

November 2016 ERCOT Monthly Operations Report **(REDLINE)**

Reliability and Operations Subcommittee Meeting

January 12th, 2016

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# Report Highlights

* The unofficial ERCOT peak for November was 50,084 MW.
* There were five frequency events in November. PMU data indicates the ERCOT system transitioned well in each case.
* There were four instances where Responsive Reserves were deployed, they were all the result of a frequency events.
* There were three RUC commitments in November.
* The level of reportable SCED congestion decreased in November. This congestion was mostly due to planned outages and area load/gen patterns. There were thirty-one instances over 20 days on the Generic Transmission Constraints (GTCs) in November. There were seventeen days on the Panhandle GTC and fourteen days on the Liston GTC in November. There was no activity on the remaining GTCs during the Month.
* There was one application issue to report for November. On 11/21/16 a watch was issued due to a SCED failure.

# Frequency Control

## Frequency Events

**5 Events (6 in October 2016)**

**Nov 16 CPS1 = 176.53**

**Oct 16 CPS1 = 178.71**

The ERCOT Interconnection experienced five frequency events in November, all of which resulted from Resource trips. The average event duration was approximately 0:04:01.

When analyzing frequency events, ERCOT evaluates PMU data according to industry standards. Events with an oscillating frequency of less than 1 Hz are considered to be inter-area, while higher frequencies indicate local events. Industry standards specify that damping ratio for inter-area oscillations should be 3.0% or greater. All events listed below indicate the ERCOT system met these standards and transitioned well after each disturbance.

Reported frequency events will include both frequency events where frequency was outside the range of 60±0.1 Hz as well as those determined to be Frequency Measurable Events (FME) as defined by BAL-001-TRE-1. Delta Frequency is defined as the difference between the pre-perturbation and post-perturbation frequency. The Duration of Event is defined as the time it takes for the frequency to recover to lesser/greater of the frequency at the time of the frequency event (t(0) or “A-point”) for low/high-frequency events, respectively. Further details on FMEs can be found in the MIS posted BAL-001-TRE-1 PDCWG Unit Performance reports. A summary of the frequency events is provided below:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date and Time** | **Delta Frequency** | **Max/Min Frequency** | **Duration of Event** | **PMU Data** | **Load** | **Wind** | **Inertia** | **Comments** |
| **(Hz)** | **(Hz)** | **Oscillation Mode (Hz)** | **Damping Ratio** | **(MW)** | **%**  | **(GW-s)** |  |
| 11/3/2016 14:31 | 0.138 | 59.81 | 0:03:46 | 0.70 | 8% |  44,882  | 7% |  255,811  | Unit Trip of 816MW (MLSES.UNIT2) |
| 11/5/2016 17:56 | 0.111 | 59.82 | 0:05:36 | 0.73 | 15% |  37,079  | 7% |  223,061  | Unit Trip of 830MW (OGSES.UNIT1A) |
| 11/19/2016 12:30 | 0.080 | 59.91 | 0:05:36 | No PMU Data Available. |  32,730  | 10% |  200,522  | Unit Trip of 467MW (WHCCS.WHCCS\_CC1) |
| 11/20/2016 5:54 | 0.038 | 59.88 | 0:01:55 | No PMU Data Available. |  31,875  | 36% |  190,575  | Unit Trip of 372MW (OGSES.UNIT1A) |
| 11/29/2016 14:45 | 0.066 | 59.91 | 0:03:14 | No PMU Data Available. |  38,766  | 12% |  222,731  | Unit Trip of 317MW (CALAVERS.JKS1) |

(Note: frequency events highlighted in blue have been identified as FMEs per BAL-001-TRE-1 and the Performance Disturbance Compliance Working group.)



## Responsive Reserve Events

**4 Events (4 in October 2016, 4 in November 2015)**

There were four events where Responsive Reserve MWs were released to SCED in November. The events highlighted in blue were related to frequency events reported in Section 2.1 above.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date and Time Released to SCED** | **Date and Time Recalled** | **Duration of Event** | **Maximum MWs Released** | **Comments** |
| 11/3/2016 14:31:13 | 11/3/2016 14:33:40 | 0:02:27 | 1162.09 |   |
| 11/5/2016 17:56:24 | 11/5/2016 18:00:32 | 0:04:08 | 611.21 |   |
| 11/19/2016 12:30:13 | 11/19/2016 12:33:25 | 0:03:12 | 233.90 |   |
| 11/20/2016 5:54:30 | 11/20/2016 5:56:50 | 0:02:20 | 206.29 |   |

## Load Resource Events

None.

