

December 2016 ERCOT Monthly Operations Report

Reliability and Operations Subcommittee Meeting

February 2nd, 2016

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# Report Highlights

* The unofficial ERCOT peak for December was 57,968 MW.
* There were two frequency events in December. PMU data indicates the ERCOT system transitioned well in each case.
* There were two instances where Responsive Reserves were deployed, one of which was the result of a frequency event.
* There were no RUC commitments in December.
* The level of reportable SCED congestion decreased in December. This congestion was mostly due to planned outages. There were twenty-five instances over 20 days on the Generic Transmission Constraints (GTCs) in December. There were fifteen days on the Panhandle GTC and ten days on the Liston GTC in December. There was no activity on the remaining GTCs during the Month.
* There were no application issues to report for December.

# Frequency Control

## Frequency Events

The ERCOT Interconnection experienced two frequency events in December, all of which resulted from Resource trips. The average event duration was approximately 0:04:05.

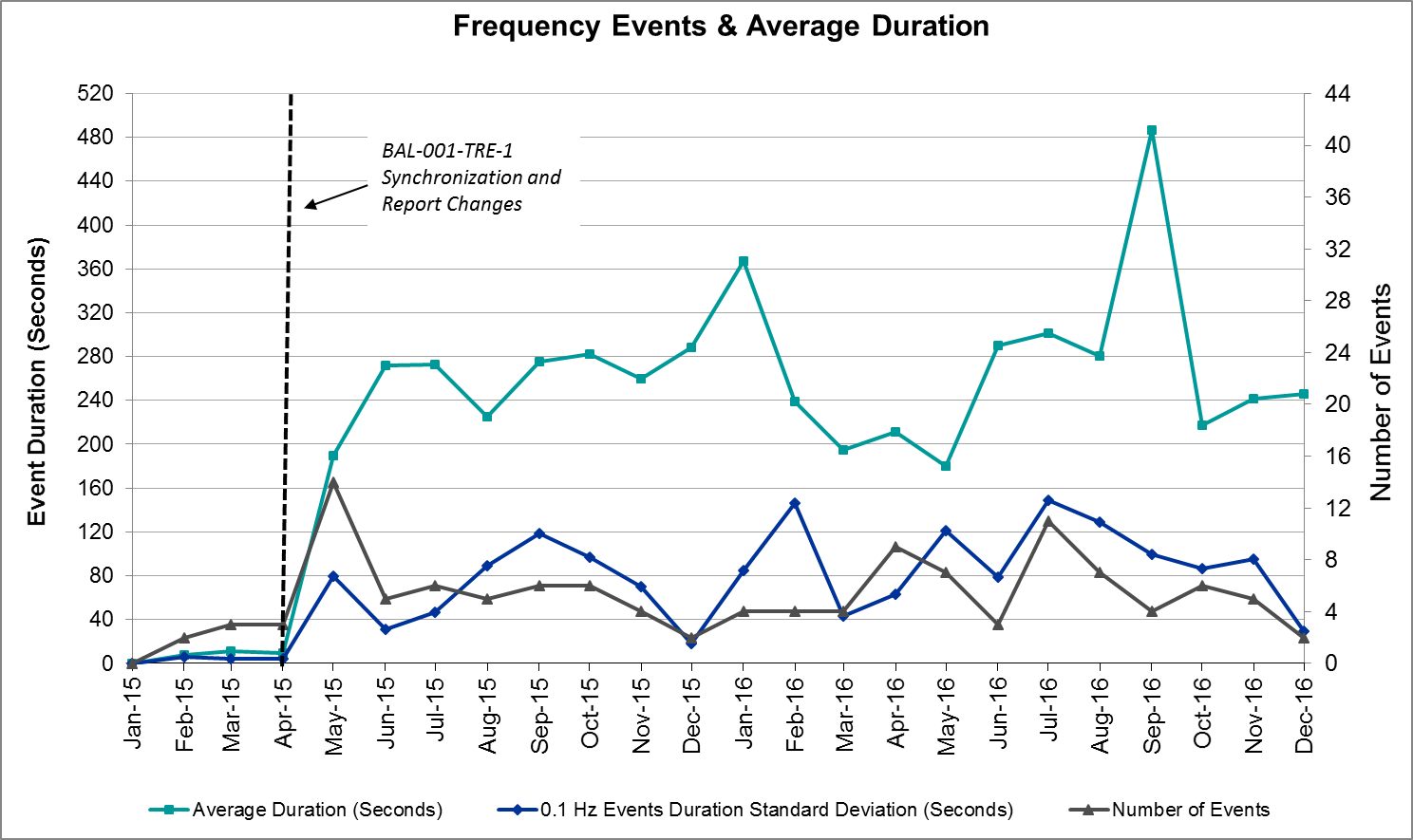
When analyzing frequency events, ERCOT evaluates PMU data according to industry standards. Events with an oscillating frequency of less than 1 Hz are considered to be inter-area, while higher frequencies indicate local events. Industry standards specify that damping ratio for inter-area oscillations 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)** |  | |
| 12/23/2016 16:54 | 0.100 | 59.87 | 0:04:26 | 0.76 | 13% | 36,671 | | 14% | 196.710 | | Unit Trip of 570MW |
| 12/28/2016 10:06 | 0.052 | 59.87 | 0:03:45 | No PMU Data Available. | | 35,616 | | 19% | 197.118 | | Unit Trip of 415MW |

