NorthWestern Energy

Curtis Pohl
Vice President, Retail Operations
Telephone: (406) 497-2119
Facsimile: (406) 497-2150
Curtis.Pohl@northwestern.com

NorthWestern Corporation
d/b/a NorthWestern Energy
40 East Broadway Street
Butte, MT 59701
Telephone: (406) 497-3000
Facsimile: (406) 497-2535
www.northwesternenergy.com

March 10, 2006

RECEIVED BY
2006 MAR 13 AM 10:05
PUBLIC SERVICE
COMMISSION

Ms. Kate Whitney
Administrator
Montana Public Service Commission
1701 Prospect Avenue
PO Box 202601
Helena, MT 59620-2601

RE: 2006 Reliability Report

Dear Ms. Whitney:

With this letter, NorthWestern Energy (NWE) submits the 2005 Reliability Report in compliance with Administrative Rules of Montana 38.5.8619 Annual Electric Reliability Report, effective on July 29, 2005. The data provided in this report includes the information requested in ARM 38.5.8619 and utilizes the *IEEE Guide for Electric Power Distribution Reliability Indices (IEEE Std 1366-2003)* for definition of major events and the appropriate reliability indices.

If you have any questions, please feel free to call.

Sincerely,

Enclosure

NorthWestern™ Energy

RECEIVED BY
2006 MAR 13 AM 10:05
PUBLIC SERVICE COMMISSION

NorthWestern Energy
2005 Annual Electric Reliability Report

March 2006

Final Report

1.0 Executive Summary

In 2003, the Working Group on System Design under the sponsorship of the Transmission and Distribution Committee of the Institute of Electrical and Electronics Engineers (IEEE) Power Engineering Society completed a revision of the *IEEE Guide for Electric Power Distribution Reliability Indices (IEEE Std 1366-2003).* This revision clarified existing definitions and introduced a statistically based definition for classification of major event days, commonly referred to as the 2.5 Beta Method. The Guide was published in May of 2004 and is fast becoming the standard for reliability reporting around the country. The use of this guide with standard definitions and methodologies should greatly improve a utility's ability to report and benchmark reliability indices.

Northwestern Energy adopted this guide for the 2005 reporting year. Previous years data (back to 2000) was sent to IEEE and the Major Event Days (MEDs) and appropriate factors were calculated for reference. This provides a consistent methodology for the three-year average comparisons. NWE is involved as a member of this IEEE working group, which helps facilitate implementation. A major event day is a day that the system SAIDI exceeds a statistically derived threshold value and represents a day when the energy delivery system experienced stresses beyond that normally expected (such as severe weather). Reviewing data with and without MEDs allows a utility to analyze emergency versus normal activities.

This report provides information with (shown as ALL) and without (shown as IEEE) major event days for the Montana Region and the defined operating areas. The 2005 reliability indices (SAIDI, SAIFI, and CAIDI) are compared to the three previous years as well as the previous three-year average. The number of outages for each year 2002 through 2005 and the three-year averages are also provided. The top ten outage causes for Montana and each operating area is also shown. This information is in both tabular and bar graph formats.

2.0 General Discussion

The headliner for 2005 reliability reporting was major events. There were four major event days in 2005, all impacting the Billings Division. This compares with three in 2002 and none recorded for 2003 and 2004. An April heavy, wet, snowstorm started things off, but proved to just be a warm up for the October snowstorm, which dropped a record snow for October; devastating the area and causing many extended outages. There was also a substation incident in August that dropped a major portion of the city. For comparison, the three 2002 events amounted to about 25 SAIDI minutes, whereas the four 2005 events tallied to over 204 SAIDI minutes. And the previous three-year average for the state is 109 minutes for the entire state!

Excluding major event days, outages were down by 164 in 2005 from 2004. SAIDI was up about six minutes in 2005 from 2004; CAIDI was also up six minutes while SAIFI is down slightly. The SAIDI increase is less than the added minutes from the "shoulder days" (4/18 and 4/20) of the Billings April MED (4/19).

This storm started on the 18th and continued into the 20th, but neither of these days amounted to a major event. For the multiple day October event, most of the outage time accrued back to the two MED's (10/4 and 10/5). All the "Top 20" SAIDI events for the year were related to the Billings storms as well as many of the "Top SAIFI" events. Other notable outages will be mentioned in the area sections.

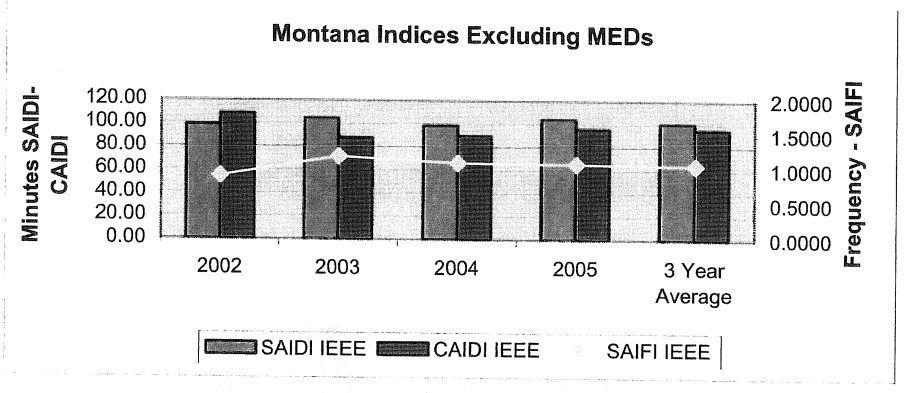
3.0 System Reliability for Montana Service Territory

3.1 Discussion

Total outages were up 239 from 2004, but were down 164 after removing MED days. Both the 2005 counts were below the three-year averages. Billings' numbers were up, largely related to the snowstorms; Bozeman was up, mainly from lightning and unknown causes. Great Falls and Missoula were down from three-year averages and the rest of the areas were fairly close to averages.

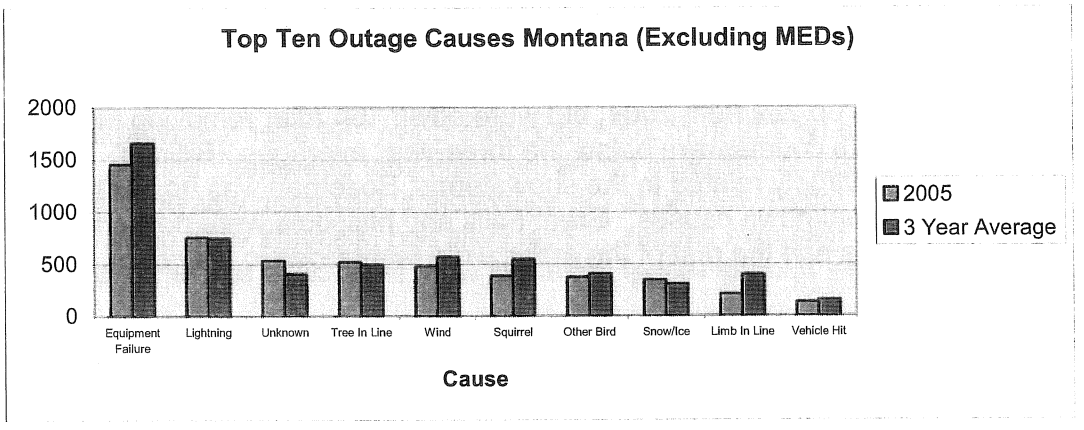
3.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Montana	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	98.49	104.39	98.26	103.97	100.38
CAIDI IEEE	108.28	87.66	89.43	95.81	95.12
SAIFI IEEE	0.9100	1.1910	1.0990	1.0851	1.0667



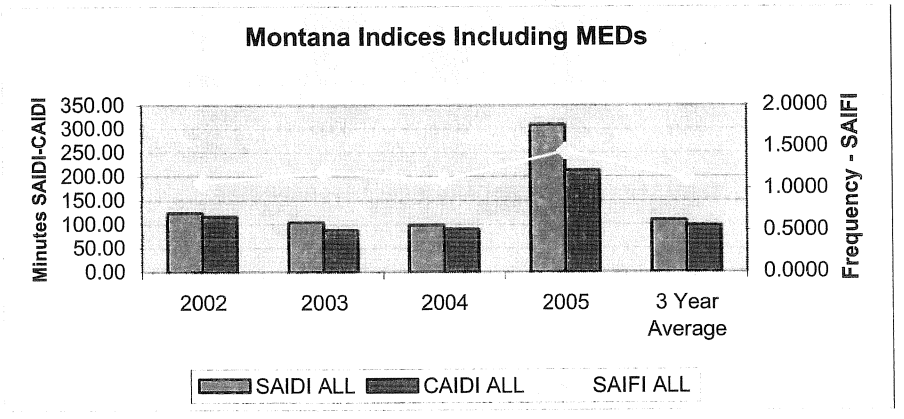
3.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	1457	1661
Lightning	755	747
Unknown	535	404
Tree In Line	520	493
Wind	480	570
Squirrel	386	546
Other Bird	376	406
Snow/Ice	346	309
Limb In Line	212	397
Vehicle Hit	130	153
Total Top Ten Counts	5197	5686