# Reliability Unit Commitment

**3 total commitments as 7 individual hour requests.**

ERCOT reports on Reliability Unit Commitments (RUC) on a monthly basis. Commitments are reported grouped by operating day and weather zone. The total number of hours committed is the sum of the hours for all the units in the specified region. Additional information on RUC commitments can be found on the MIS secure site at Grid 🡪 Generation 🡪 Reliability Unit Commitment.

There were no DRUC commitments in November.

There were 3 HRUC commitments in November.

|  |
| --- |
| **HRUC Commitments** |
| **Resource Location** | **# of Resources** | **Operating Day** | **Total # of Hours Committed** | **Total MWhs** | **Reason for Commitment** | **Units** |
| South Central | 1 | 11/14/2016 | 10 |  460  | Local Congestion | LEON\_CRK\_LCPCT4 |
| South Central | 1 | 11/15/2016 | 1 |  46  | Local Congestion | LEON\_CRK\_LCPCT4 |
| Southern | 1 | 11/29/2016 | 9 |  2,858  | Local Congestion | B\_DAVIS\_CC1\_1 |

# Wind Generation as a Percent of Load



# Congestion Analysis

The number of congestion events experienced by the ERCOT system decreased in November. There were thirty-one instances of activity on the Generic Transmission Constraints (GTCs) in November.