\*Currently, the Critical Inertia Level for ERCOT appears to be around 100 GW-s ([link](http://www.ercot.com/content/wcm/key_documents_lists/77622/06.__Inertia_Background_for_ROS.pptx))

(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

There were two events where Responsive Reserve MWs were released to SCED in December. 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** |
| 12/23/2016 16:54:13 | 12/23/2016 16:57:44 | 0:03:31 | 469.44 |  |
| 12/28/2016 10:06:28 | 12/28/2016 10:10:52 | 0:04:24 | 775.95 |  |

## Load Resource Events

None.

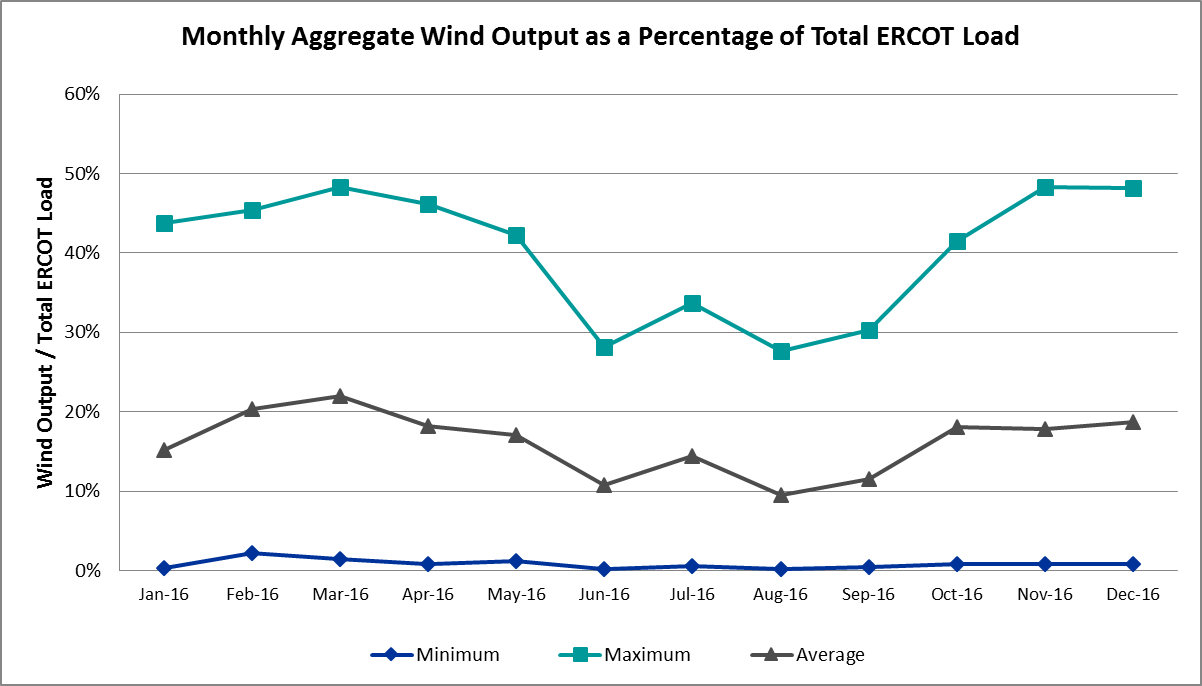
# Reliability Unit Commitment

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 December.

There were no HRUC commitments in December.