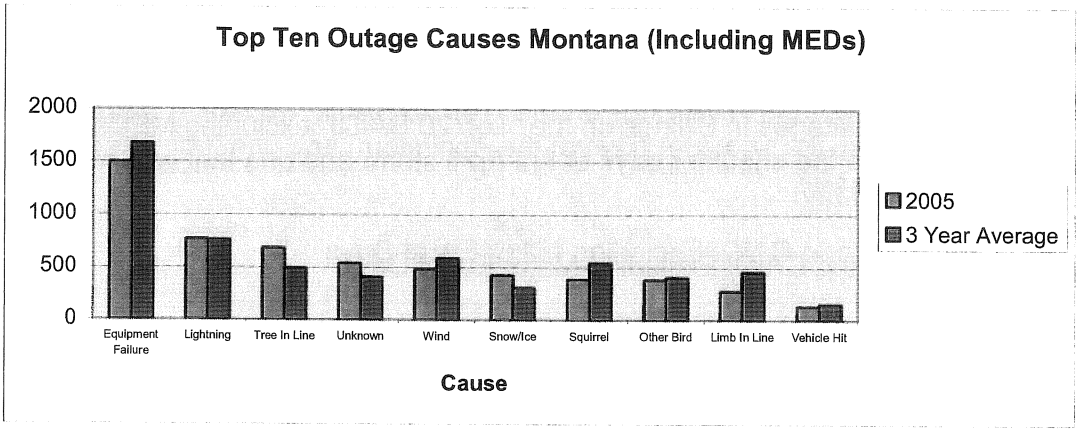
3.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Montana	2002	2003	2004	2005	3 Year Average
SAIDI ALL	123.69	104.39	98.26	308.02	108.78
CAIDI ALL	116.13	87.66	89.43	212.95	97.74
SAIFI ALL	1.0650	1.1910	1.0990	1.4464	1.1183



3.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	1496	1674
Lightning	767	761
Tree In Line	684	493
Unknown	540	407
Wind	485	591
Snow/Ice	427	309
Squirrel	391	547
Other Bird	383	407
Limb In Line	276	459
Vehicle Hit	130	154
Total Top Ten Counts	5579	5802


Top Ten Outage Causes Montana (Including MEDs)
2000
1500
1000
500
0
Equipment Failure
Lightning
Tree In Line
Unknown
Wind
Snow/Ice
Squirrel
Other Bird
Limb In Line
Vehicle Hit
Cause
2005
3 Year Average

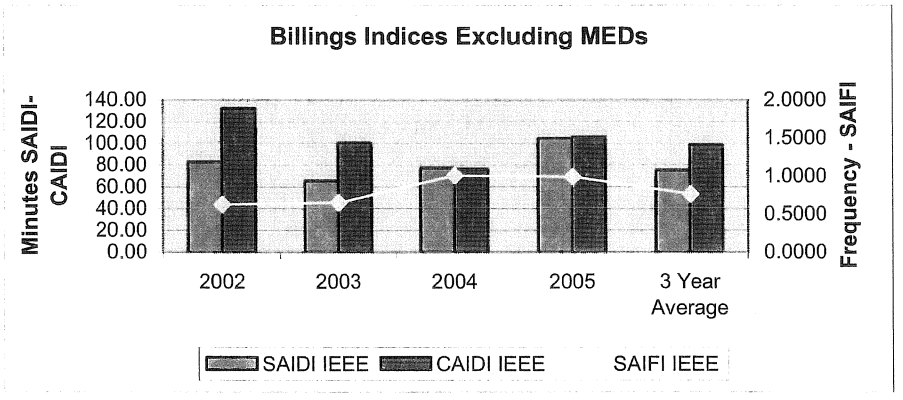
4.0 System Reliability for Billings Division

4.1 Discussion

There were three outages in Billings on the "Top 20 SAIDI" excluding MEDs list that were related to the shoulder days of the April storm and one that was related to a snowstorm in May.

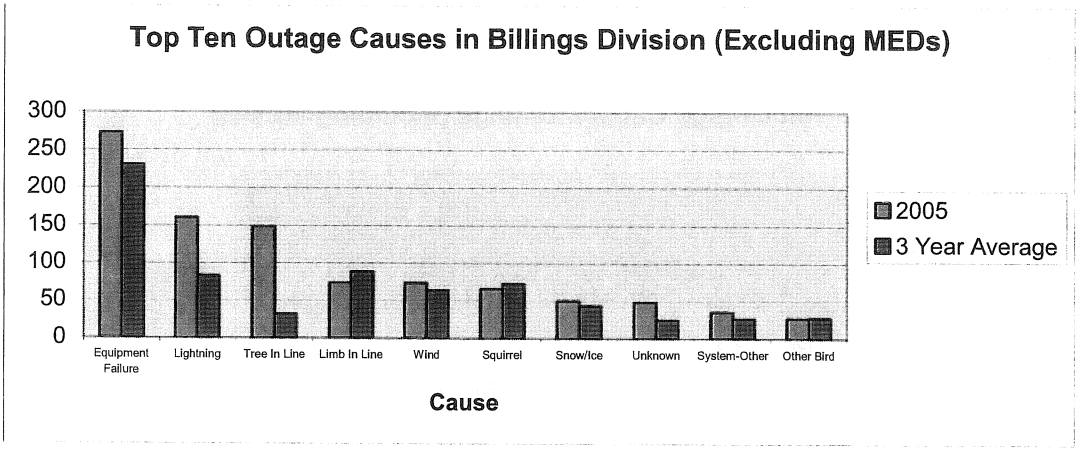
4.2.SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Billings	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	82.84	65.35	77.22	104.79	75.14
CAIDI IEEE	132.16	100.73	76.64	105.89	98.73
SAIFI IEEE	0.6268	0.6487	1.0076	0.9896	0.7610



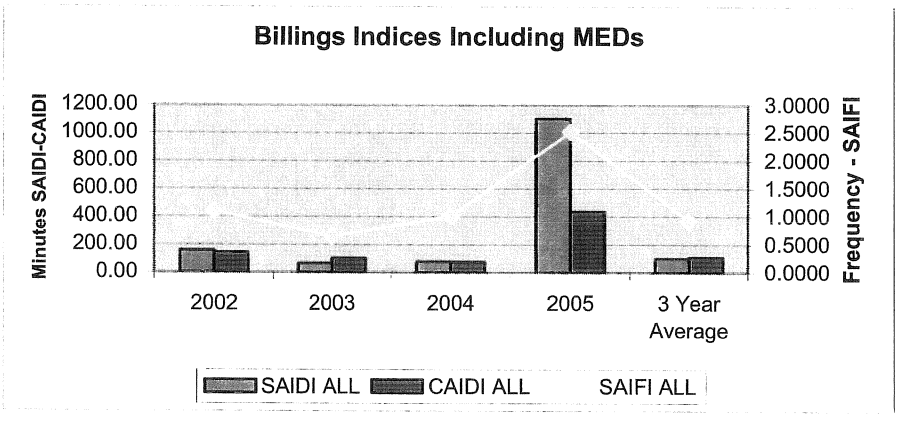
4.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	272	230
Lightning	160	83
Tree In Line	148	32
Limb In Line	74	89
Wind	74	64
Squirrel	66	73
Snow/Ice	50	44
Unknown	48	25
System-Other	35	27
Other Bird	27	28
Total Top Ten Counts	954	694