## Notable Constraints for November

**26 reportable events (49 for October 2016)**

**167 total congestion events (347 for October 2016, 228 for November 2015)**

Nodal protocol section 3.20 specifies that ERCOT shall identify transmission constraints that are active or binding three or more times within a calendar month. As part of this process, ERCOT reports congestion that meets this criterion to ROS. In addition ERCOT also highlights notable constraints that have an estimated congestion rent exceeding $1,000,000 for a calendar month. These constraints are detailed in the table below. Rows highlighted in blue indicate the congestion was affected by one or more outages. For a list of all constraints activated in SCED for the month of November, please see Appendix A at the end of this report.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Contingency Name** | **Overloaded Element** | **# of Days Constraint Active** | **Congestion Rent** | **Transmission Project** | **Comments** |
|
| Basecase | Panhandle GTC | 20 | $17,822,792.99 | Panhandle Upgrade | Multiple area line outages |
| DCKT Hill Country - Marion and Elmcreek 345 kV | Cibolo - Schertz 138kV | 11 | $7,220,084.57 | Cibolo to Schertz T-Line (T303) | Planned Outage on 345 kV line from SKYLINE to MARION and ELMCREEK |
| DCKT Gibbons Creek - Singleton 345 kV | Jewett - Singleton 345kV | 1 | $6,665,002.04 | Houston Import Project | Unavoidable extension on Jewet 345 kV bus |
| Midland East - Moss Switch - Odessa Ehv Switch 345 kV | Odessa EHV Switch to Trigas Odessa Tap | 1 | $1,271,800.29 |  | Planned 138 kV outage ODEHV to TXJTP to MDSSW |
| Mountain Creek Ses Axfmr1h (3)138/69 kV | Cedar Crest Switch - Oak Cliff South 138kV | 1 | $1,154,155.43 |  | Planned Outage of Davis Streep Tap (DVSTP) to Dallas West (DALLW), DVSTP to Davis Street (DAVST), and DVSTP to Westmorland North (WMRNR) 138kV Lines  |
| DCKT Hill Country - Marion and Elmcreek 345 kV | Tri\_Cnty - Parkway Lcra 138kV | 3 | $915,351.01 |  | Planned Outage on 345 kV line from SKYLINE to MARION and ELMCREEK |
| Cagnon to Kendall 345 kV | Cico - Comfort 138kV | 3 | $907,531.53 |  | Planned 345 kV line outage from WTRML to TRSES and planned 69 kV line outage from BCPOI to POWEL |
| DCKT Sandow Switch - Austrop 345kV | Howard Lane Tap - Howard Lane Aen 138kV | 10 | $680,095.73 |  | Multiple area line outages |
| Bosque Switch - Elm Mott 345 kV | Bosque Switch - Rogers Hill Bepc 138kV | 10 | $640,339.46 |  | 138 kV bus outage at HLSBR |
| Loyola Sub to Kleberg Aep 138 kV | Loyola Sub 69\_1 138/69kV | 9 | $492,611.82 |  | Multiple area line outages |
| Sandow Switch - Austrop 345 kV | Sandow Switch - Austrop 345kV | 3 | $428,321.45 | Upgrade existing DCKT line | Area Load/Gen pattern |
| Jardin to Cotulla Sub 138 kV | Dilley Switch Aep - Cotulla Sub 69kV | 9 | $386,434.47 | Rebuild 4/0 ACSR 69 kV line with 138 kV capable 795 ACSR. 2015 RTP | High N-H Import |
| Dilleysw-Sanmgsw&Cotulas 138kV | Dilley Switch Aep - Cotulla Sub 69kV | 4 | $292,493.52 | Rebuild 4/0 ACSR 69 kV line with 138 kV capable 795 ACSR. 2015 RTP | High N-H Import |
| Basecase | Liston GTC | 16 | $291,559.05 | Increase the MOT rating of the Bates to Wormser 138kV line by raising xx structures | 138 kV bus outage at HLSBR |
| DCKT Whitepint - Lon Hill and South Texas Project 345 kV | Blessing - Lolita 138kV | 4 | $236,784.67 |  | High N-H Import |
| Laquinta - Lobo 138 kV | Bruni Sub 69\_1 138/69kV | 6 | $127,259.13 |  | Area Load/Gen Pattern |
| DKCT Roans Prarie-Rothwood & Singleton-Tomball 345kV | Singleton - Zenith 345kV | 5 | $123,445.94 | Houston Import Project | Planned outages at Three\_RI |
| Uvalde Aep - Odlaw Switchyard 138 kV | Hamilton Road - Maverick 138kV | 3 | $119,932.46 | Rebuild Hamilton Road to Escondido 138 kV line | Planned 345 kV line outages from SKYLINE to ELMCREEK and SKYLINE to MARION |
| DCKT Jewett - Singleton 345 kV | Btu\_Jack\_Creek - Twin Oak Switch 345kV | 7 | $84,514.49 | Houston Import Project | 138 kV planned bus outage at HLSBR |
| Dilleysw-Sanmgsw&Cotulas 138kV | Dilley Switch Aep - Cotulla Sub 69kV | 4 | $82,178.16 | Rebuild 4/0 ACSR 69 kV line with 138 kV capable 795 ACSR. 2015 RTP | 138 kV bus outage at HLSBR. Planned 69 kV line outage from BEVO to BRUNDGS. |
| Mercers Gap Sw to Comanche Switch (Oncor) 138 kV | Camp Bowie (Oncor) - Brownwood Switch 138kV | 5 | $31,579.18 | Reconductor Airline to Westside with 1966 ACCC/TW | Planned outage of 138 kV line N\_Sharpe to Alazan |
| Eskota Switch - Abilene South 138 kV | Roby - Round Tree Tap 69kV | 8 | $23,024.53 |  | Area Load/Gen pattern |
| Javelina Wind Energy Project to Rio Bravo (4)138/138/138/138 kV | Bates - Liston 138kV | 3 | $17,121.55 | Increase the MOT rating of the Bates to Wormser 138kV line by raising xx structures | Area Load/Gen pattern |
| Liston to Bates 138 kV | Garza - Roma Switch 138kV | 7 | $4,297.16 |  | Area Load/Gen pattern |
| Eskota Switch - Abilene South 138 kV | Eskota Switch - Longworth 69kV | 3 | $4.61 |  | Area Load/Gen pattern |

## Generic Transmission Constraint Congestion

There were seventeen days on the Panhandle GTC and fourteen days on the Liston GTC in November. There was no activity on the remaining GTCs during the Month.

Note: This is how many times a constraint has been activated to avoid exceeding a GTC limit, it does not imply an exceedance of the GTC occurred or that the GTC was binding.

## Manual Overrides for November

None.