# Wind Generation as a Percent of Load



# Congestion Analysis

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

## Notable Constraints for December

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 December, please see Appendix A at the end of this report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency Name** | **Overloaded Element** | **# of Days Constraint Active** | **Congestion Rent** | **Transmission Project** |
|
| Basecase | Panhandle GTC | 25 | $5,159,849.84 | Panhandle Upgrade |
| Hicks Switch - Alliance & Roanoke Switch 345 kV | Eagle Mountain Ses - Morris Dido 138kV | 3 | $3,540,816.14 | 4252 |
| Hicks Switch - Alliance & Roanoke Switch 345 kV | Wagley Robertson - Summerfield 138kV | 2 | $2,216,780.97 |  |
| DKCT Roans Prarie-Rothwood & Singleton-Tomball 345kV | Singleton - Zenith 345kV | 3 | $1,753,444.11 | Houston Import Project |
| Carrolton Northwest - Lewisville Switch 345 kV | Carrollton Northwest - Lakepointe Tnp 138kV | 7 | $1,277,369.54 | 5488 |
| Carrolton Northwest - Lewisville Switch 345 kV | Ti Tnp - West Tnp 138kV | 4 | $947,958.58 |  |
| Carrolton Northwest - Lewisville Switch 345 kV | Lewisville Switch - Jones Street Tnp 138kV | 5 | $589,172.37 |  |
| DCKT Sandow Switch - Austrop 345kV | Howard Lane Tap - Howard Lane Aen 138kV | 16 | $574,750.29 |  |
| Mercers Gap Sw to Comanche Switch (Oncor) 138 kV | Holder FMR1 138/69kV | 18 | $557,719.28 |  |
| Loyola Sub to Kleberg Aep 138 kV | Loyola Sub 69\_1 138/69kV | 7 | $527,897.44 |  |
| Jardin to Cotulla Sub 138 kV | Dilley Switch Aep - Cotulla Sub 69kV | 4 | $503,779.18 | 5222 |
| DCKT Jewett - Singleton 345 kV | Btu\_Jack\_Creek - Twin Oak Switch 345kV | 5 | $330,958.44 | Houston Import Project |
| DCKT Gibbons Creek - Singleton 345 kV | Jewett - Singleton 345kV | 3 | $215,811.77 | Houston Import Project |
| Laquinta - Lobo 138 kV | Bruni Sub 69\_1 138/69kV | 9 | $215,520.95 | 5529 |
| Basecase | Liston GTC | 13 | $207,335.26 | 5171 |
| Fppyd1-Salem & Fayett 345kV | Smithville - Winchester 138kV | 3 | $188,671.42 | 5272 |
| Mercers Gap Sw to Comanche Switch (Oncor) 138 kV | Camp Bowie (Oncor) - Brownwood Switch 138kV | 6 | $133,937.21 | 5713 |
| Barrilla to Solstice 138 kV | Barrilla - Fort Stockton Switch 69kV | 5 | $120,012.04 |  |
| DCKT Whitepint - Lon Hill and South Texas Project 345 kV | Blessing - Lolita 138kV | 3 | $114,464.00 |  |
| Liston to Bates 138 kV | Garza - Roma Switch 138kV | 6 | $110,425.83 | 5171 |
| Twinbu-Dvide 345kV | Nicole - Orient 138kV | 3 | $26,983.65 |  |
| Sandow Switch - Austrop 345 kV | Sandow Switch - Austrop 345kV | 4 | $16,480.23 | 5625 |
| Uvalde Aep - Odlaw Switchyard 138 kV | Hamilton Road - Maverick 138kV | 4 | $13,966.44 | 16TPIT0024 |
| Markley (Oncor) to Rice Switch (2)138/138 kV | Navy Kickapoo Switch FMR1 138/69kV | 3 | $5,630.67 |  |
| Eskota Switch - Abilene South 138 kV | Eskota Switch - Longworth 69kV | 3 | $3,886.72 |  |

## Generic Transmission Constraint Congestion

There were fifteen days on the Panhandle GTC and ten days on the Liston GTC in December. 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 December

