

February 2016 ERCOT Monthly Operations Report

Reliability and Operations Subcommittee Meeting April 7th, 2016

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# Report Highlights

* The unofficial ERCOT peak for February was 47,421 MW.
* There were four frequency events in February. PMU data indicates the ERCOT system transitioned well in each case.
* There were four instances where Responsive Reserves were deployed, three of which were the result of frequency events.
* There were six RUC commitments in February.
* The level of reportable SCED congestion increased in February. This congestion was due primarily to planned outages and area load/gen patterns. There were thirty-three instances of activity distributed over 24 days on the Generic Transmission Constraints (GTCs) in February. This included twenty-four days on the Liston GTC, five days on the Panhandle GTC and for days of activity on the Zorillo – Ajo GTC.
* There were no significant system events for the month of February.
* ERCOT Applications performed well throughout the month. There were no ERCOT related application performance issues.

# Frequency Control

## Frequency Events

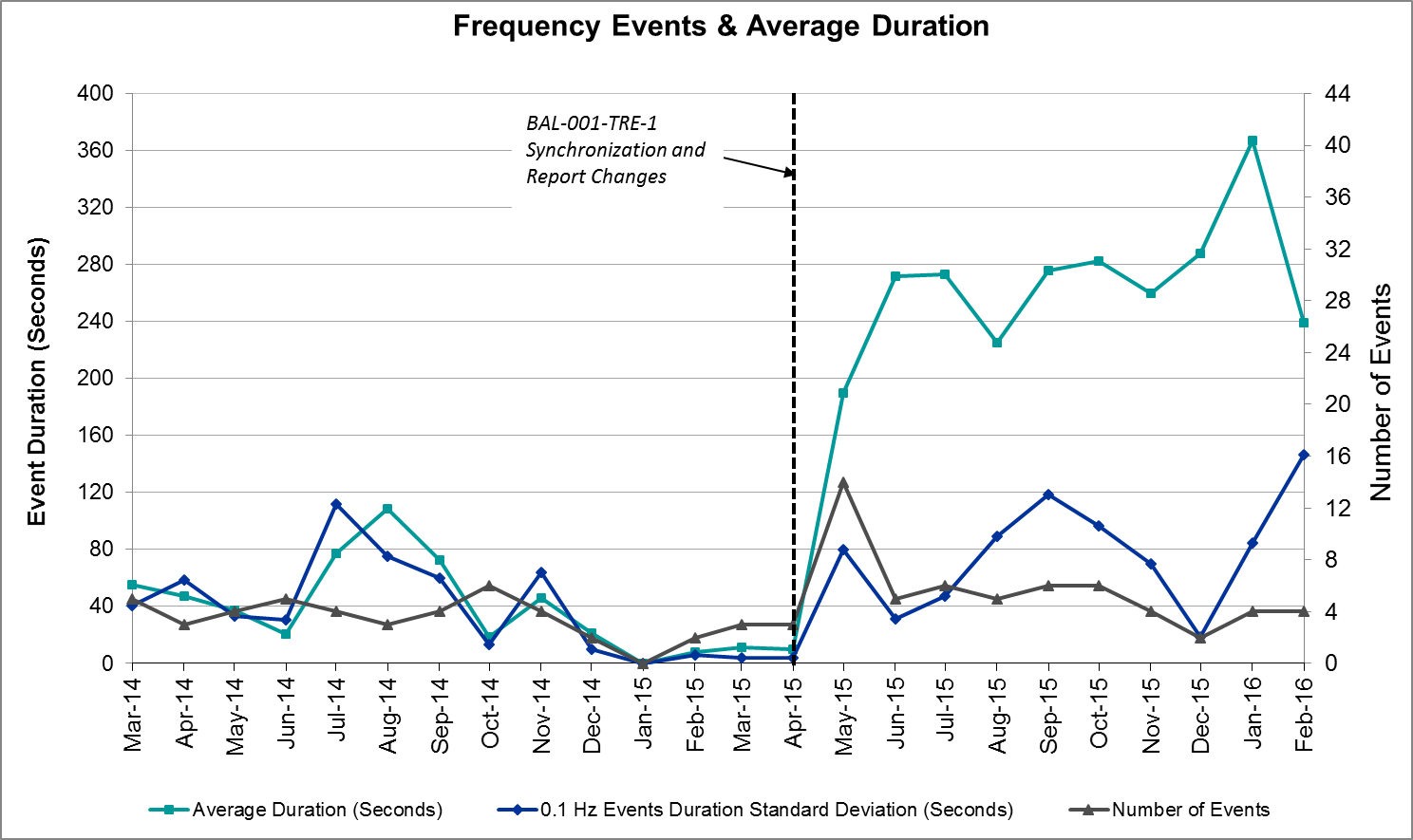
The ERCOT Interconnection experienced four frequency events in February, all of which resulted from Resource trips. The average event duration was approximately 0:03:59.

