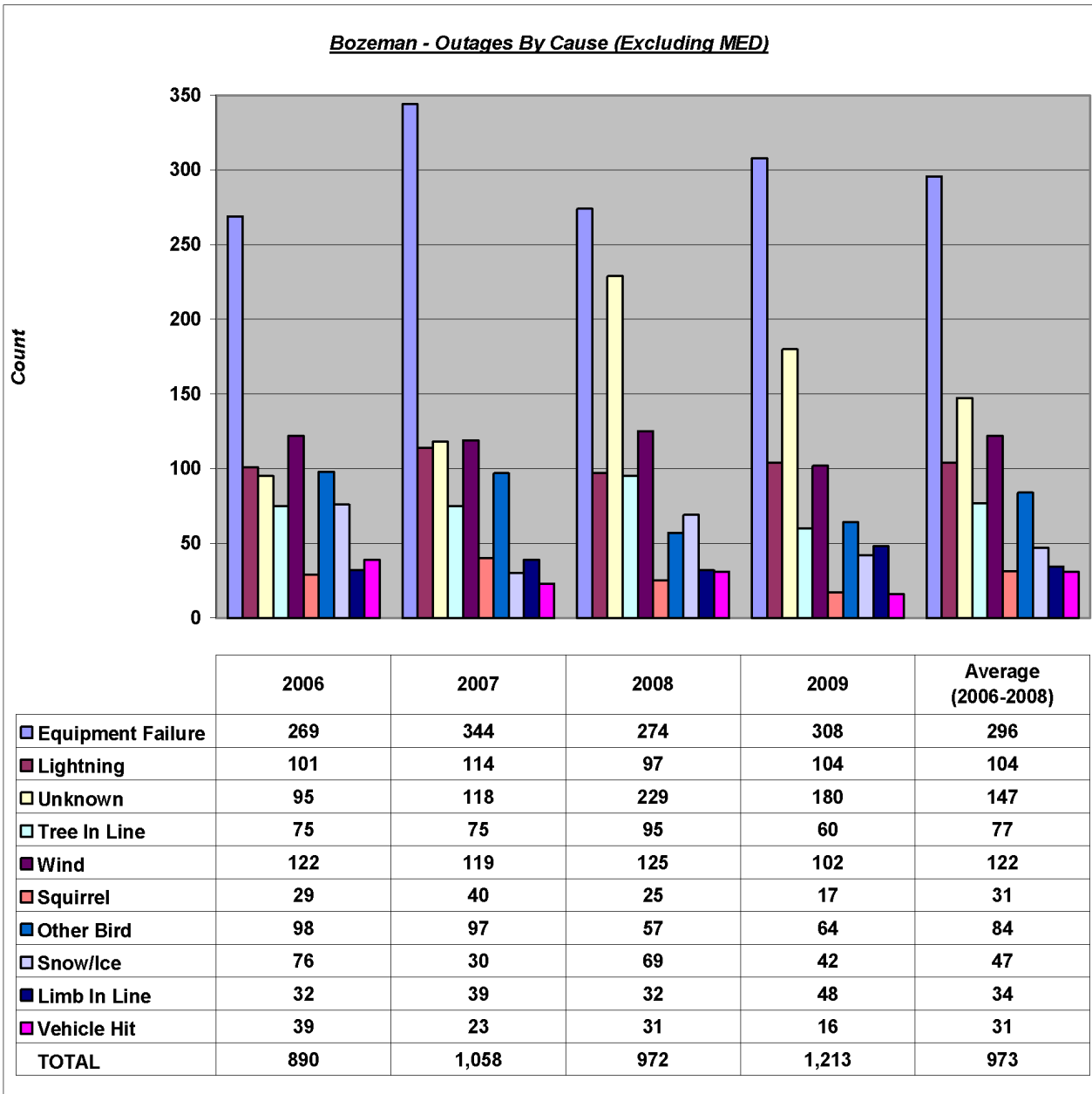
**Figure 4.0b – Billings – Outages By Cause (Excluding MED)**

## 5.0 Bozeman – System Reliability

Discussion: Bozeman Division had a large number of outages in early October from a windstorm that was then followed by a wet snowstorm. Without any MEDs though, overall SAIDI was down almost 40% from 2008. Excluding MEDs, SAIFI rose but CAIDI was down considerably. All three indices are below the previous three-year averages. There are no significant swings in the outage causes, though trees and vehicle hits were noticeably lower.