## Congestion Costs for Calendar Year 2016

The following table represents the top twenty active constraints for the calendar year based on the estimated congestion rent attributed to the congestion. ERCOT updates this list on a monthly basis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Binding Element** | **# of 5-min SCED Intervals** | **Estimated Congestion Rent** | **Transmission Project** |
| Rns-Rtw & Sng-Tb 345kv | Singleton - Zenith 345kV | 9,728 |  $ 46,334,673.52  | Houston Import Project |
| Ph Robinson At1l\_H (3)345/138 KV | Meadow AT1 345/138kV | 1,470 |  $ 37,410,531.94  | 4708 |
| Basecase | Panhandle GTC | 12,104 |  $ 26,320,735.24  |  Panhandle Upgrade |
| Villa Cavazos to Military Highway Aep (2)138/138 KV | Los Fresnos - Loma Alta Substation 138kV | 3,272 |  $ 26,026,381.24  |   |
| Jewet-Sng 345kv | Btu\_Jack\_Creek - Twin Oak Switch 345kV | 13,429 |  $ 14,532,560.26  |  Houston Import Project |
| Jim Christal Substation to West Denton 138 KV | Fort Worth Subsation - West Denton 138kV | 1,712 |  $ 12,652,770.74  |   |
| Fort Worth Subsation to West Denton 138 KV | Jim Christal Substation - West Denton 138kV | 2,075 |  $ 10,854,453.30  |   |
| Rnksw-W\_Dent&Lwssw-Krwsw 345kv | Fort Worth Subsation - West Denton 138kV | 1,774 |  $ 10,027,611.63  |   |
| Moss Switch to Odessa Ehv Switch 345 KV | Odessa EHV Switch to Trigas Odessa Tap | 2,101 |  $ 9,455,517.12  |   |
| Hcksw-Allnc&Rnksw 345kv | Eagle Mountain Ses - Morris Dido 138kV | 1,481 |  $ 9,187,189.06  |  4252 |
| Hillctry-Marion&Elmcreek 345kv | Cibolo - Schertz 138kV | 1,308 |  $ 7,775,371.11  |   |
| Gibcrk-Sng 345 Kv | Jewett - Singleton 345kV | 1,332 |  $ 7,555,045.65  |   |
| Basecase | Valley Import | 205 |  $ 7,406,577.64  | LRGV (ower Rio Grande Valley) Import Project  |
| Bm-Sr73 & Sr81 138kv | Bellaire - San Felipe 138kV | 196 |  $ 7,119,922.62  |  4703 |
| Rosen Heights to Eagle Mountain Compressor (5)138/138/138/138/138 KV | Rosen Heights Tap 2 - Morris Dido 138kV | 857 |  $ 6,945,775.57  |  4252 |
| Meadow to Ph Robinson 345 KV | Meadow AT1 345/138kV | 89 |  $ 6,552,987.55  |  4708 |
| WA Parish - Bailey & Hillje 345 kV  | Oasis - Dow Chemical 345kV | 64 |  $ 5,749,309.96  |   |
| Lwssw-Krwsw&Rnksw 345kv | Fort Worth Subsation - West Denton 138kV | 791 |  $ 5,462,367.54  |   |
| Hcksw-Allnc&Rnksw 345kv | Rosen Heights Tap 2 - Morris Dido 138kV | 805 |  $ 5,063,292.44  | 4252  |
| South Carbide to Loma Alta Substation 138 KV | La Palma - Villa Cavazos 138kV | 505 |  $ 5,060,645.62  | 4490  |

# System Events

## ERCOT Peak Load

The unofficial ERCOT peak load for the month was 50,084 MW and occurred on November 2nd during hour ending 17:00.

**Instantaneous peak was 50,198 MW**

**November 2015 actual peak was 45,014 MW**

## Load Shed Events

None.

## Stability Events

None.

## Notable PMU Events

ERCOT analyzes PMU data for any significant system disturbances that do not fall into the Frequency Events category reported in section 2.1. The results are summarized in this section once the analysis has been completed.

There were no reportable events in November.

## TRE/DOE Reportable Events

None.

## New/Updated Constraint Management Plans

None.

## New/Modified/Removed SPS

None.

## New Procedures/Forms/Operating Bulletins

None.

# Emergency Conditions

## OCNs

None.

## Advisories

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 11/13/16 13:27 | Advisory issued due to DAM timeline deviation |

## Watches

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 11/21/16 19:35 | Watch issued due to SCED failure |

## Emergency Notices

None.

# Application Performance

## TSAT/VSAT Performance Issues

None.

## Communication Issues

None.

## Market System Issues

* 11/21/16 – A watch was issued due to a SCED failure.