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)** |
| 2/2/2016 12:17 | 0.068 | 59.92 | 0:07:24 | PMU Data Not Available. | | 37,089 | 3.39% | 207,525 | Unit Trip of 375 MW |
| 2/11/2016 21:09 | 0.051 | 59.90 | 0:04:04 | PMU Data Not Available. | | 34,385 | 7.23% | 224,912 | Unit Trip of 385 MW |
| 2/18/2016 21:07 | 0.062 | 59.85 | 0:02:02 | PMU Data Not Available. | | 38,105 | 17.63% | 206,696 | Unit Trip of 468 MW |
| 2/21/2016 20:54 | 0.041 | 59.87 | 0:02:26 | 0.73 | 8% | 36,862 | 10.56% | 240,843 | Unit Trip of 343 MW |

(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 four events where Responsive Reserve MWs were released to SCED in February. 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** |
| 2/11/2016 21:09:30 | 2/11/2016 21:12:38 | 0:03:08 | 299.49 |  |
| 2/18/2016 21:07:50 | 2/18/2016 21:09:54 | 0:02:04 | 558.52 |  |
| 2/19/2016 22:01:38 | 2/19/2016 22:07:46 | 0:06:08 | 551.48 | RRS deployed after frequency declined to 59.89Hz due to units shutting down faster than their telemetered Ramp Rate. |
| 2/21/2016 20:54:46 | 2/21/2016 20:57:14 | 0:02:28 | 601.44 |  |

## Load Resource Events

There were no load resource deployment events in February.

# 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 February.

There were six HRUC commitments in February.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **HRUC Commitments** | | | | | |
| **Resource Location** | **# of Resources** | **Operating Day** | **Total # of Hours Committed** | **Total MWhs** | **Reason for Commitment** | |
| Southern | 1 | 2/5/2016 | 4 | 172 | Local Congestion | |
| Southern | 1 | 2/15/2016 | 8 | 316 | Local Congestion | |
| Southern | 1 | 2/16/2016 | 1 | 41 | Local Congestion | |
| Southern | 1 | 2/17/2016 | 9 | 350 | Local Congestion | |
| Southern | 1 | 2/23/2016 | 5 | 205 | Local Congestion | |
| Southern | 1 | 2/27/2016 | 14 | 4879 | Local Congestion | |

# Wind Generation as a Percent of Load



# Congestion Analysis

The number of congestion events experienced by the ERCOT system increased in February due to planned outages and area load/gen patterns. There were thirty-three instances of activity distributed over 24 days on the Generic Transmission Constraints (GTCs) in February.