**Figure 5.0a – Bozeman – System Indices (Excluding MED)**

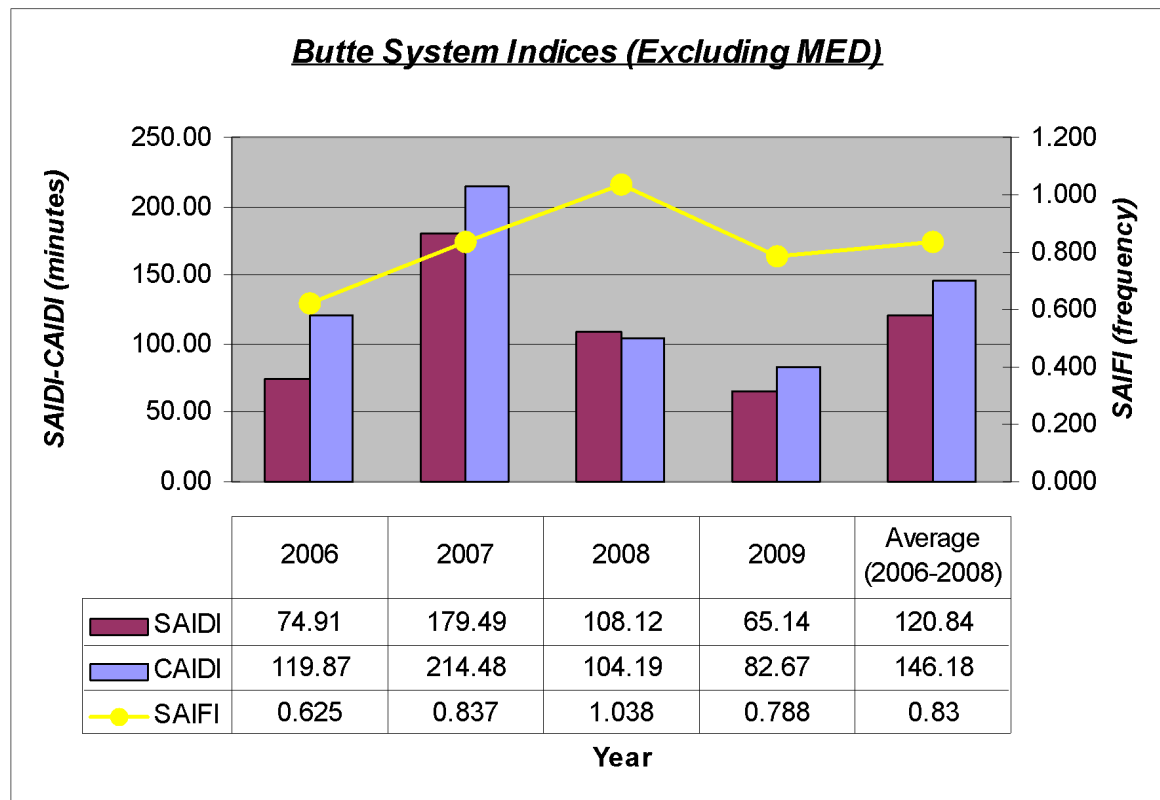


**Figure 5.0b – Bozeman – Outages By Cause (Excluding MED)**

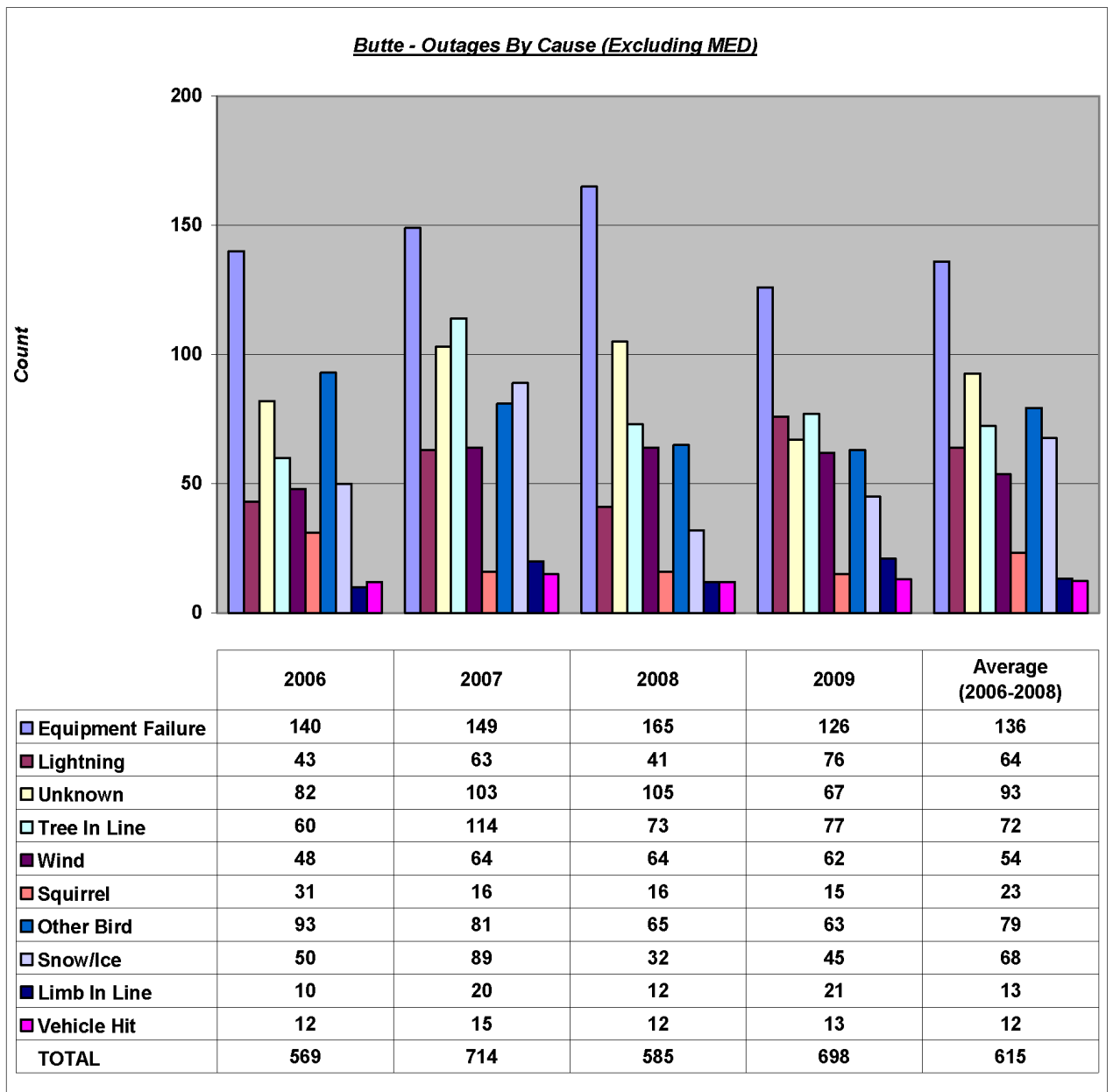


## 6.0 Butte – System Reliability

Discussion: Butte Division went from a good year reliability year in 2008 to a better one in 2009. SAIDI was just over half the previous three-year average and CAIDI and SAIFI were also down appreciably from 2008. The only outage cause appreciably up from 2008 was lightning.