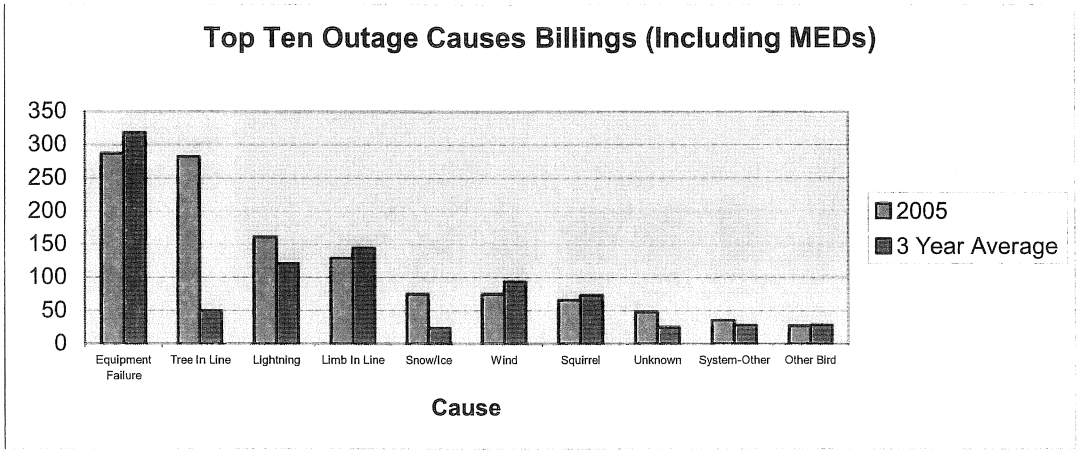
4.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Billings	2002	2003	2004	2005	3 Year Average
SAIDI ALL	157.96	65.35	77.22	1102.58	100.18
CAIDI ALL	143.69	100.73	76.64	437.26	109.06
SAIFI ALL	1.0993	0.6487	1.0076	2.5215	0.9186



4.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	287	318
Tree In Line	282	50
Lightning	161	121
Limb In Line	129	144
Snow/Ice	75	24
Wind	75	94
Squirrel	66	73
Unknown	48	25
System-Other	35	28
Other Bird	27	28
Total Top Ten Counts	1185	904


Top Ten Outage Causes Billings (Including MEDs)
350
300
250
200
150
100
50
0
Equipment Failure
Tree In Line
Lightning
Limb In Line
Snow/Ice
Wind
Squirrel
Unknown
System-Other
Other Bird
Cause
2005
3 Year Average

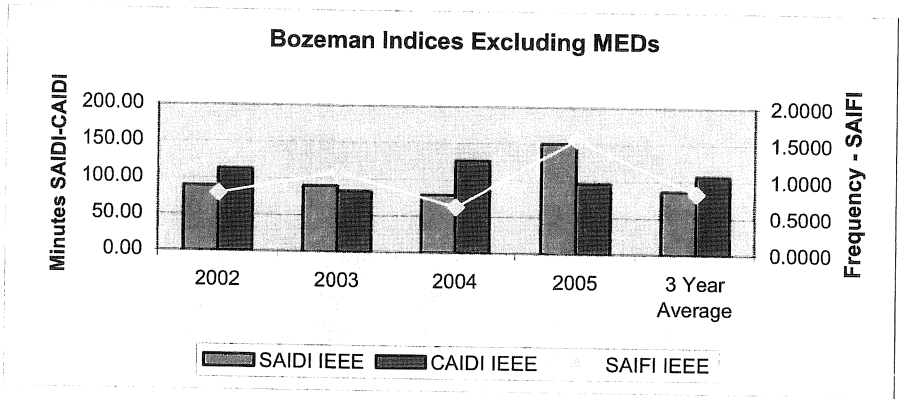
5.0 System Reliability for Bozeman Division

5.1 Discussion

To facilitate transmission line improvements in the Bozeman Division, the Manhattan area was radial-fed for much of the spring and experienced three sustained outages. One of these "backed into" the Belgrade Substation putting it in the dark. Also, the Bozeman Sourdough substation had two outages in the fall while it was being served radial from Livingston to accommodate transmission line upgrades. A substation transformer failure in February put a larger number of customers out for about an hour.

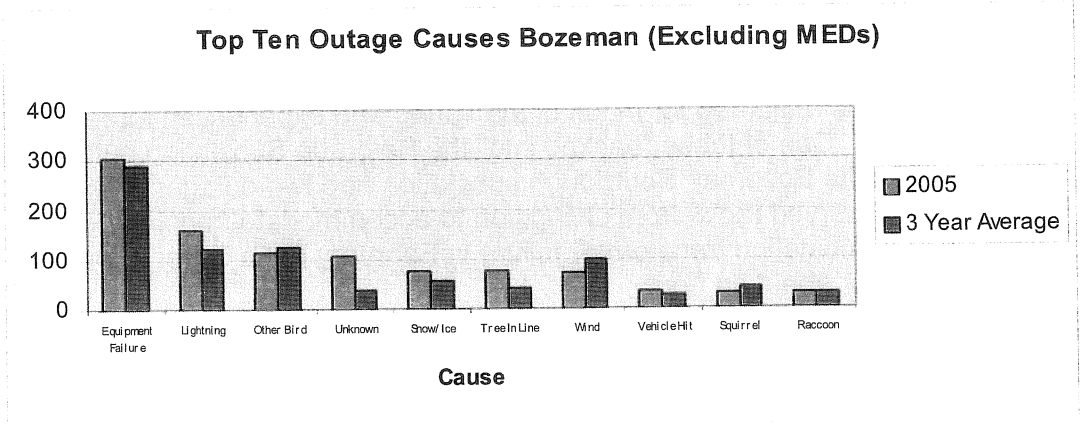
5.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Bozeman	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	89.24	89.72	79.20	150.69	86.05
CAIDI IEEE	112.49	82.80	126.71	96.36	107.33
SAIFI IEEE	0.7933	1.0835	0.6251	1.5637	0.8339



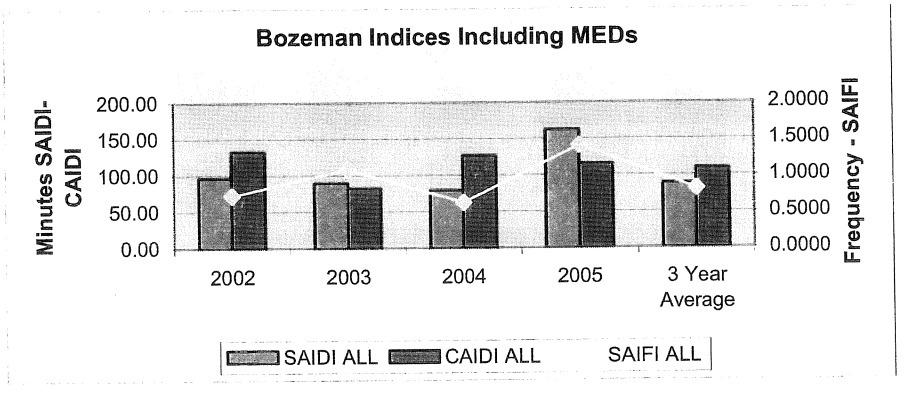
5.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	306	289
Lightning	161	123
Other Bird	115	125
Unknown	107	40
Snow/Ice	76	58
Tree In Line	75	42
Wind	74	97
Vehicle Hit	35	28
Squirrel	32	43
Raccoon	31	32
Total Top Ten Counts	1012	876



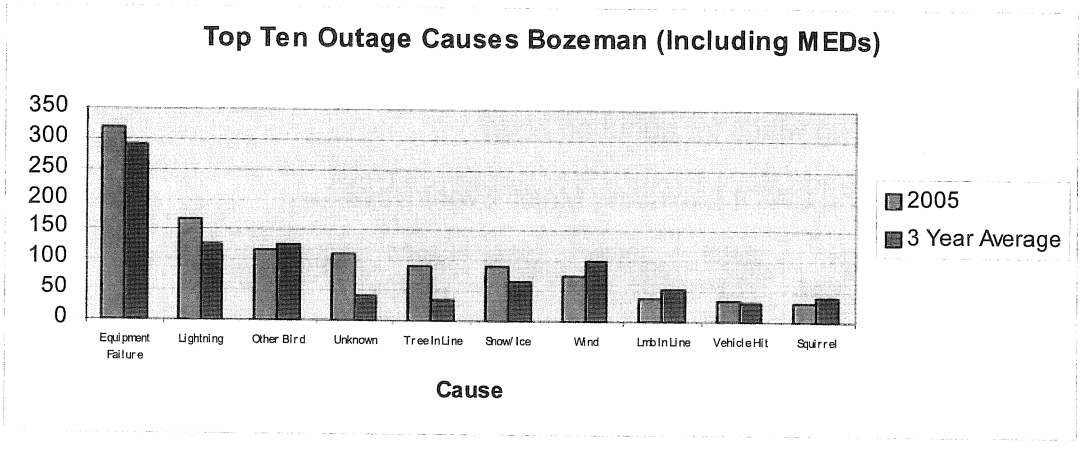
5.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Bozeman	2002	2003	2004	2005	3 Year Average
SAIDI ALL	96.50	89.72	79.20	161.91	88.47
CAIDI ALL	133.16	82.80	126.71	115.14	109.08
SAIFI ALL	0.7247	1.0835	0.6251	1.4062	0.8111