# Appendix A: Real-Time Constraints

The following is a complete list of constraints activated in SCED for the month of November. Full contingency descriptions can be found in the Standard Contingencies List located on the MIS secure site at Grid 🡪 Generation 🡪 Reliability Unit Commitment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Constrained Element** | **From Station** | **To Station** | **# of Days Constraint Active** |
| BASE CASE | PNHNDL | n/a | n/a | 20 |
| BASE CASE | LISTON | n/a | n/a | 16 |
| DHILELM5 | 293T304\_1 | CIBOLO | SCHERT | 11 |
| DAUSSND5 | HWRDLN\_1 | HWRDTP | HWRDLN | 10 |
| SBOSELM5 | 1030\_\_B | BOSQUESW | RGH | 10 |
| SKLELOY8 | LOYOLA\_69\_1 | LOYOLA | LOYOLA | 9 |
| SJARDIL8 | DIL\_COTU\_1 | DILLEYSW | COTULAS | 9 |
| SMCEABS8 | ROBY\_RONDTP1\_1 | ROBY | RONDTPT | 8 |
| DJEWSNG5 | JK\_TOKSW\_1 | TOKSW | JK\_CK | 7 |
| SLISBAT8 | GARZA\_ROMA\_S1\_1 | GARZA | ROMA\_SW | 7 |
| SLAQLOB8 | BRUNI\_69\_1 | BRUNI | BRUNI | 6 |
| SZEPCMN8 | 670\_\_B | BRNSW | CMPBW | 5 |
| DRNS\_TB5 | SNGZEN99\_A | SNG | ZEN | 5 |
| DDILCOT8 | DIL\_COTU\_1 | DILLEYSW | COTULAS | 4 |
| DDILCOT8 | DIL\_COTU\_1 | COTULAS | DILLEYSW | 4 |
| DWH\_STP5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 4 |
| DGIBSNG5 | 260\_A\_1 | JEWET | SNG | 3 |
| SSNDAU15 | 450\_\_A | SNDSW | AUSTRO | 3 |
| SMCEABS8 | 6780\_\_A | ESKSW | LONGWRTH | 3 |
| SBRAUVA8 | HAMILT\_MAVERI1\_1 | HAMILTON | MAVERICK | 3 |
| SRIOWOR8 | BATES\_LISTON1\_1 | LISTON | BATES | 3 |
| SCAGKEN5 | 74T148\_1 | COMFOR | CICO | 3 |
| DHILELM5 | PAR\_TRI\_CNTY\_1 | PARKWA | F5 | 3 |
| SN\_SLON5 | KINGSV\_KLEBER1\_1 | KLEBERG | KINGSVIL | 2 |
| DCC3\_NED | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 2 |
| DCRLLSW5 | 591\_\_A | LKPNT | CRLNW | 2 |
| SSPUASP8 | ROTN\_WOLFGA1\_1 | WOLFGANG | ROTN | 2 |
| SDANBLE8 | BLESSING\_69A1 | BLESSING | BLESSING | 2 |
| DELMMAR5 | 293T304\_1 | CIBOLO | SCHERT | 2 |
| STRCTRS5 | 2040\_\_D | NVARO | MLDR2 | 2 |
| BASE CASE | LGD\_SANTIA1\_1 | LGD | SANTIAGO | 2 |
| DBIGKEN5 | FRIR\_ROCKSP1\_1 | FRIR | ROCKSPRS | 2 |
| SSPUMW18 | ROTN\_WOLFGA1\_1 | WOLFGANG | ROTN | 2 |
| DTHWZEN5 | OB\_ZEN71\_A | ZEN | OB | 2 |
| XWFA89 | 6945\_\_A | LKWSW | WFALS | 2 |
| DAUSSND5 | 211T147\_1 | GILLCR | MCNEIL\_ | 2 |
| DCRLLSW5 | 590\_\_A | LWSSW | LWVJS | 2 |
| XWL2V58 | 3130\_\_B | INDST | CMPST | 1 |