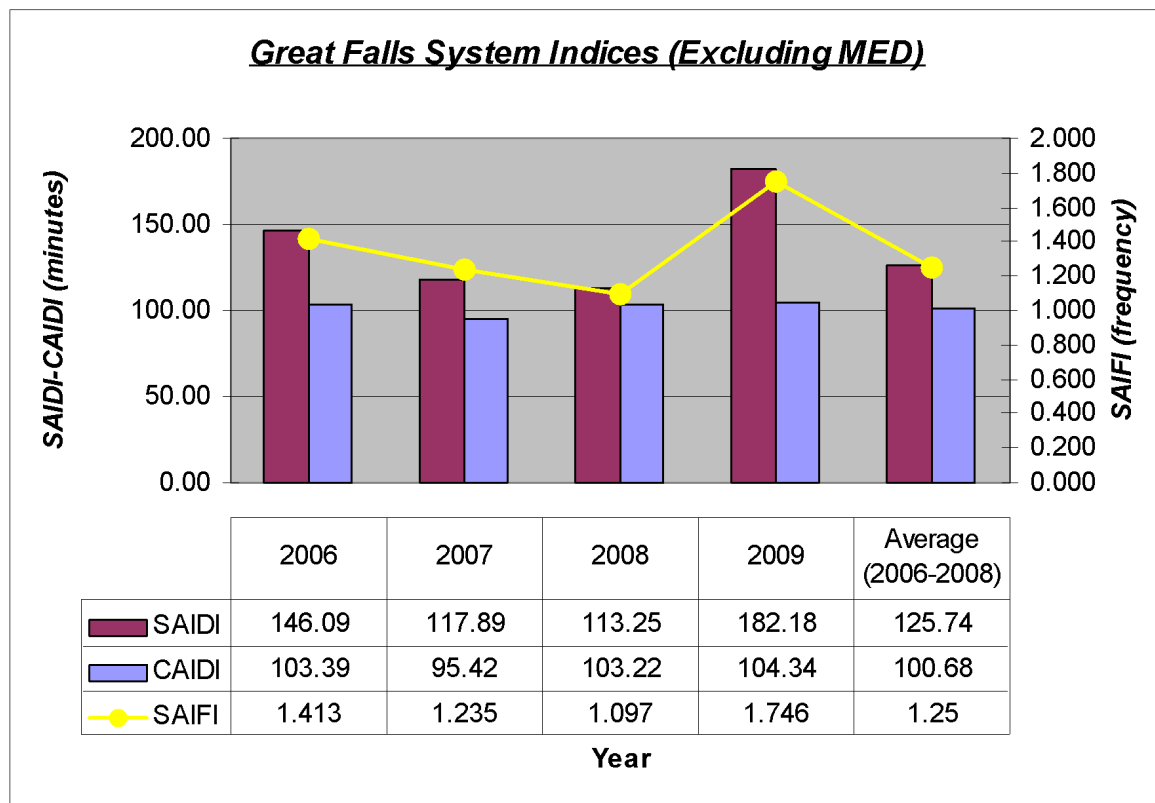
**Figure 6.0a – Butte – System Indices (Excluding MED)**



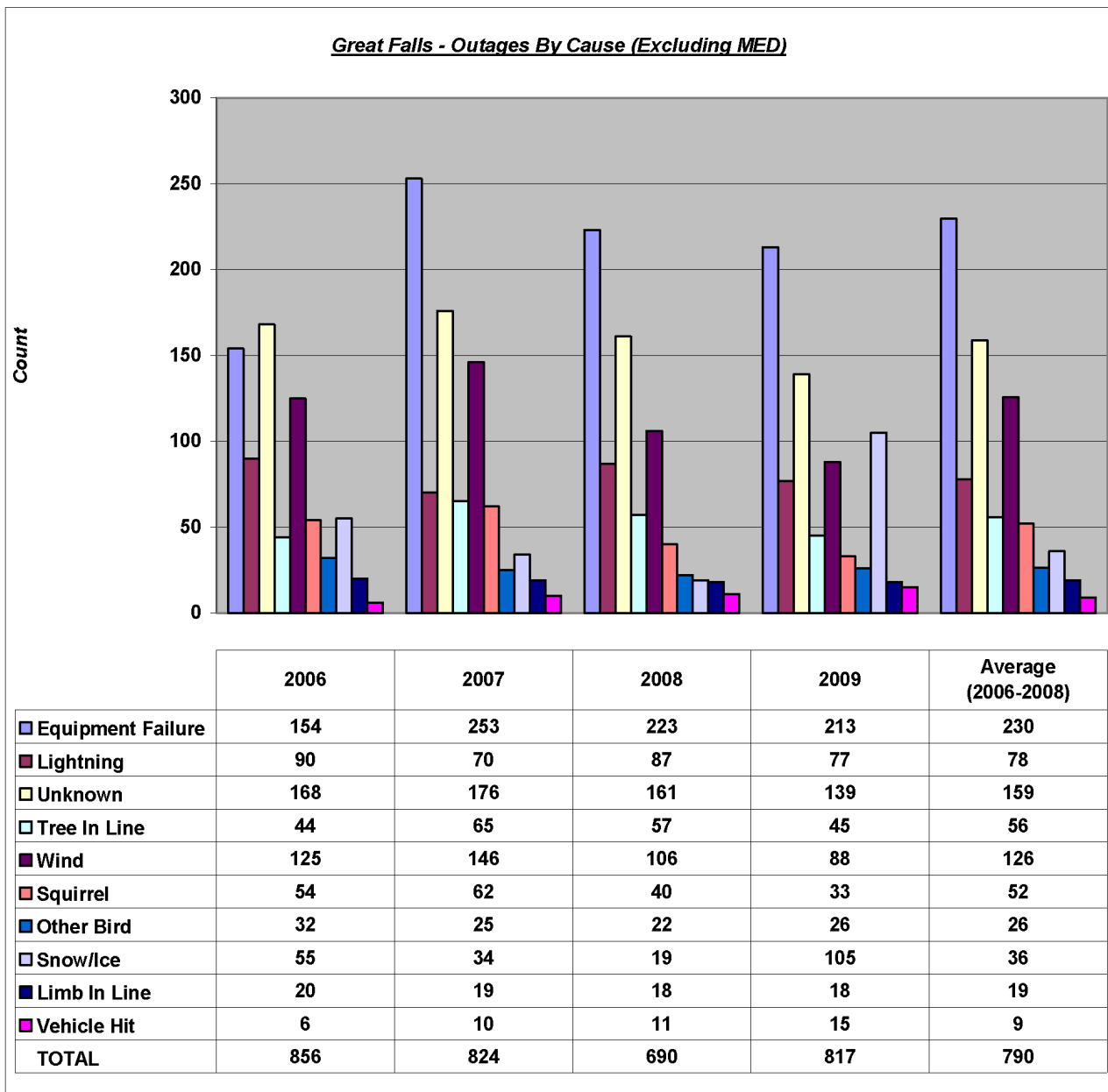
**Figure 6.0b – Butte – Outages By Cause (Excluding MED)**

## 7.0 Great Falls – System Reliability

Great Falls Division had considerable storm trouble in 2009 with snow and ice problems in March and April. A dump truck contacting the 230 kV transmission line in May also caused a large outage. Without any major events though, total SAIDI was 89 minutes less than the 2008 SAIDI including MEDs. The 230kV line outage and a couple other substation outages drove SAIFI higher for the year. Snow and ice outages were up considerably from the storms, with no other causes increasing notably.