## Notable Constraints for February

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Contingency** | **Overload** | **# of Days Constraint Active** | **Estimated Congestion Rent** | **Transmission Project** |
| Hicks Switch - Alliance & Roanoke Switch 345 kV | Eagle Mountain Ses - Morris Dido 138 kV | 9 | $4,287,264.81 | 4252 |
| Villa Cavazos - Military Highway Aep 138 kV | Los Fresnos - Loma Alta Substation 138 kV | 9 | $3,618,579.29 |  |
| Rosen Heights - Eagle Mountain Compressor 138 kV | Rosen Heights Tap 2 - Morris Dido 138 kV | 1 | $1,532,549.18 | 4252 |
| Lon Hill - North Edinburg 345 kV and Orange Grove Switching Station 138 kV | Javalina Tap - Molina 138 kV | 24 | $1,412,270.49 | 4401 |
| Basecase | Liston GTC | 27 | $662,974.65 |  |
| Twinbu -Dvide 345 kV | Nicole - Orient 138 kV | 4 | $601,479.63 |  |
| Sweetwater Downtown - Haynes Substation 138 kV | Eskota Switch - Trent 69 kV | 5 | $487,083.72 |  |
| Carrolton Northwest - Lewisville Switch 345 kV | Carrollton Northwest - Lakepointe Tnp 138 kV | 8 | $463,891.69 | 2013 to 2015 RTP |
| Adamsville - Evant 138 kV | Goldthwaite 9AT2 138/69 kV | 10 | $436,453.76 |  |
| Basecase | Rio Hondo - East Rio Hondo Sub 138 kV | 20 | $395,562.17 | 2014-S16 |
| Basecase | Zorillo to Ajo GTC | 10 | $355,032.68 | LRGV Import Project |
| Lon Hill - North Edinburg 345 kv and Orange Grove Switching Station 138 kV | Airco Aep - Rincon 138 kV | 19 | $338,292.52 | 08TPIT0132 |
| Basecase | Panhandle GTC | 6 | $320,051.32 |  |
| Nelson Sharpe - Lon Hill 345 kV | Javalina Tap - Molina 138 kV | 6 | $235,514.49 | 4401 |
| Laquinta - Lobo 138 kV | Bruni Sub 69\_1 138/69 kV | 18 | $200,779.21 |  |
| Ferguson - Granite Mountain and Wirtz - Starcke - Paleface 138 kV | Flat Rock Lcra - Wirtz 138 kV | 20 | $187,041.14 | 4465 |
| Bluff Creek T2 345/138 kV | Bluff Creek T1\_H 345/34.5/138 kV | 13 | $154,265.72 |  |
| Loyola Sub to Kleberg Aep 138 KV | Loyola Sub 69\_1 138/69kV | 5 | $146,305.18 |  |
| Mercers Gap Sw - Comanche Switch 138 kV | Camp Bowie - Brownwood Switch 138 kV | 6 | $100,032.29 |  |
| Laquinta - Lobo 138 kV | Javalina Tap - Molina 138 kV | 6 | $71,748.08 | 4401 |
| Uvalde Aep - Odlaw Switchyard 138 kV | Hamilton Road - Maverick 138 kV | 6 | $67,126.68 | 16TPIT0024 |
| Lon Hill - North Edinburg 345 kV and Orange Grove Switching Station 138 kV | Edroy - Smith 69 kV | 7 | $49,642.13 |  |
| Falcon Switch Station - Roma Switch 138 kV | Javalina Tap - Molina 138 kV | 7 | $43,838.20 | 4401 |
| Basecase | Wkn\_Bkr - Ena Snyder Wind 69 kV | 14 | $41,637.55 |  |
| Bosque Switch - Elm Mott 345 kV | Bosque Switch - Rogers Hill Bepc 138 kV | 9 | $28,742.16 | 4356 |
| Bighil-Kendal 345 kV | Rocksprings - Friess Ranch 69 kV | 5 | $11,384.39 |  |
| Sandow Switch - Austrop 345 kV | Sandow Switch - Austrop 345 kV | 5 | $4,360.96 | 4477 |

## Generic Transmission Constraint Congestion

There were four days of activity on the Zorillo – Ajo GTC, five days on the Panhandle GTC, and twenty-four days on the Liston GTC in February. There was no activity on the remaining GTCs during the Month of February.

## Manual Overrides for February

There were no manual overrides for the month of February 2016.

## 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** |
| Villa Cavazos - Military Highway Aep 138 kV | Los Fresnos - Loma Alta Substation 138 kV | 1124 | $9,639,876.41 |  |
| Hicks Switch - Alliance & Roanoke Switch 345 kV | Eagle Mountain Ses - Morris Dido 138 kV | 792 | $4,287,264.81 | 4252 |
| DCKT Lon Hill - North Edinburg 345 kV and Orange Grove Switching Station 138 kV | Javalina Tap - Molina 138 kV | 2958 | $2,232,654.37 | 4401 |
| Carrolton Northwest - Lewisville Switch 345 kV | Carrollton Northwest - Lakepointe Tnp 138 kV | 1012 | $1,661,412.39 | 2013 to 2015 RTP |
| Rosen Heights - Eagle Mountain Compressor 138 kV | Rosen Heights Tap 2 - Morris Dido 138 kV | 127 | $1,532,549.18 | 4252 |
| Gibbons Creek - Singleton 345 kV | Jewett - Singleton 345 kV | 998 | $1,065,468.33 | 4485, 3937, 3950 (a,b) |
| Basecase | Liston GTC | 3899 | $889,275.17 |  |
| Bluff Creek T2 345/138 kV | Bluff Creek T1\_H 345/34.5/138 kV | 1525 | $831,801.07 |  |
| Adamsville - Evant 138 kV | Goldthwaite 9AT2 138/69 kV | 974 | $729,771.28 |  |
| Lon Hill - North Edinburg 345 kV and Orange Grove Switching Station 138 kV | Airco Aep - Rincon 138 kV | 2478 | $654,284.07 | 08TPIT0132 |
| Basecase | Rio Hondo - East Rio Hondo Sub 138 kV | 3721 | $642,217.70 | 2014-S16 |
| Twinbu - Dvide 345 kV | Nicole - Orient 138 kV | 570 | $601,479.63 |  |
| Laquinta - Lobo 138 kV | Bruni Sub 69\_1 138/69 kV | 2240 | $563,381.03 |  |
| Wichita Falls Axfmr1 138/69 kV | Lake Wichita Switch - Wichita Falls 69 kV | 82 | $555,087.20 | Lake Wichita Switch - Wichita Falls Switch 69 kV line |
| Pawnee Switching Station - Lon Hill 345 kV | Javalina Tap - Molina 138 kV | 540 | $492,667.88 | 4401 |
| Sweetwater Downtown - Haynes Substation 138 kV | Eskota Switch - Trent 69 kV | 480 | $487,083.72 |  |
| Basecase | Zorillo - Ajo GTC | 956 | $454,747.90 | LRGV Import Project |
| Nelson Sharpe - Lon Hill 345 kV | Javalina Tap - Molina 138 kV | 588 | $420,400.46 | 4401 |
| Carrolton Northwest - Lewisville Switch 345 kV | Lewisville Switch - Jones Street Tnp 138 kV | 100 | $414,275.97 | 4282 |
| Sulphur Springs Switch Axfmr1l 345/138 kV | Forest Grove Switch - Eustace Southeast 138 kV | 91 | $396,518.36 | 4820 |