5.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	317	291
Lightning	167	125
Other Bird	117	126
Unknown	109	41
Tree In Line	93	35
Snow/Ice	91	65
Wind	76	100
Limb In Line	38	53
Vehicle Hit	35	31
Squirrel	33	40
Total Top Ten Counts	1076	905


Top Ten Outage Causes Bozeman (Including MEDs)
350
300
250
200
150
100
50
0
Equipment Failure
Lightning
Other Bird
Unknown
Tree In Line
Snow/Ice
Wind
Lmb In Line
Vehicle Hit
Squirrel
Cause
2005
3 Year Average

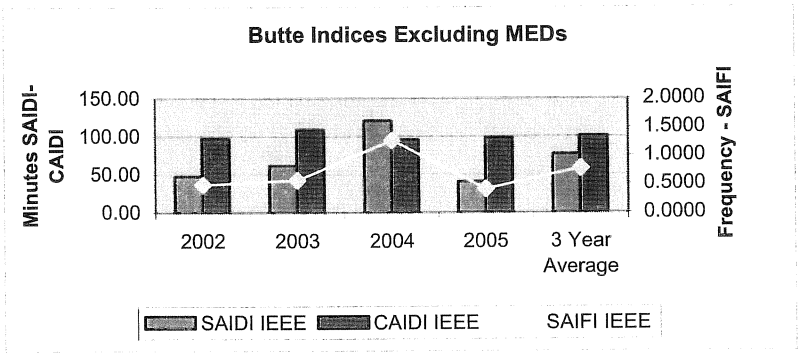
6.0 System Reliability for Butte Division

6.1 Discussion

Butte only had one event that made the "Top 20 SAIFI" list. The Industrial Park Sub was lost in strong winds for about an hour.

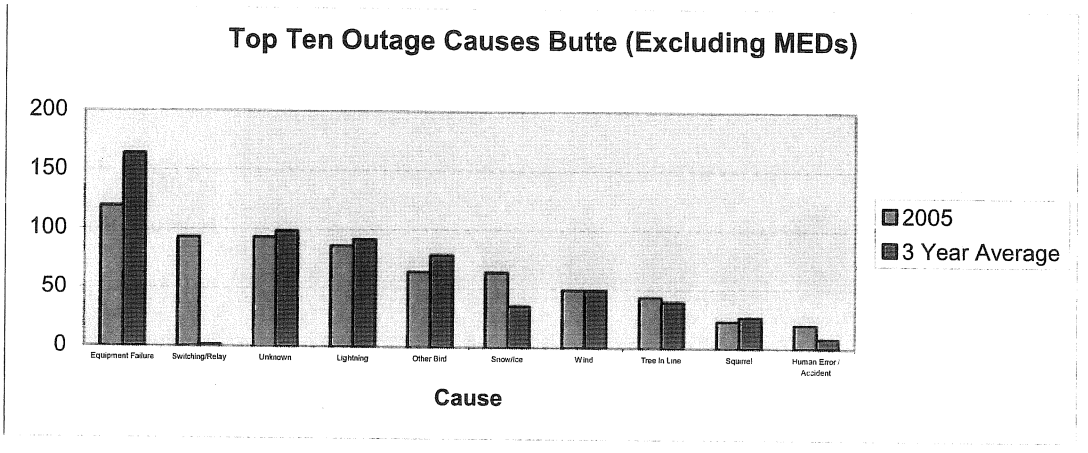
6.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Butte	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	47.59	61.38	120.69	40.41	76.56
CAIDI IEEE	97.77	109.02	95.86	98.25	100.88
SAIFI IEEE	0.48675	0.56308	1.25912	0.41129	0.76965



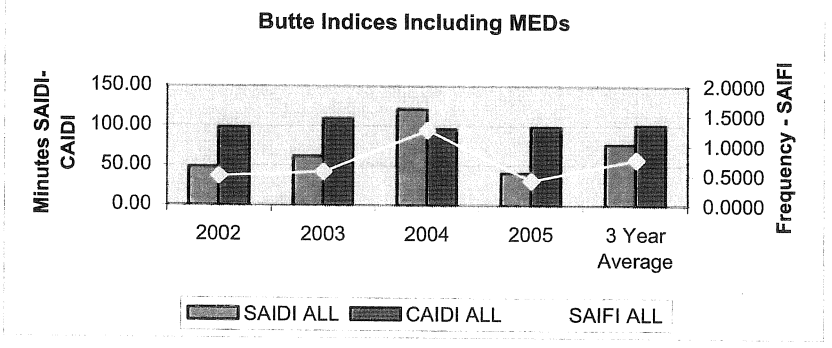
6.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	119	164
Switching/RelayManually	93	2
Unknown	93	98
Lightning	86	91
Other Bird	64	78
Snow/Ice	64	35
Wind	49	49
Tree In Line	43	39
Squirrel	23	26
Human Error / Accident	20	8
Total Top Ten Counts	654	592



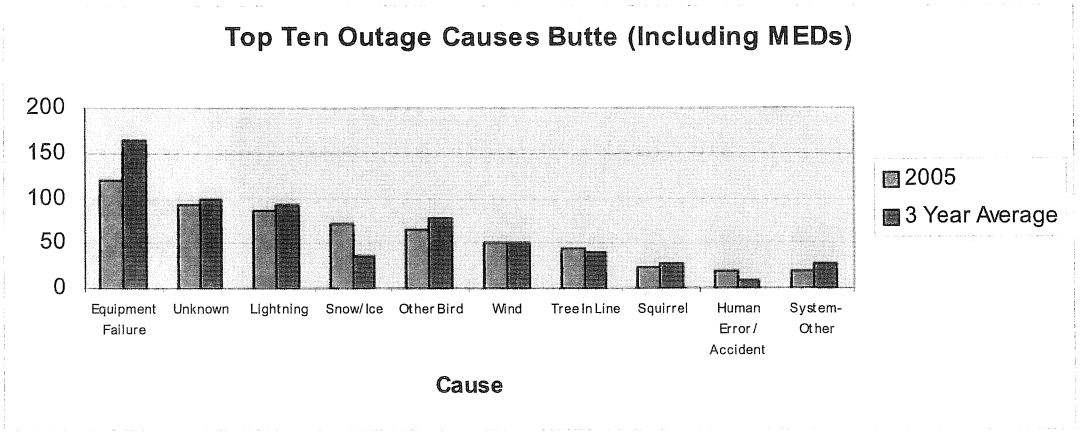
6.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Butte	2002	2003	2004	2005	3 Year Average
SAIDI ALL	48.03	61.38	120.69	40.75	76.70
CAIDI ALL	97.98	109.02	95.86	98.59	100.95
SAIFI ALL	0.4901	0.5631	1.2591	0.4133	0.7708



6.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Equipment Failure	120	164
Unknown	93	99
Lightning	87	93
Snow/Ice	71	35
Other Bird	65	78
Wind	50	50
Tree In Line	45	39
Squirrel	23	26
Human Error / Accident	20	8
System-Other	20	27
Total Top Ten Counts	594	621


Top Ten Outage Causes Butte (Including MEDs)
200
150
100
50
0
Equipment Failure
Unknown
Lightning
Snow/Ice
Other Bird
Wind
Tree In Line
Squirrel
Human Error / Accident
System-Other
Cause
2005
3 Year Average

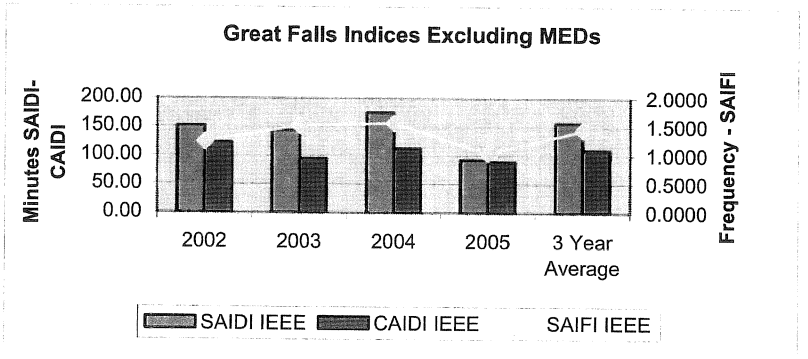
7.0 System Reliability for Great Falls Division

7.1 Discussion

Great Falls Division had two substation differential relay actions in August that took 5800 customers out each time. These were the main Great Falls events that made the Top 20 lists.