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 | 9,947 | $ 48,088,117.63 | 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 | 15,174 | $ 31,480,585.08 | 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 | 13,717 | $ 14,863,518.70 | Houston Import Project |
| Hcksw-Allnc&Rnksw 345kv | Eagle Mountain Ses - Morris Dido 138kV | 1,807 | $ 12,728,005.20 | 4252 |
| 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 | 2,113 | $ 9,455,517.12 |  |
| Hillctry-Marion&Elmcreek 345kv | Cibolo - Schertz 138kV | 1,308 | $ 7,775,371.11 | 5234 |
| Gibcrk-Sng 345 Kv | Jewett - Singleton 345kV | 1,332 | $ 7,555,045.65 | Houston Import Project |
| 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 |  |
| Crlnw-Lwssw 345kv | Carrollton Northwest - Lakepointe Tnp 138kV | 3,122 | $ 5,071,746.67 | 5488 |
| Hcksw-Allnc&Rnksw 345kv | Rosen Heights Tap 2 - Morris Dido 138kV | 805 | $ 5,063,292.44 | 4252 |

# System Events

## ERCOT Peak Load

The unofficial ERCOT peak load for the month was 57,968 MW and occurred on December 19th during hour ending 8:00.

## 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 December.

## TRE/DOE Reportable Events

None.

## New/Updated Constraint Management Plans

* MP\_2016\_13

## New/Modified/Removed SPS

None.

## New Procedures/Forms/Operating Bulletins

ERCOT has revised the following procedure manuals, effective December 30, 2016.

|  |  |
| --- | --- |
| **Procedure Title** | **POB** |
| [Real-Time Desk](http://www.ercot.com/content/wcm/key_documents_lists/90055/Real_Time_Desk_Operating_Procedure.docx) | [766](http://www.ercot.com/content/wcm/pobs/115575/Power_Operations_Bulletin_766.doc) |
| [Resource Desk](http://www.ercot.com/content/wcm/key_documents_lists/90055/Reliability_Unit_Commitment_Desk_Operating_Procedure.docx) | [767](http://www.ercot.com/content/wcm/pobs/115579/Power_Operations_Bulletin_767.doc) |
| [Shift Supervisor Desk](http://www.ercot.com/content/wcm/key_documents_lists/90055/Shift_Supervisor_Desk_Operating_Procedure.docx) | [768](http://www.ercot.com/content/wcm/pobs/115583/Power_Operations_Bulletin_768.doc) |
| [Transmission & Security Desk](http://www.ercot.com/content/wcm/key_documents_lists/90055/Transmission_and_Security_Desk_Operating_Procedure.docx) | [769](http://www.ercot.com/content/wcm/pobs/115586/Power_Operations_Bulletin_769.doc) |

# Emergency Conditions

## OCNs

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 12/07/16 10:37 | OCN issued due to freezing temperatures. |
| 12/15/16 17:02 | OCN issued due to freezing temperatures. |

## Advisories

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 12/16/16 16:29 | Advisory issued due to extreme cold weather. |
| 12/26/16 14:30 | Advisory issued due to Physical Responsive Capability being below 3000 MW. |
| 12/27/16 11:40 | Advisory issued due to Physical Responsive Capability being below 3000 MW. |

## Watches

None.

## Emergency Notices

None.

# Application Performance

## TSAT/VSAT Performance Issues

None.

## Communication Issues

None.

## Market System Issues

None.