# System Events

## ERCOT Peak Load

The unofficial ERCOT peak load for the month was 47,421 MW and occurred on February 4th during hour ending 08:00.

## 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 February.

## TRE/DOE Reportable Events

None.

## New/Updated Constraint Management Plans

None.

## New/Modified/Removed SPS

None.

## New Procedures/Forms/Operating Bulletins

* Reliability Unit Commitment Desk V1 Rev33
* Transmission and Security Desk V1 Rev43
* Resource Desk V1 Rev40

# Emergency Conditions

## OCNs

None.

## Advisories

|  |  |
| --- | --- |
| **Date and Time** | **Description** |
| 2/17/16 13:29 | ERCOT issued an Advisory due to postponement deadline for posting DAM solution, delayed due to long solution run time. |

## Watches

None.

## Emergency Notices

None.

# Application Performance

ERCOT system applications performed well in February. There were no issues to report.

## 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 February. 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** |
| DHCKRNK5 | 6265\_\_A | EMSES | MRSDO | 9 |
| SVCAMIL8 | LOMA\_A\_L\_FRES1\_1 | L\_FRESNO | LOMA\_ALT | 9 |
| SRSNEMS8 | 6265\_\_D | MRSDO | RHTP2 | 1 |
| DLONOR58 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 24 |
| BASE CASE | LISTON |  |  | 27 |
| DTWIDIV5 | NICOLE\_ORNT1\_1 | NICOLE | ORNT | 4 |
| SSWDMGS8 | 6585\_\_A | ESKSW | TRNT | 5 |
| DCRLLSW5 | 591\_\_A | LKPNT | CRLNW | 8 |
| SADALAM8 | GOLDTH\_9AT2 | GOLDTH | GOLDTH | 10 |
| BASE CASE | RIOHND\_ERIOHND\_1 | MV\_RIOHO | RIOHONDO | 20 |
| BASE CASE | ZO\_AJO |  |  | 10 |
| DLONOR58 | AIRCO4\_RINCON1\_1 | RINCON | AIRCO4 | 19 |
| BASE CASE | PNHNDL |  |  | 6 |
| SN\_SAJO5 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 6 |
| SLAQLOB8 | BRUNI\_69\_1 | BRUNI | BRUNI | 18 |
| DFERPAL8 | 38T365\_1 | WIRTZ | FLATRO | 20 |
| XBL2U58 | BLUF\_CRK\_T1\_H | BLUF\_CRK | BLUF\_CRK | 13 |
| SKLELOY8 | LOYOLA\_69\_1 | LOYOLA | LOYOLA | 5 |
| SSONFRI8 | FDR\_OZNC\_1 | FRIEND\_R | OZNC | 1 |
| DELMSAN5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 3 |
| DBIGKEN5 | CTHR\_SONR1\_1 | SONR | CTHR | 4 |
| SZEPCMN8 | 670\_\_B | BRNSW | CMPBW | 6 |
| DGIBSNG5 | 260\_A\_1 | JEWET | SNG | 2 |
| SLAQLOB8 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 6 |
| SBRAUVA8 | HAMILT\_MAVERI1\_1 | HAMILTON | MAVERICK | 6 |
| SCREBRU8 | BRUNI\_69\_1 | BRUNI | BRUNI | 2 |