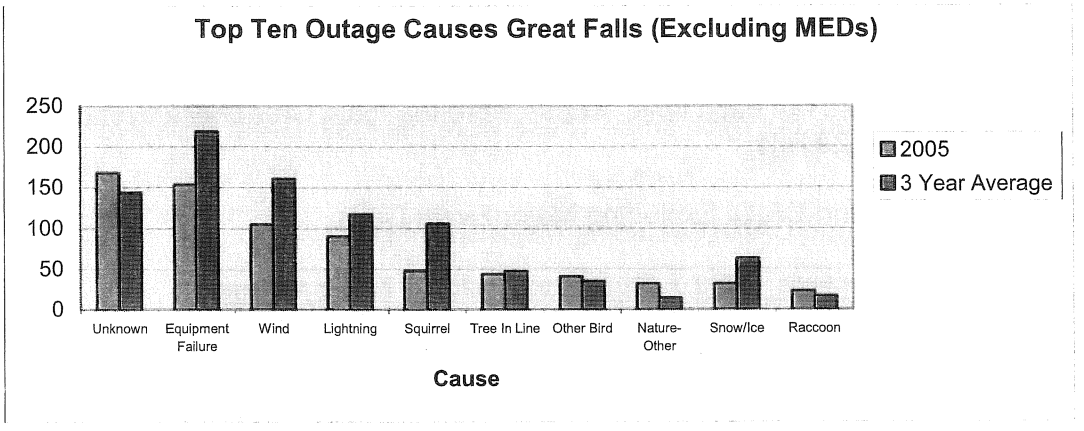
7.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Great Falls	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	151.33	143.42	174.71	92.25	156.48
CAIDI IEEE	122.35	94.52	111.78	89.29	109.55
SAIFI IEEE	1.237	1.5174	1.5629	1.0331	1.4391



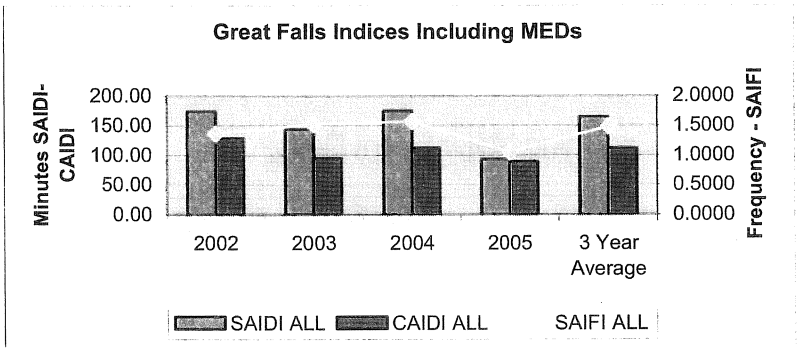
7.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Unknown	168	144
Equipment Failure	154	219
Wind	105	161
Lightning	90	117
Squirrel	48	106
Tree In Line	44	48
Other Bird	41	35
Nature-Other	32	14
Snow/Ice	32	63
Raccoon	23	17
Total Top Ten Counts	737	924



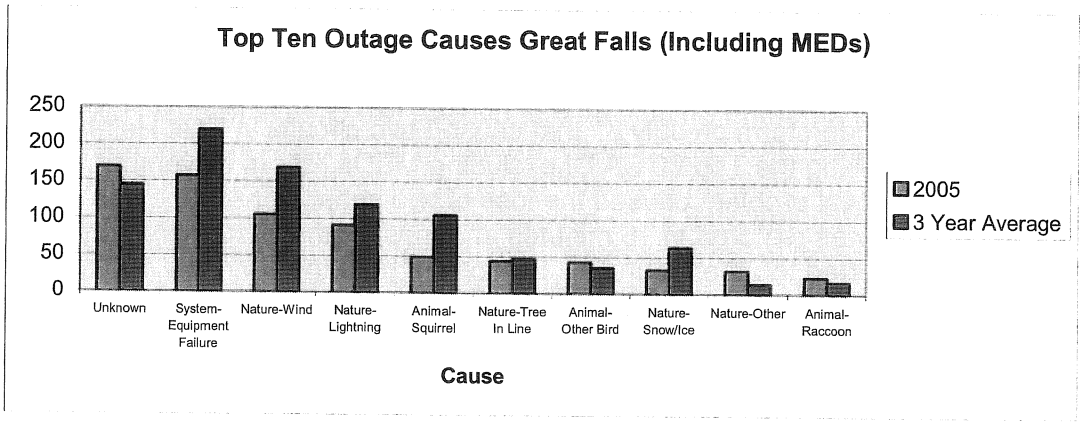
7.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Great Falls	2002	2003	2004	2005	3 Year Average
SAIDI ALL	173.62	143.42	174.71	93.15	163.91
CAIDI ALL	128.01	94.52	111.78	89.01	111.43
SAIFI ALL	1.3563	1.5174	1.5629	1.0466	1.4789



7.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Unknown	169	145
System-Equipment Failure	157	220
Nature-Wind	105	169
Nature-Lightning	91	119
Animal-Squirrel	49	106
Nature-Tree In Line	44	48
Animal-Other Bird	43	35
Nature-Snow/Ice	33	63
Nature-Other	32	14
Animal-Raccoon	23	17
Total Top Ten Counts	746	935


Top Ten Outage Causes Great Falls (Including MEDs)
250
200
150
100
50
0
Unknown
System-Equipment Failure
Nature-Wind
Nature-Lightning
Animal-Squirrel
Nature-Tree In Line
Animal-Other Bird
Nature-Snow/Ice
Nature-Other
Animal-Raccoon
Cause
2005
3 Year Average

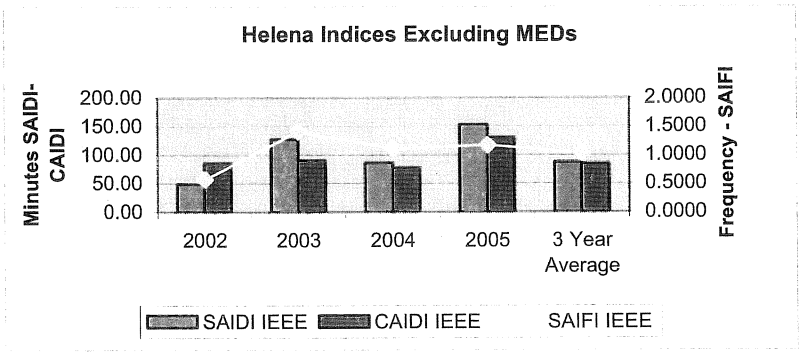
8.0 System Reliability for Helena Division

8.1 Discussion

Helena had a thunderstorm on July 8th that caused two circuits in East Helena to relay out, both making the Top 20 SAIDI excluding MEDs list. In November, a substation differential problem caused the loss of two substations. One sub (with 6400 customers) was restored in 15 minutes and most of the customers from the other were transferred to other sources. The loss of both the Rainbow 100kv lines on 12/29 caused extended outages for Boulder, Clancy, and Basin.

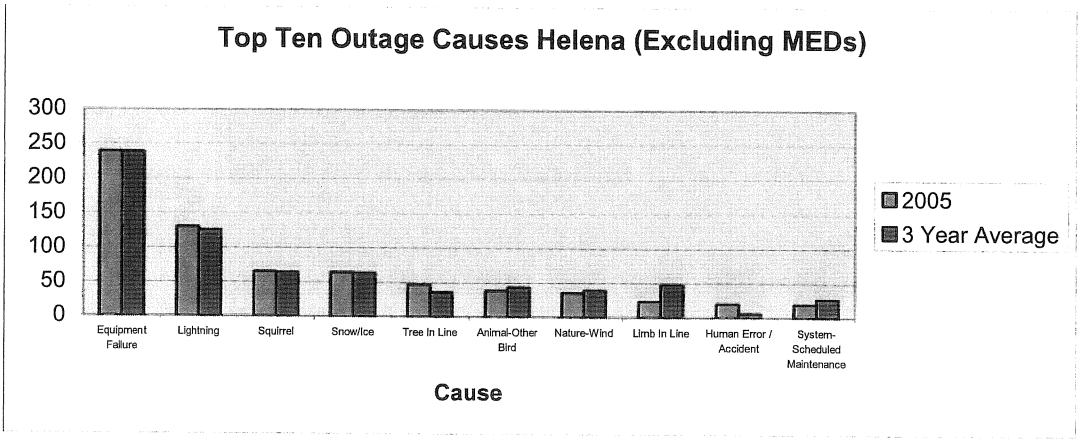
8.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Helena	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	48.69	127.20	86.05	152.79	87.31
CAIDI IEEE	85.70	90.19	77.79	130.46	84.56
SAIFI IEEE	0.568	1.4103	1.1062	1.1711	1.0282