| DCRLLSW5 | 588\_A\_1 | LWSVW | LWVTI | 1 |
| DMTSCOS5 | 6437\_\_F | SCRCV | KNAPP | 1 |
| SLOBSA25 | BRUNI\_69\_1 | BRUNI | BRUNI | 1 |
| SGILNU78 | GILA\_MORRIS1\_1 | GILA | MORRIS | 1 |
| DFPPFAY5 | HK\_TB\_66\_A | TB | HK | 1 |
| BASE CASE | THOMASTN\_PS1 | THOMASTN | THOMASTN | 1 |
| XMCS89 | 3160\_\_A | CDCSW | OKCLS | 1 |
| DGIBSNG5 | 240\_\_A | JEWET | SNG | 1 |
| DSCOFAR5 | 6437\_\_F | SCRCV | KNAPP | 1 |
| SECTPBS8 | 6485\_\_A | MOSSW | PBSES | 1 |
| SNADRIC8 | NAD\_ELCM\_1 | NADAS | ELCMPOS | 1 |
| DTRCELK5 | 1000\_\_B | TYLNW | TYWST | 1 |
| SMDLODE5 | 6475\_\_C | ODEHV | TROTP | 1 |
| DFL\_MAR8 | BETHK\_66\_A | HK | BET | 1 |
| DBRACOL8 | KARNES\_KENEDS1\_1 | KENEDSW | KARNESCI | 1 |
| SMYRSPR8 | SJO\_SJO2 | SJO | SJO | 1 |
| SBOSELM5 | 1030\_\_A | RGH | ELMOT | 1 |
| DHILELM5 | 581T581\_1 | ECMORN | PARKWA | 1 |
| SMDLODE5 | 6345\_\_B | GNTSW | SPRTP | 1 |
| DELMSAN5 | PAWNEE\_SPRUCE\_1 | CALAVERS | PAWNEE | 1 |
| DFPPFAY5 | 190T152\_1 | GIDEON | WINCHE | 1 |
| DMARSKY5 | 293T304\_1 | CIBOLO | SCHERT | 1 |
| SSCLWC28 | G138\_16\_1 | BRAZORIA | WCOLMAIN | 1 |
| DMARSKY5 | PAR\_TRI\_CNTY\_1 | PARKWA | F5 | 1 |
| DTOKJK\_5 | 240\_\_A | JEWET | SNG | 1 |
| XTH2W58 | OB\_ZEN71\_A | ZEN | OB | 1 |
| BASE CASE | RANDAD\_ZAPATA1\_1 | RANDADO | ZAPATA | 1 |
| SPLUFLA8 | 154T176\_1 | FAYETT | FRELSB | 1 |
| SBRAUVA8 | EAGLHY\_MAVERI1\_1 | MAVERICK | EAGLHYTP | 1 |
| SSPJFS8 | JFSSC\_06\_A | JFS | SC | 1 |
| SSCUSU28 | ROTN\_WOLFGA1\_1 | WOLFGANG | ROTN | 1 |
| SSWDMGS8 | ROBY\_RONDTP1\_1 | ROBY | RONDTPT | 2 |
| STRCTRS5 | 2040\_\_D | NVARO | MLDR2 | 1 |
| BASE CASE | RIOHND\_ERIOHND\_1 | MV\_RIOHO | RIOHONDO | 1 |
| SRICGRS8 | 6850\_\_B | NVKSW | ARCTY | 1 |
| DB\_DPHA8 | AIRLIN\_B\_DAVI1\_1 | B\_DAVIS | AIRLINE | 1 |
| XSA2R58 | BALG\_ROWE1\_1 | BALG | ROWE | 1 |
| SBEVASH8 | BIG\_COTU\_1 | COTULAS | BIGWELS | 1 |
| DSC\_SL28 | CO\_WAS84\_A | CO | WAS | 1 |
| DCHBJOR5 | CV\_LH\_03\_A | LH | CV | 1 |
| SWEIWES8 | MCKENZ\_WESTSI1\_1 | MCKENZIE | WESTSIDE | 1 |
| SSARBLU5 | NICOLE\_ORNT1\_1 | NICOLE | ORNT | 1 |
| XSA2R58 | ORNT\_REDCRE1\_1 | ORNT | REDCREEK | 1 |
| DTOKJK\_5 | 240\_\_A | JEWET | SNG | 1 |
| SSCLWF18 | 6840\_\_B | NVKSW | ANARN | 1 |
| SRNGCBY8 | CV\_LH\_03\_A | LH | CV | 1 |
| DJFSFT\_8 | GV\_UN\_30\_A | UN | GV | 1 |
| XSND58 | SNDSW\_MR2H | SNDSW | SNDSW | 1 |
| XALV89 | 2040\_\_D | NVARO | MLDR2 | 1 |