# Appendix A: Real-Time Constraints

The following is a complete list of constraints activated in SCED for the month of December. 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 | 25 |
| SZEPCMN8 | HLD\_FMR1 | HLD | HLD | 18 |
| DAUSSND5 | HWRDLN\_1 | HWRDTP | HWRDLN | 16 |
| BASE CASE | LISTON | n/a | n/a | 13 |
| SLAQLOB8 | BRUNI\_69\_1 | BRUNI | BRUNI | 9 |
| DCRLLSW5 | 591\_\_A | LKPNT | CRLNW | 7 |
| SKLELOY8 | LOYOLA\_69\_1 | LOYOLA | LOYOLA | 7 |
| SLISBAT8 | GARZA\_ROMA\_S1\_1 | GARZA | ROMA\_SW | 6 |
| SZEPCMN8 | 670\_\_B | BRNSW | CMPBW | 6 |
| SBARSOL8 | BARL\_FTSW1\_1 | FTSW | BARL | 5 |
| DCRLLSW5 | 590\_\_A | LWSSW | LWVJS | 5 |
| DJEWSNG5 | JK\_TOKSW\_1 | TOKSW | JK\_CK | 5 |
| SSNDAU15 | 450\_\_A | SNDSW | AUSTRO | 4 |
| SBRAUVA8 | HAMILT\_MAVERI1\_1 | HAMILTON | MAVERICK | 4 |
| SJARDIL8 | DIL\_COTU\_1 | DILLEYSW | COTULAS | 4 |
| DCRLLSW5 | 588\_A\_1 | LWSVW | LWVTI | 4 |
| DWH\_STP5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 3 |
| SMCEABS8 | 6780\_\_A | ESKSW | LONGWRTH | 3 |
| DRNS\_TB5 | SNGZEN99\_A | SNG | ZEN | 3 |
| DTWIDIV5 | NICOLE\_ORNT1\_1 | NICOLE | ORNT | 3 |
| DHCKRNK5 | 6265\_\_A | EMSES | MRSDO | 3 |
| BASE CASE | RANDAD\_ZAPATA1\_1 | RANDADO | ZAPATA | 3 |
| SSCLWF18 | NVKSW\_FMR1 | NVKSW | NVKSW | 3 |
| DGIBSNG5 | 260\_A\_1 | JEWET | SNG | 3 |
| DFPPFAY5 | 192T175\_1 | SMITHV | WINCHE | 3 |
| SBRAUVA8 | EAGLHY\_ESCOND1\_1 | EAGLHYTP | ESCONDID | 2 |
| SCENLOB5 | GARZA\_ROMA\_S1\_1 | GARZA | ROMA\_SW | 2 |
| DHCKRNK5 | 6271\_\_C | WGROB | SUMRFELD | 2 |
| DMARZOR5 | 459T459\_1 | KENDAL | CAGNON | 2 |
| SILLFTL8 | CTHR\_SONR1\_1 | SONR | CTHR | 2 |
| DBIGKEN5 | FRIR\_ROCKSP1\_1 | FRIR | ROCKSPRS | 2 |
| DDILCOT8 | DIL\_COTU\_1 | COTULAS | DILLEYSW | 2 |
| BASE CASE | SNYDER\_WKN\_BK1\_1 | ENAS | WKN\_BKR | 1 |
| DFPPFAY5 | 190T152\_1 | GIDEON | WINCHE | 1 |
| SN\_SLON5 | LOYOLA\_69\_1 | LOYOLA | LOYOLA | 1 |
| SRICGRS8 | 6840\_\_A | ANARN | CRDSW | 1 |
| SVICCO28 | COLETO\_VICTOR2\_1 | COLETO | VICTORIA | 1 |
| SBEVASH8 | BIG\_COTU\_1 | COTULAS | BIGWELS | 1 |
| SMGIENW8 | TRU\_UAT1 | TRU | TRU | 1 |
| DSTPWHI5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 1 |
| SRICGRS8 | 6840\_\_B | NVKSW | ANARN | 1 |
| SMGIENW8 | 921\_\_D | ENSSW | TRU | 1 |
| SPATDCR8 | BOW\_FMR1 | BOW | BOW | 1 |
| DELMSAN5 | COLETO\_KENEDS1\_1 | COLETO | KENEDSW | 1 |
| DWHIHEC8 | RINCON\_WHITE\_2\_1 | WHITE\_PT | RINCON | 1 |
| SMDLODE5 | 6475\_\_C | ODEHV | TROTP | 1 |
| SADALAM8 | 663\_\_A | MGPSW | CMNSW | 1 |
| DRYSFOR5 | FORSW\_MR3H | FORSW | FORSW | 1 |
| DMARSKY5 | 293T304\_1 | CIBOLO | SCHERT | 1 |
| DAUSSND5 | 211T147\_1 | GILLCR | MCNEIL\_ | 1 |
| SSCLWF18 | 6840\_\_B | NVKSW | ANARN | 1 |
| SFORYEL8 | FORTMA\_MASN1\_1 | FORTMA | MASN | 1 |
| DGBY\_KG5 | GBYUV\_03\_A | GBY | UV | 1 |
| DRIOHAR5 | BURNS\_RIOHONDO\_1 | RIOHONDO | MV\_BURNS | 1 |
| SCOLBAL8 | SANA\_FMR1 | SANA | SANA | 1 |
| SRDODES8 | 940\_\_C | ENWSW | WXHCH | 1 |
| SMCEABS8 | ROBY\_RONDTP1\_1 | ROBY | RONDTPT | 1 |
| BASE CASE | LGD\_SANTIA1\_1 | LGD | SANTIAGO | 1 |
| SLOBSA25 | NLARSW\_PILONC1\_1 | NLARSW | PILONCIL | 1 |