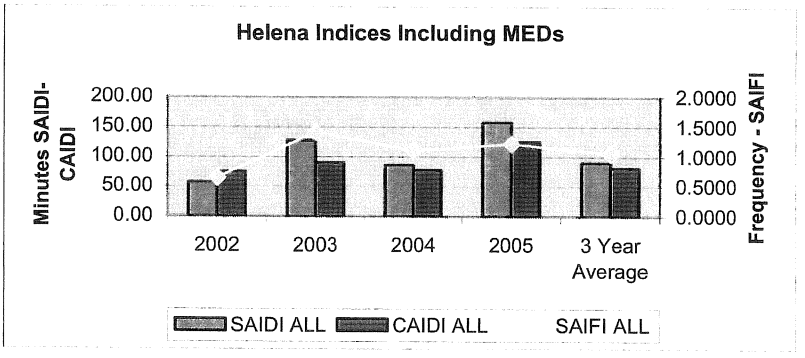
8.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	239	239
Nature-Lightning	130	125
Animal-Squirrel	65	64
Nature-Snow/Ice	64	64
Nature-Tree In Line	47	36
Animal-Other Bird	38	43
Nature-Wind	35	39
Nature-Limb In Line	23	48
System-Human Error / Accident	20	6
System-Scheduled Maintenance	19	27
Total Top Ten Counts	680	690



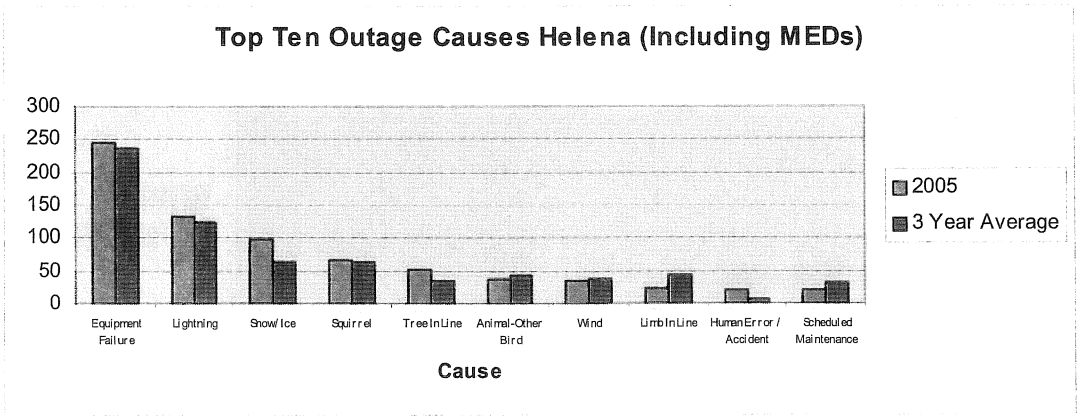
8.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Helena	2002	2003	2004	2005	3 Year Average
SAIDI ALL	56.85	127.20	86.05	157.89	90.03
CAIDI ALL	75.12	90.19	77.79	125.30	81.03
SAIFI ALL	0.6481	1.4103	1.1062	1.2194	1.0549



8.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	244	237
Nature-Lightning	133	123
Nature-Snow/Ice	97	64
Animal-Squirrel	65	64
Nature-Tree In Line	51	36
Animal-Other Bird	38	43
Nature-Wind	36	37
Nature-Limb In Line	23	45
System-Human Error / Accident	20	6
System-Scheduled Maintenance	19	31
Total Top Ten Counts	726	686


Top Ten Outage Causes Helena (Including MEDs)
300
250
200
150
100
50
0
Equipment Failure
Lightning
Snow/Ice
Squirrel
Tree In Line
Animal-Other Bird
Wind
Limb In Line
Human Error / Accident
Scheduled Maintenance
Cause
2005
3 Year Average

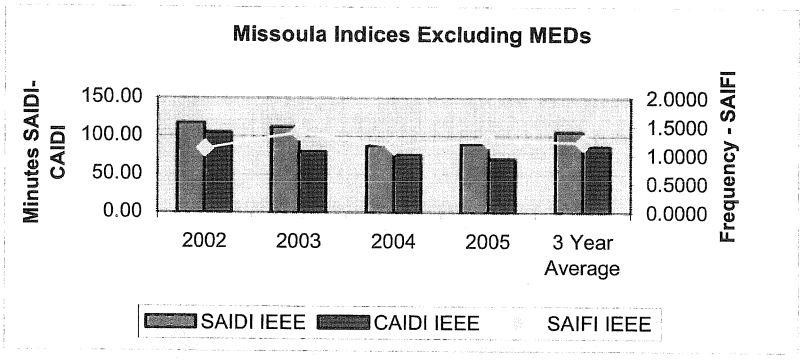
9.0 System Reliability for Missoula Division

9.1 Discussion

Two outages occurred in the spring at the Russell Street Sub due to squirrel problems, both making the Top 20 SAIFI list. This substation has had further animal mitigation work done since these incidents. A substation get-away cable also failed in August, causing an extended outage.

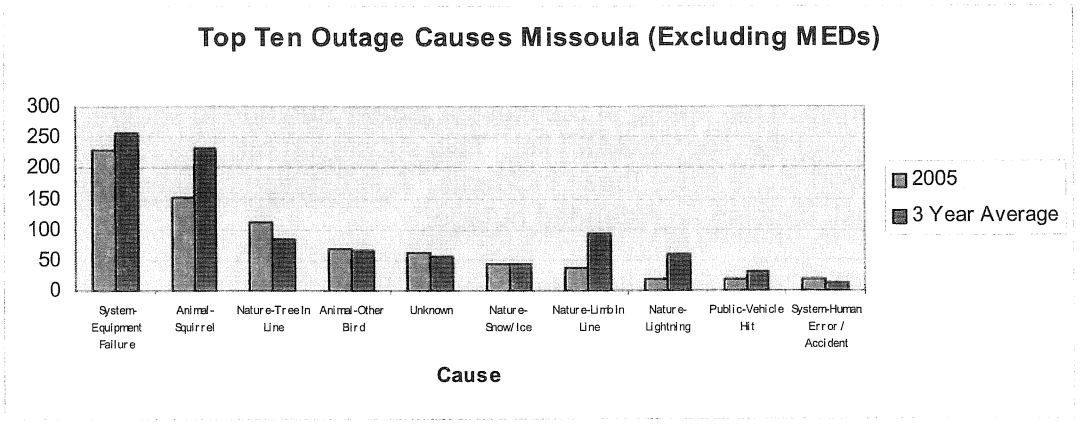
9.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Missoula	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	117.19	112.02	87.29	88.87	105.50
CAIDI IEEE	104.91	79.88	75.71	70.10	86.84
SAIFI IEEE	1.117	1.4023	1.1529	1.2677	1.2241



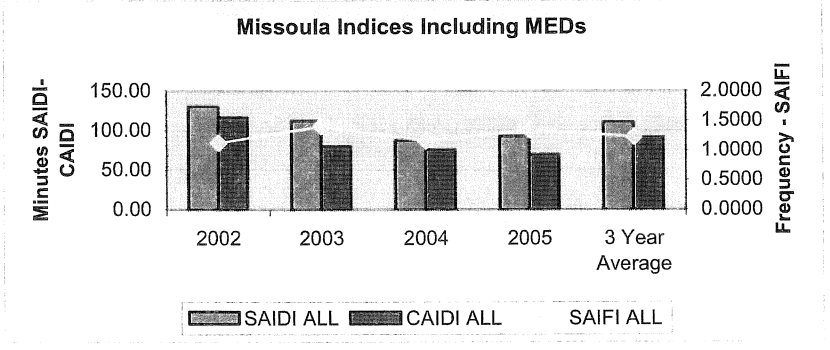
9.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	229	257
Animal-Squirrel	151	232
Nature-Tree In Line	112	83
Animal-Other Bird	67	64
Unknown	63	55
Nature-Snow/Ice	44	42
Nature-Limb In Line	37	92
Nature-Lightning	20	59
Public-Vehicle Hit	20	31
System-Human Error / Accident	18	12
Total Top Ten Counts	761	927