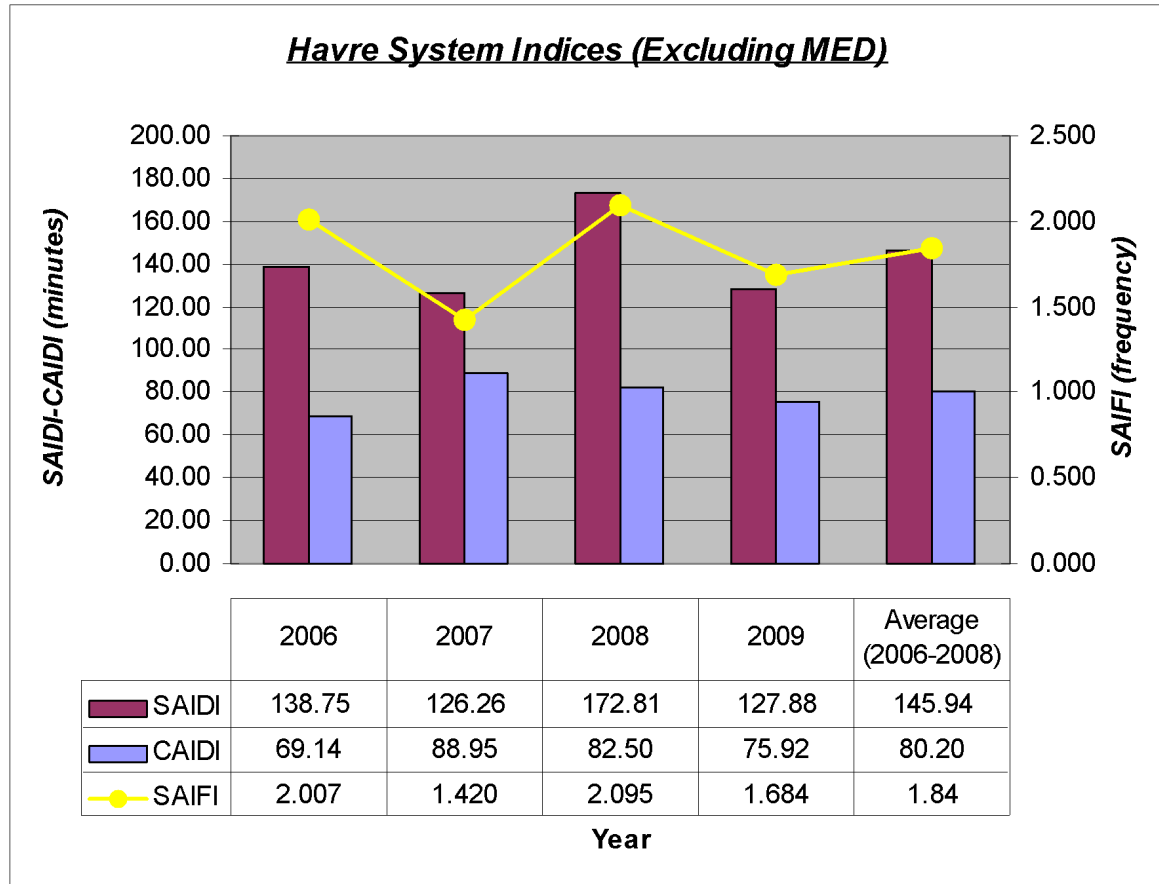
**Figure 7.0a – Great Falls – System Indices (Excluding MED)**



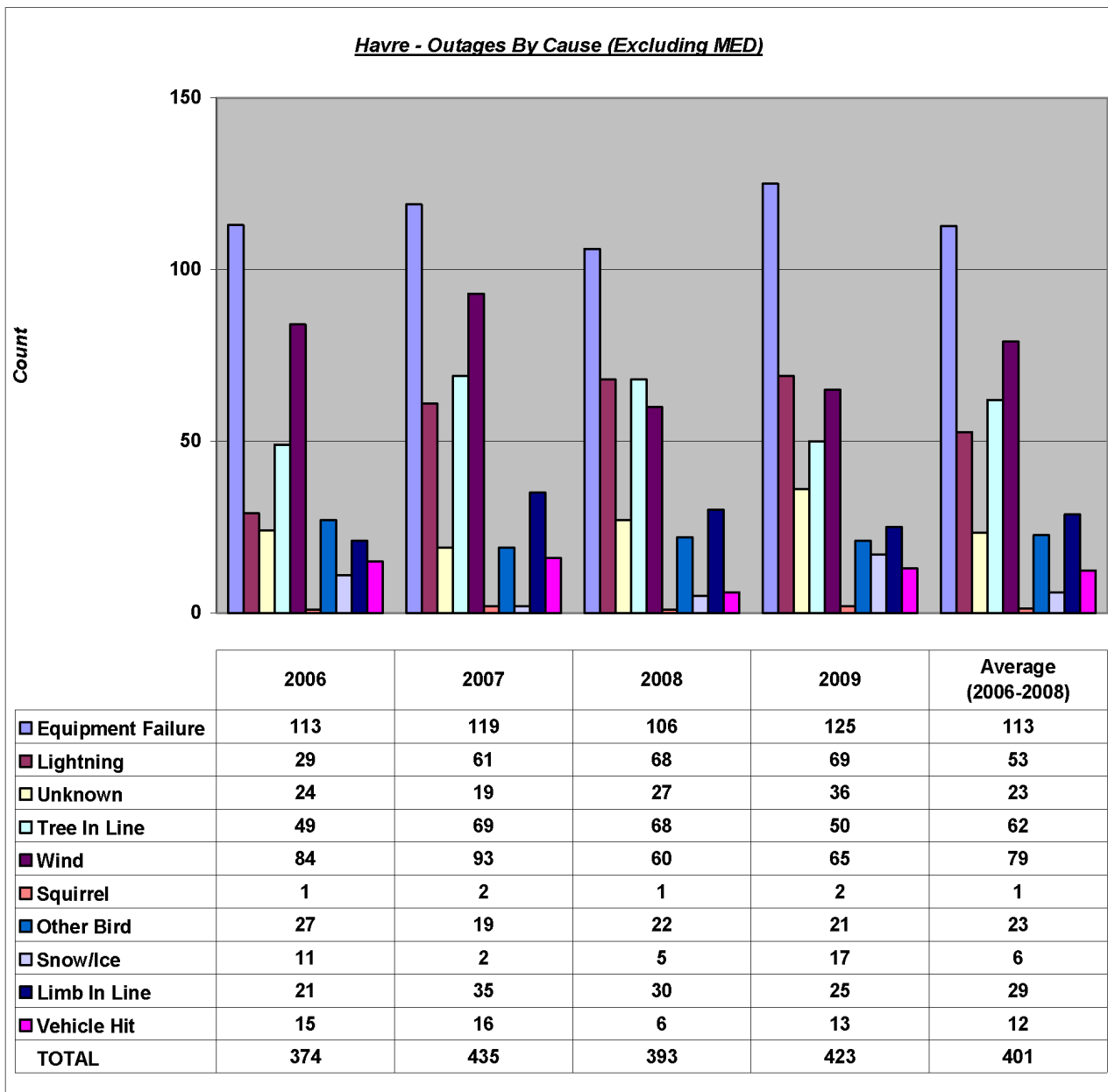
**Figure 7.0b – Great Falls – Outages By Cause (Excluding MED)**