| SSALFPP5 | 501T231\_1 | AUSTRO | WEBBER | 1 |
| DHCKRNK5 | 6271\_\_A | EMSES | WGROB | 1 |
| SALAN\_28 | AIRLIN\_CABANI1\_1 | AIRLINE | CABANISS | 1 |
| SDTCR8 | DT\_GS\_32\_A | GS | DT | 1 |
| SHINDIL8 | PLESNTN\_TORDLO\_1 | TORDILLO | PLSNTOS | 1 |
| DALNRYS5 | 1627\_\_A | APOLLO | REAST | 1 |
| SGRIVE28 | 2040\_\_D | NVARO | MLDR2 | 1 |
| DMCSCDC8 | 3405\_\_B | TRIRA | IHFT2 | 1 |
| DBEEPAL8 | 43T365\_1 | FLATRO | PALEPE | 1 |
| SEMMEM28 | 6265\_\_A | EMSES | MRSDO | 1 |
| SALAN\_28 | AIRLIN\_B\_DAVI1\_1 | B\_DAVIS | AIRLINE | 1 |
| SJMCW\_D8 | FTW\_W\_DE\_1 | W\_DENT | FTWORTH | 1 |
| SN\_MNED8 | MCOLL\_\_NEDIN1\_1 | NEDIN | MCOLL\_RD | 1 |
| XSA2N58 | SANMIGL\_ATAL | SANMIGL | SANMIGL | 1 |
| DTOKJK\_5 | 260\_A\_1 | JEWET | SNG | 1 |
| DELMMAR5 | 293T304\_1 | CIBOLO | SCHERT | 1 |
| XMCS89 | 3160\_\_A | CDCSW | OKCLS | 1 |
| SCNRFOR5 | 568\_\_A | RYSSW | NEVADA | 1 |
| SSWDMGS8 | 6940\_\_C | SWTWR | ROSCO | 1 |
| DWH\_STP5 | AIRCO4\_NCARBI1\_1 | NCARBIDE | AIRCO4 | 1 |
| SSIGSAN8 | NCA\_SMTP\_1 | SANMTAP | NCALHMS | 1 |
| SNUELON8 | NUECES\_WHITE\_2\_1 | NUECES\_B | WHITE\_PT | 1 |
| DMARSKY5 | PAR\_TRI\_CNTY\_1 | PARKWA | F5 | 1 |
| DELMSAN5 | PAWNEE\_SPRUCE\_1 | CALAVERS | PAWNEE | 1 |
| SPHRCTR5 | RINRNG87\_A | RNG | RIN | 1 |
| SBOSELM5 | WHTNY\_MR2L | WHTNY | WHTNY | 1 |
| DHILELM5 | 293T304\_1 | CIBOLO | SCHERT | 1 |
| XWL2V58 | 3130\_\_B | INDST | CMPST | 1 |
| DFPPFAY5 | 500T231\_1 | WEBBER | BASTCI | 1 |
| XAN2A58 | 562\_\_B | MEMWT | VANAL | 1 |
| SSCLWF28 | 6560\_\_B | MRKLY | RICSW | 1 |
| DB\_DPHA8 | B\_DAVI\_RODD\_F1\_1 | B\_DAVIS | RODD\_FLD | 1 |
| DCBYRN28 | CV\_LH\_03\_A | LH | CV | 1 |
| DAUSSND5 | 1665\_\_A | TLRWT | HUTTO | 1 |
| XAN2A58 | 562\_\_D | PAYSW | MEMWT | 1 |
| SSANSAN8 | BIG\_FO\_PLEASA1\_1 | PLEASANT | BIG\_FOOT | 1 |
| DWH\_STP5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 1 |
| DWRNCRV8 | BT\_HL\_66\_A | BT | HL | 1 |
| SBATFRO8 | GARZA\_ROMA\_S1\_1 | GARZA | ROMA\_SW | 1 |
| SE4LEO8 | KARNES\_KENEDS1\_1 | KENEDSW | KARNESCI | 1 |
| BASE CASE | VALIMP | n/a | n/a | 1 |
| SSALSND8 | 1666\_\_B | GILLCR | PFLGV | 1 |
| SMCEABS8 | 6780\_\_A | ESKSW | LONGWRTH | 1 |
| SPHRCTR5 | ATKRIN87\_A | RIN | ATK | 1 |
| XO3B58 | BETHK\_66\_A | HK | BET | 1 |
| SE3X28 | PLESNTN\_TORDLO\_1 | TORDILLO | PLSNTOS | 1 |
| DPBSHLT8 | 6480\_\_B | ECTHP | PBSES | 1 |