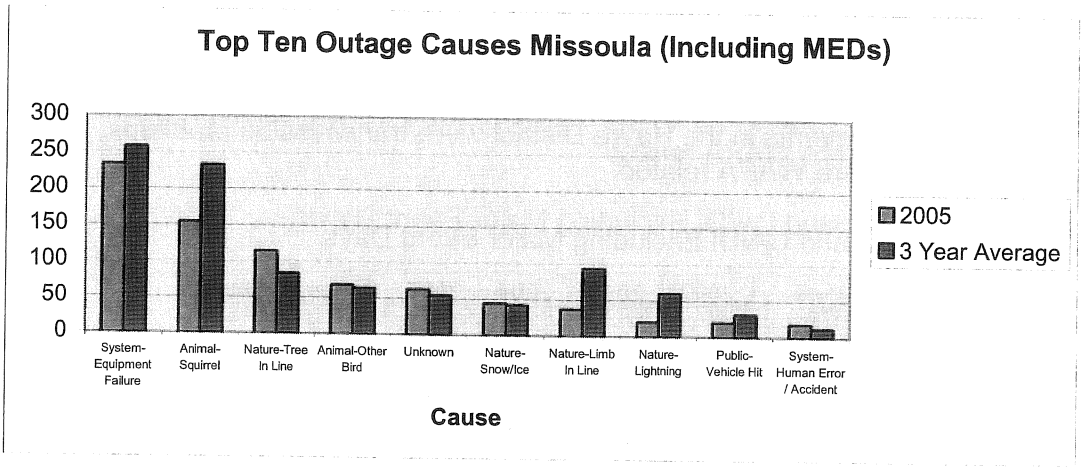
9.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Missoula	2002	2003	2004	2005	3 Year Average
SAIDI ALL	130.81	112.02	87.29	92.21	110.04
CAIDI ALL	116.11	79.88	75.71	69.11	90.57
SAIFI ALL	1.1265	1.4023	1.1529	1.3344	1.2272



9.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	233	258
Animal-Squirrel	154	233
Nature-Tree In Line	114	83
Animal-Other Bird	68	64
Unknown	63	55
Nature-Snow/Ice	44	42
Nature-Limb In Line	37	94
Nature-Lightning	20	60
Public-Vehicle Hit	20	31
System-Human Error / Accident	18	12
Total Top Ten Counts	771	932


Top Ten Outage Causes Missoula (Including MEDs)
300
250
200
150
100
50
0
System-Equipment Failure
Animal-Squirrel
Nature-Tree In Line
Animal-Other Bird
Unknown
Nature-Snow/Ice
Nature-Limb In Line
Nature-Lightning
Public-Vehicle Hit
System-Human Error / Accident
Cause
2005
3 Year Average

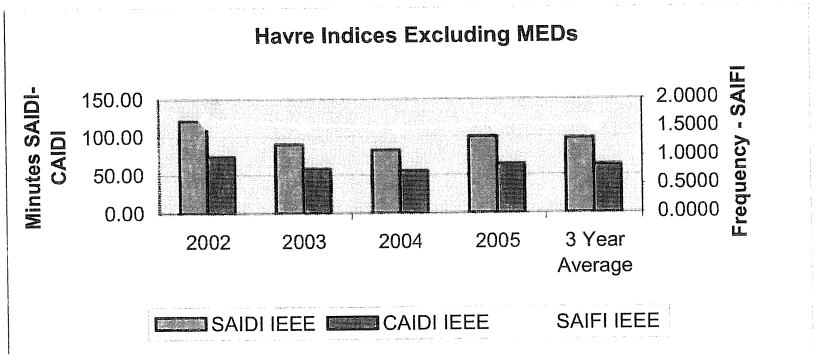
10.0 System Reliability for Havre District

10.1 Discussion

The top five SAIDI events in the Havre District were transmission problems, several of which were WAPA related.

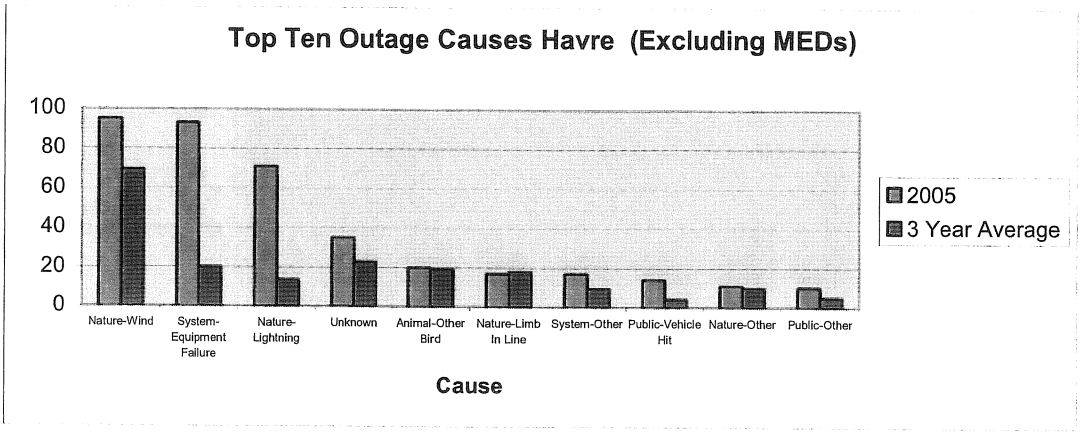
10.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Havre	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	121.00	90.14	82.70	100.24	97.95
CAIDI IEEE	74.51	58.32	55.57	64.31	63.09
SAIFI IEEE	1.6239	1.5457	1.4883	1.5588	1.5526



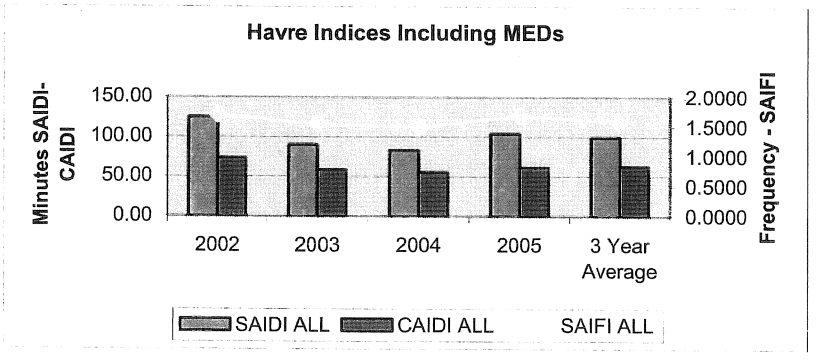
10.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
Nature-Wind	95	69
System-Equipment Failure	93	20
Nature-Lightning	71	14
Unknown	35	23
Animal-Other Bird	20	19
Nature-Limb In Line	17	18
System-Other	17	9
Public-Vehicle Hit	14	4
Nature-Other	11	10
Public-Other	10	5
Total Top Ten Counts	383	191



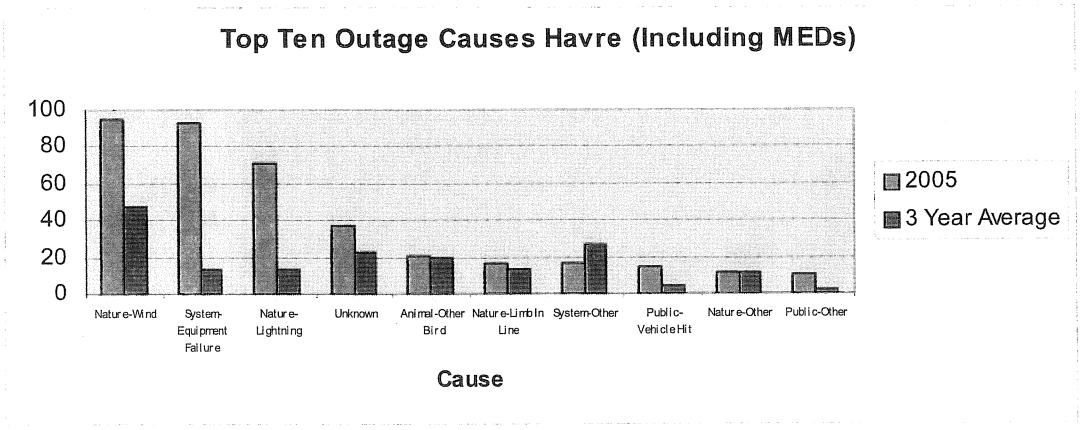
10.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Havre	2002	2003	2004	2005	3 Year Average
SAIDI ALL	124.67	90.14	82.70	103.92	99.17
CAIDI ALL	73.23	58.32	55.57	61.38	62.81
SAIFI ALL	1.7025	1.5457	1.4883	1.6931	1.5788