## 8.0 Havre – System Reliability

Discussion: Havre area had a good year for reliability in 2009 with all three indices improving over 2008. They were also all below the previous three-year averages. Transmission outages from a storm on July sixth resulted in the worst daily event. No outage causes stick out as significantly different from 2008 or the three-year averages.



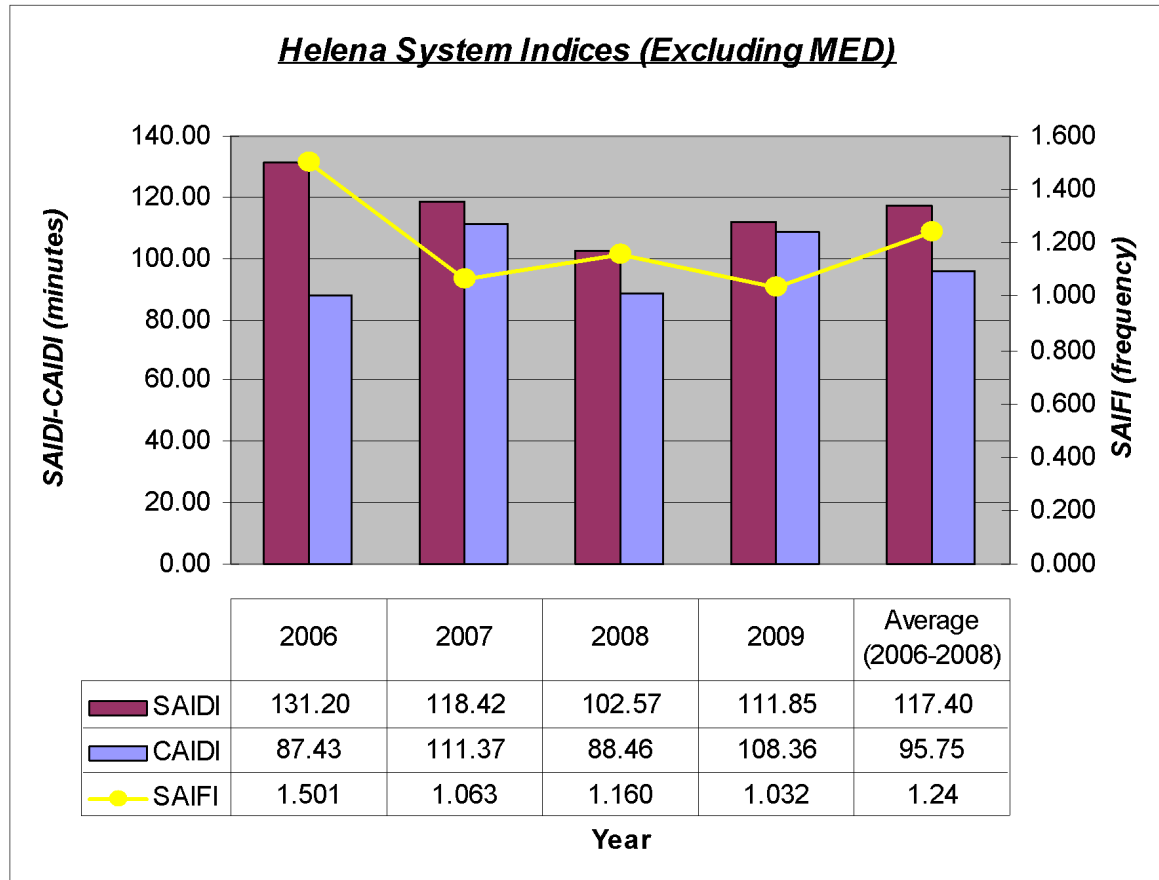
**Figure 8.0a – Havre – System Indices (Excluding MED)**



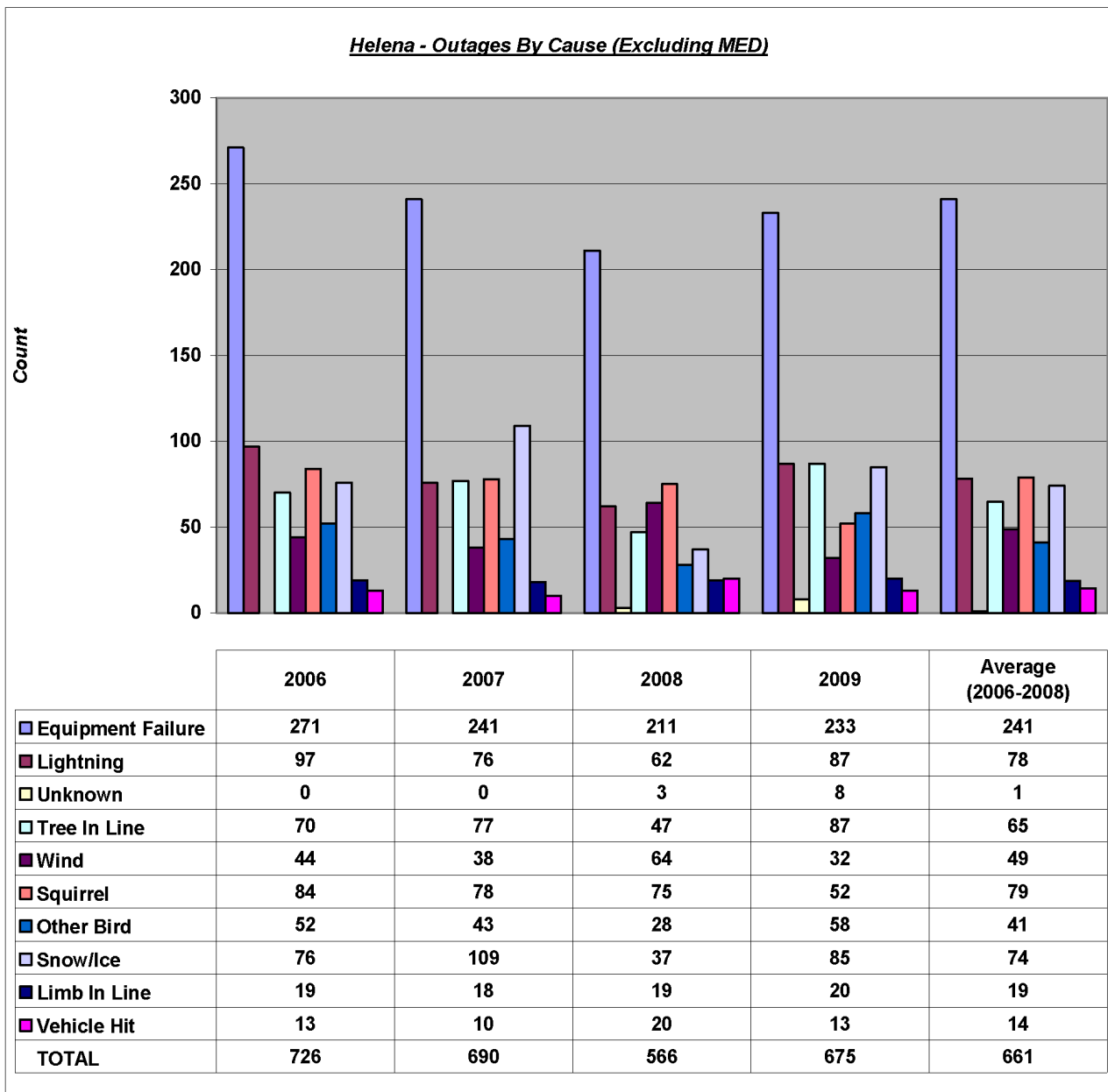
**Figure 8.0b – Havre – Outages By Cause (Excluding MED)**

## 9.0 Helena – System Reliability

Discussion: Helena Division saw some increase in the SAIDI and CAIDI indices from 2008 to 2009 though neither was a major jump. Except for CAIDI, the indices remain below three-year averages. Animals caused a couple of the larger outages as well as some wind and snowstorms. Lightning, trees and snow/ice were the causes that were notably up from 2008, though none of these were far from the three-year average numbers.