10.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
Nature-Wind	95	47
System-Equipment Failure	93	14
Nature-Lightning	71	14
Unknown	37	23
Animal-Other Bird	21	20
Nature-Limb In Line	17	14
System-Other	17	27
Public-Vehicle Hit	14	4
Nature-Other	11	11
Public-Other	10	2
Total Top Ten Counts	386	175


Top Ten Outage Causes Havre (Including MEDs)
100
80
60
40
20
0
Nature-Wind
System-Equipment Failure
Nature-Lightning
Unknown
Animal-Other Bird
Nature-Limb In Line
System-Other
Public-Vehicle Hit
Nature-Other
Public-Other
Cause
2005
3 Year Average

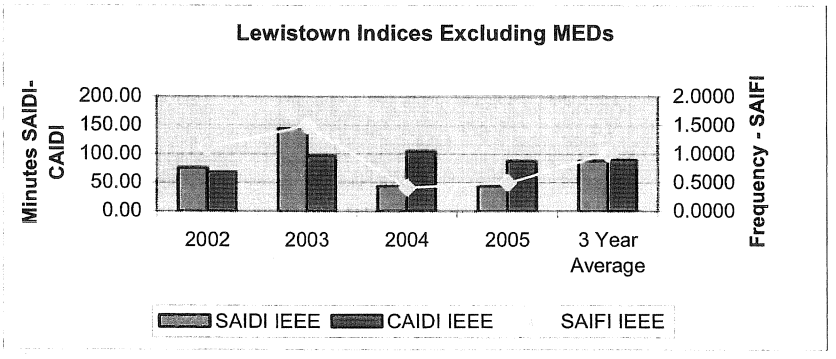
11.0 System Reliability for Lewistown District

11.1 Discussion

The largest SAIDI event in the Lewistown District only contributed 0.168 minutes to the Montana Region index. Both SAIDI and SAIFI are less than one half of the three-year averages, so Lewistown had a very reliable year!

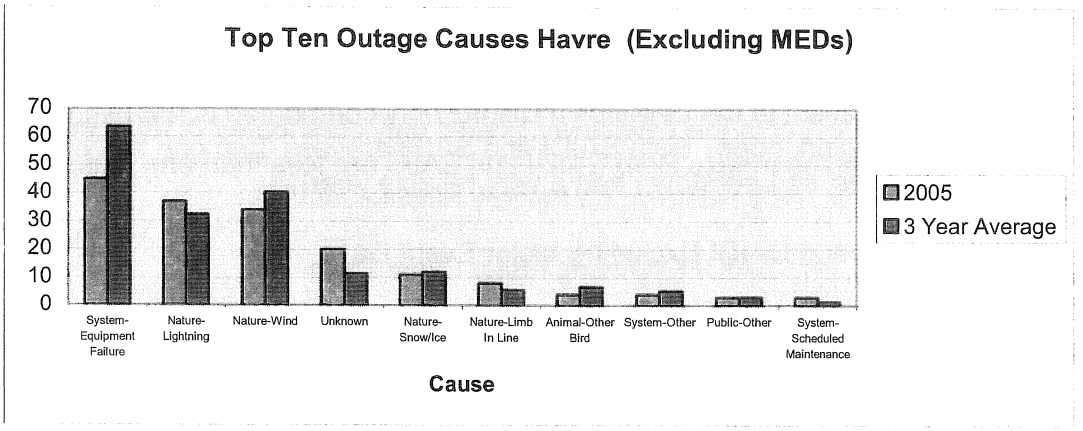
11.2 SAIDI, SAIFI, and CAIDI Excluding Major Event Days

Lewistown	2002	2003	2004	2005	3 Year Average
SAIDI IEEE	75.69	144.20	43.14	43.13	87.68
CAIDI IEEE	68.33	96.45	104.56	86.96	89.78
SAIFI IEEE	1.108	1.4950	0.4126	0.4960	1.0051



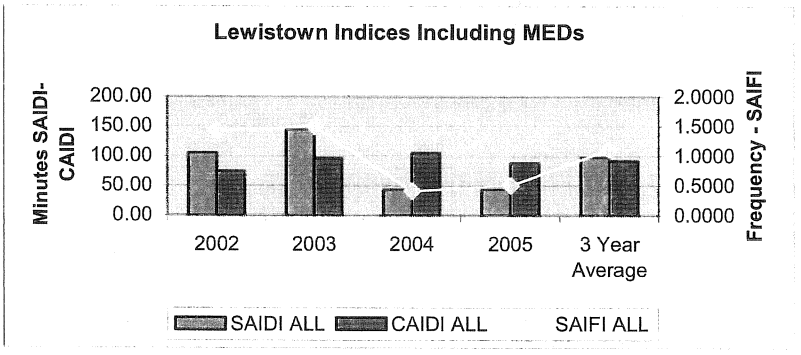
11.3 Outages by Cause Excluding Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	45	64
Nature-Lightning	37	32
Nature-Wind	34	40
Unknown	20	11
Nature-Snow/Ice	11	12
Nature-Limb In Line	8	6
Animal-Other Bird	4	7
System-Other	4	5
Public-Other	3	3
System-Scheduled Maintenance	3	1
Total Top Ten Counts	169	182



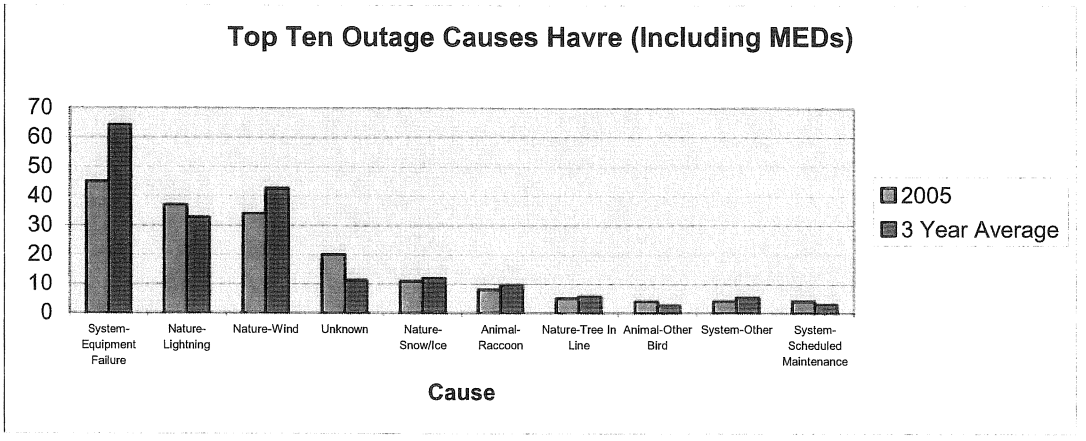
11.4 SAIDI, SAIFI, and CAIDI Including Major Event Days

Lewistown	2002	2003	2004	2005	3 Year Average
SAIDI ALL	105.00	144.20	43.14	43.94	97.45
CAIDI ALL	74.09	96.45	104.56	87.37	91.70
SAIFI ALL	1.4172	1.4950	0.4126	0.5029	1.1083



11.5 Outages by Cause Including Major Event Days

Outage Cause	2005	3 Year Average
System-Equipment Failure	45	64
Nature-Lightning	37	33
Nature-Wind	34	43
Unknown	20	11
Nature-Snow/Ice	11	12
Animal-Raccoon	8	10
Nature-Tree In Line	5	6
Animal-Other Bird	4	3
System-Other	4	5
System-Scheduled Maintenance	4	3
Total Top Ten Counts	172	189



12.0 Summary

Most of the major impacts on reliability indices and customers are related to substation problems or transmission problems that consequently cause substation outages. These problems take out large numbers of customers, but often the outages are not long, due to loop feeds, transfer capabilities or other contingencies. Some of these are relay related problems, but the relays protect the equipment from major damage and also the safety of the public, so occasional problems are acceptable. Most of the remaining Top 20 events are feeder problems, once again because they might serve thousands of customers. These may be short in duration, if a limb falls onto the line, or long, if poles are broken and need to be replaced. Good line coordination and transfer capability can often mitigate the impacts of these outages.

In looking at outage causes, equipment failures are down about 10.6% from the three-year average. Snow/ice and unknowns showed increases and may be related to the storms. Tree and limb problems were up slightly when considering MEDs also, but down by 311 from 2004 (158 from the three-year average) without the MEDs. This improvement may be from additional tree trimming efforts. Wind and squirrel counts were down. Missoula's squirrel outages were down by 80 from the three-year average, most probably reflecting the considerable mitigation work done in this area.