**Figure 9.0a – Helena – System Indices (Excluding MED)**

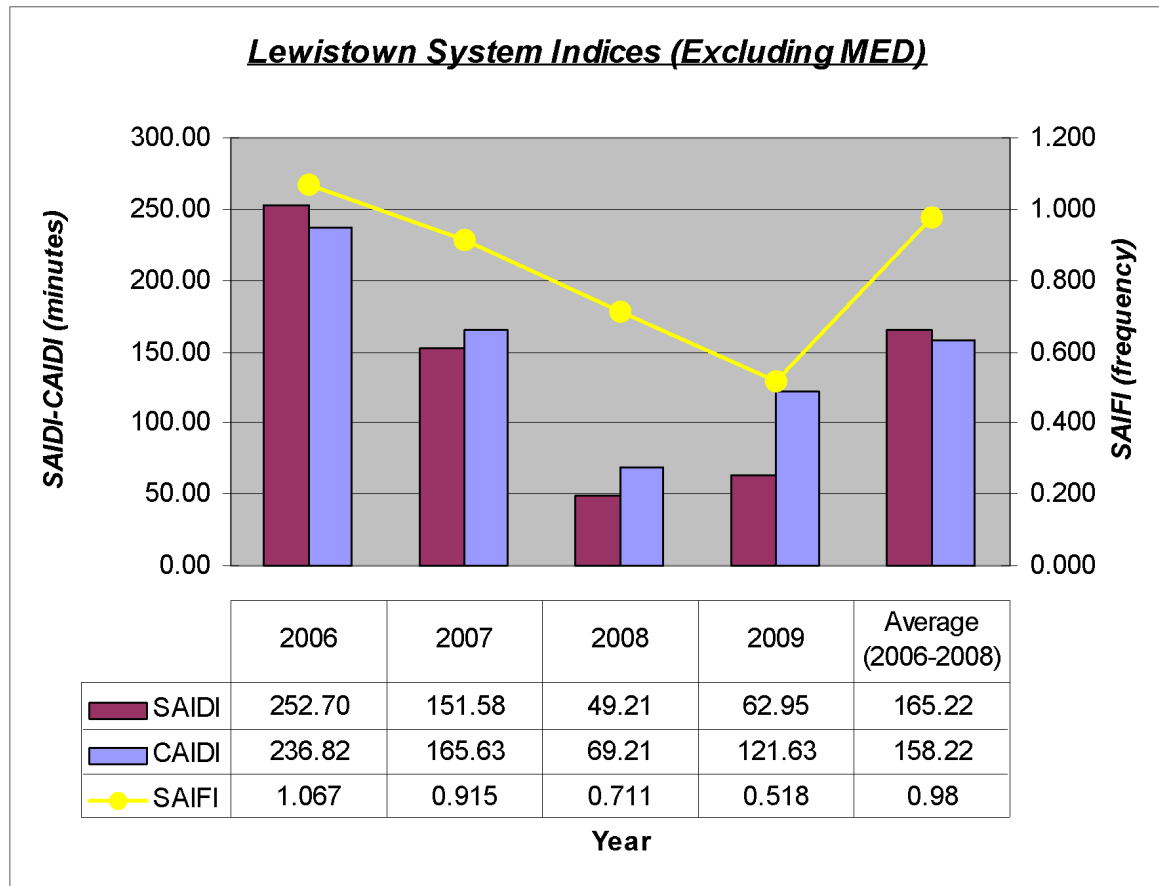


**Figure 9.0b – Helena – Outages By Cause (Excluding MED)**

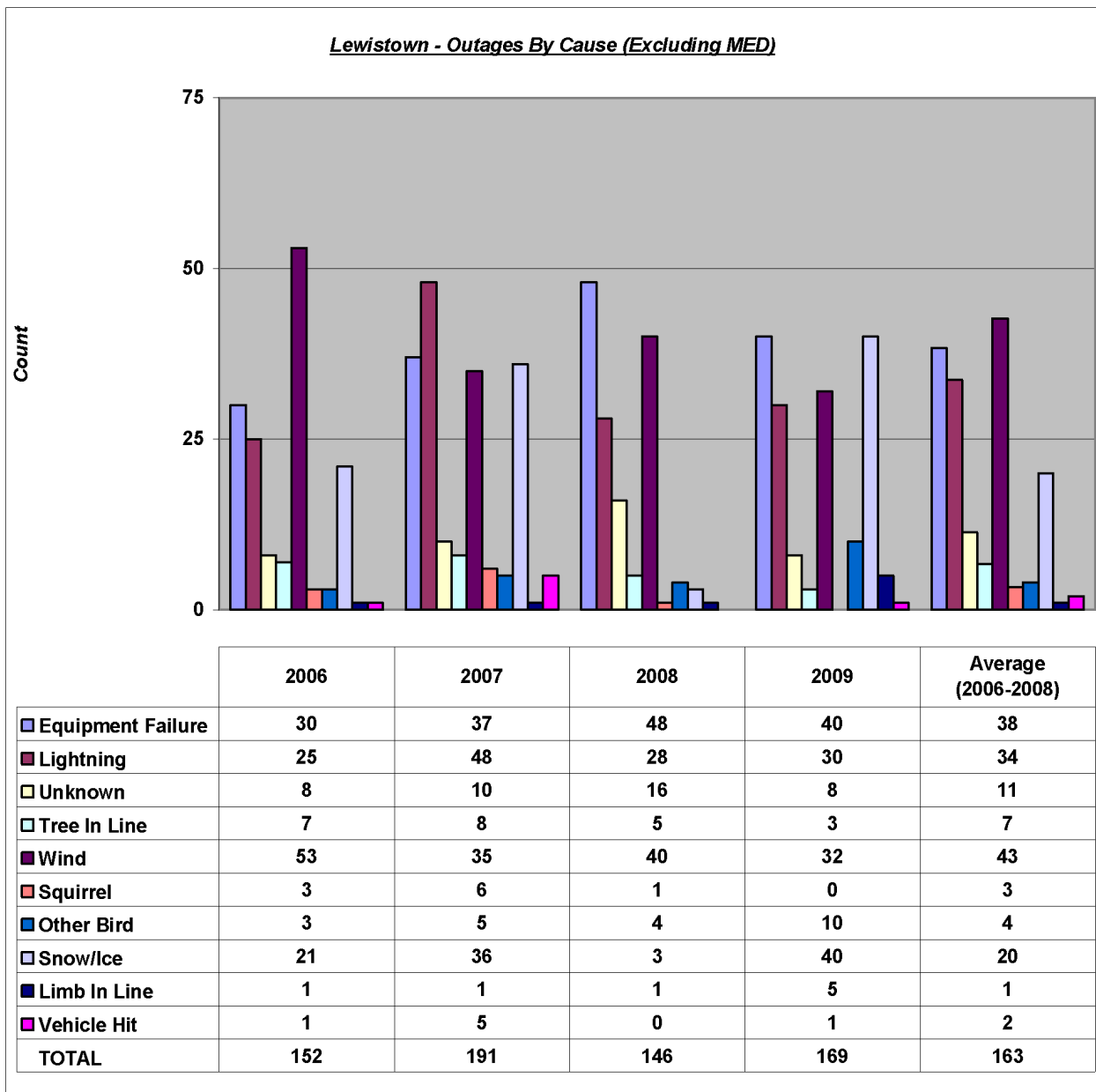


## 10.0 Lewistown – System Reliability

Discussion: Lewistown area reliability indices remain very low though CAIDI rose considerably from the 2008 value. This is a typical case of SAIFI dropping from fewer urban outages and CAIDI rising from more rural, permanent cause outages. This CAIDI is still below the previous three-year average. None of the outage cause categories appear to be out of line.



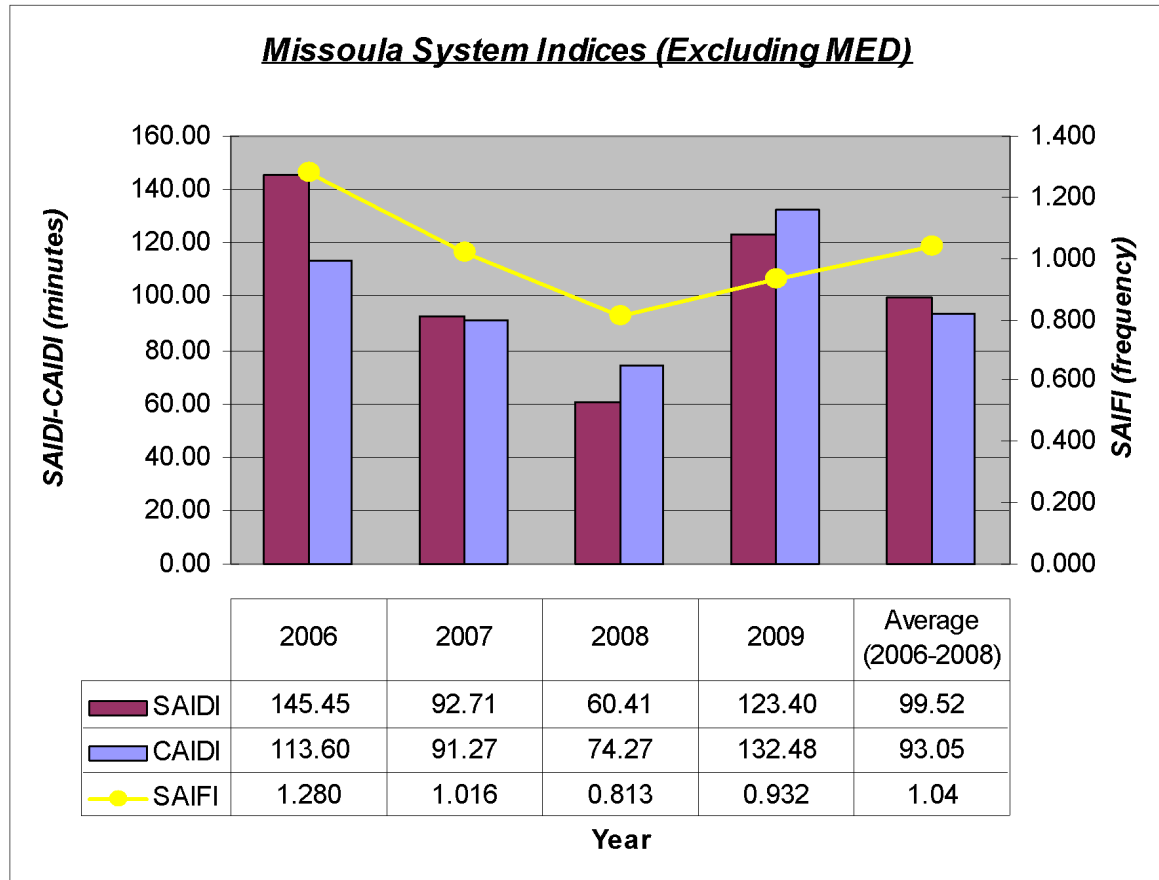
**Figure 10.0a – Lewistown – System Indices (Excluding MED)**



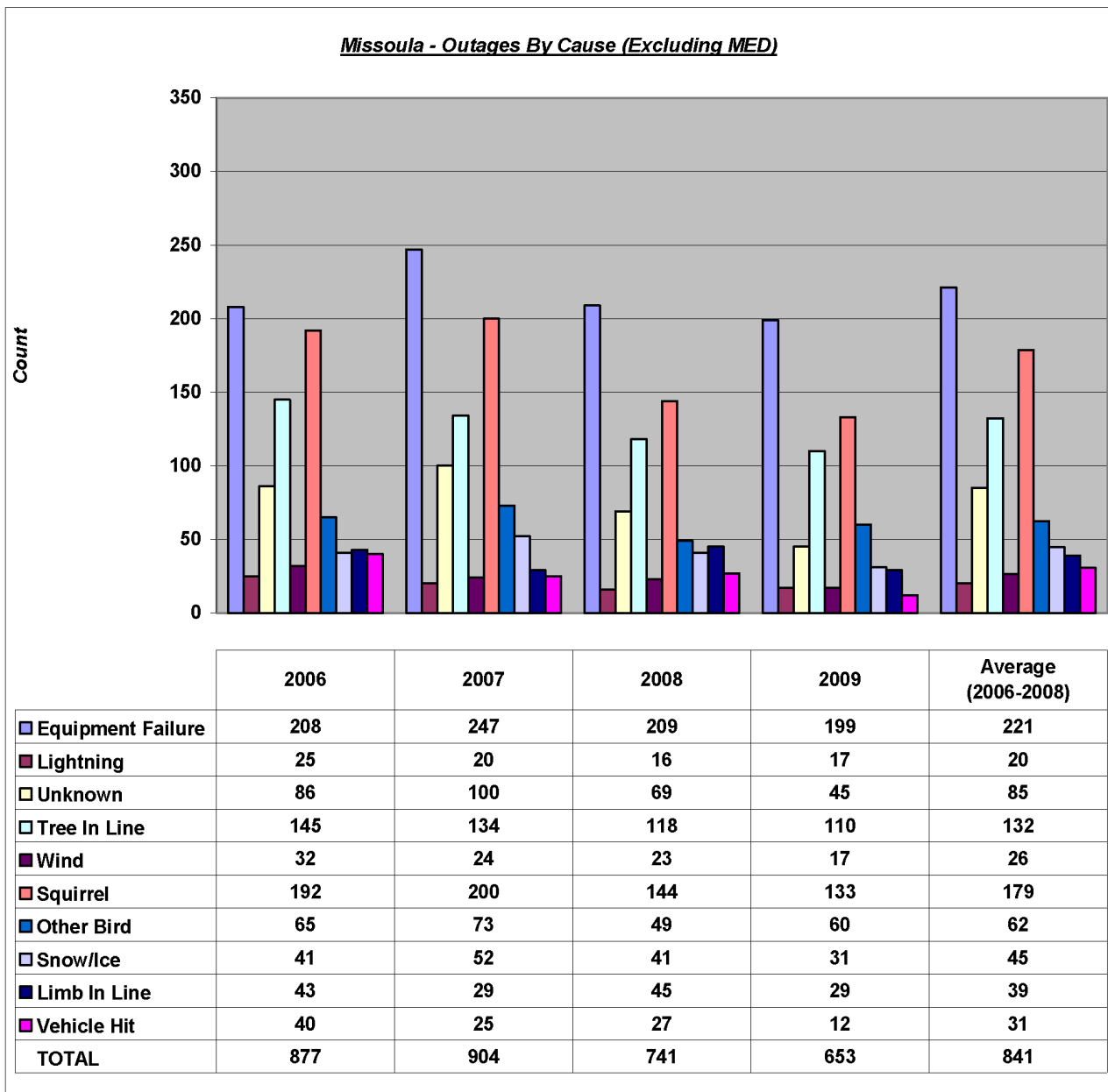
**Figure 10.0b – Lewistown – Outages By Cause (Excluding MED)**

## 11.0 Missoula – System Reliability

Discussion: Missoula Division indices are all up from the very good year they had in 2008. This was largely due to wind and snowstorms and the 69kV transmission line outage in the Bitterroot Valley that was caused by a beaver dropping a tree through the line. Total outages were actually down from 2008, but the outages had greater impact than in 2009. The top ten outage causes for 2009 were in line with the 2008 and three-year average numbers.



**Figure 11.0a – Missoula – System Indices (Excluding MED)**



**Figure 11.0b – Missoula – Outages By Cause (Excluding MED)**

## **12.0 Conclusion**

Although the 2009 reliability indices were up from the exceptional values (excluding MEDs) experienced in 2008, they still represent a good year, with SAIDI and SAIFI both below the previous three-year averages. Without any major events during 2009, SAIDI is 42 minutes lower than the “complete package” for 2008. The CAIDI value of 107 minutes represents a 99.98% Average Service Availability Index (ASAI) for Montana customers, which is very good for a large, predominately rural service territory. That said, there is always room for improvement. NWE will continue to pursue programs that enhance customer reliability.

Several system integrity programs have been implemented in recent years. A company wide cycle tree-trimming program is starting its fifth year. These trimmed circuits are experiencing a significant drop in tree related outages and thereby are reflecting on the regional reliability indices. Regular line inspections by company personnel were started two years ago, which should reduce equipment failure outages and provide safer lines. A “worst circuits” program is also looking at distribution lines that may need significant work to make them more reliable. Pole and cable replacement programs are also in process. Distribution and substation automation, smart grid improvements, electronic detection and outage reporting are some of the newer realms being investigated and implemented that will improve system reliability.

The large State of Montana experiences extremes in weather and temperatures. Along with the associated wind, lightning, snow and ice, providing reliable electric service can be challenging. With good planning and sincere effort though, the existing reliable electric service will not only be maintained, but will continue to improve.