| DLONOR58 | EDROY\_SMITH1\_1 | SMITH | EDROY | 7 |
| DSTPWHI5 | BLESSI\_LOLITA1\_1 | BLESSING | LOLITA | 1 |
| SFALROM8 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 7 |
| BASE CASE | SNYDER\_WKN\_BK1\_1 | ENAS | WKN\_BKR | 14 |
| DFL\_MAR8 | HK\_TB\_66\_A | TB | HK | 2 |
| DCLEZOR5 | 87T233\_1 | MCCALA | HENNE | 2 |
| SN\_SLON5 | LOYOLA\_69\_1 | LOYOLA | LOYOLA | 1 |
| SBOSELM5 | 1030\_\_B | BOSQUESW | RGH | 9 |
| BASE CASE | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 6 |
| SSARBLU5 | NICOLE\_ORNT1\_1 | NICOLE | ORNT | 2 |
| SNICBLU8 | NICOLE\_ORNT1\_1 | NICOLE | ORNT | 2 |
| DRIOHAR5 | S104A\_1 | RIOHONDO | MV\_BURNS | 1 |
| DSTPWHI5 | BLESSI\_PALACI1\_1 | BLESSING | PALACIOS | 1 |
| SBRAUVA8 | EAGLHY\_ESCOND1\_1 | EAGLHYTP | ESCONDID | 4 |
| DLONOR58 | SND\_ORAN\_1 | SNDIEGS | ORNGROV | 1 |
| SILLFTL8 | CTHR\_SONR1\_1 | SONR | CTHR | 1 |
| DBIGKEN5 | FRIR\_ROCKSP1\_1 | FRIR | ROCKSPRS | 5 |
| SGLDSUN8 | ECRSW\_FMR1 | ECRSW | ECRSW | 1 |
| SLISBAT8 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 1 |
| SLAQLOB8 | FALFUR\_69A1 | FALFUR | FALFUR | 1 |
| SROMROM8 | BATES\_LISTON1\_1 | LISTON | BATES | 1 |
| SCLCGRS8 | 6635\_\_B | LENSW | ESTTP | 2 |
| BASE CASE | ANA\_LINE\_1 | ANACACHO | ODLASW | 1 |
| SSNDAU15 | 450\_\_A | SNDSW | AUSTRO | 5 |
| DFERPAL8 | 318T313\_1 | WIRTZ | JOHNCI | 1 |
| SBRTORA8 | 6560\_\_E | SCTLD | WFSSW | 1 |
| XBLU58 | BLUF\_CRK\_T2\_H | BLUF\_CRK | BLUF\_CRK | 2 |
| S127STA8 | 6144\_\_A | STASW | BSPRW | 1 |
| DCLEZOR5 | 86T235\_1 | HENNE | COMAL | 1 |
| SPAWLON5 | AIRCO4\_RINCON1\_1 | RINCON | AIRCO4 | 1 |
| BASE CASE | LENSW\_PUTN2\_1 | PUTN | LENSW | 1 |
| SFRIFTL8 | MIDW\_OZNA1\_1 | OZNA | MIDW | 1 |
| DLONOR58 | BONIVI\_RINCON1\_1 | RINCON | BONIVIEW | 1 |
| DMARPA\_8 | 38T365\_1 | WIRTZ | FLATRO | 2 |
| SSCUSUN8 | ROTN\_WOLFGA1\_1 | WOLFGANG | ROTN | 4 |
| DLONOR58 | EDROY\_MATHIS1\_1 | EDROY | MATHIS | 1 |
| DFERCOR8 | SANDCR\_AT1 | SANDCR | SANDCR | 1 |
| XBL2U58 | BLUF\_CRK\_T1\_L | BLUF\_CRK | BLUF\_CRK | 1 |
| SPAWLON5 | BONIVI\_RINCON1\_1 | RINCON | BONIVIEW | 1 |
| SPAWSAN5 | PAWNEE\_XF1 | PAWNEE | PAWNEE | 1 |
| SSCJFS8 | CRNJFS94\_A | JFS | CRN | 1 |
| SGOOFRO8 | BATES\_LISTON1\_1 | LISTON | BATES | 1 |
| DCLEZOR5 | 89T204\_1 | ZORN | HENNE | 1 |
| SL\_FLA\_8 | LA\_PAL\_VCAVAZ1\_1 | LA\_PALMA | VCAVAZOS | 1 |
| SNEDLON5 | JAVALT\_MOLINA1\_1 | JAVALTAP | MOLINA | 2 |
| SBTECH25 | BTE\_AT-2 | BTE | BTE | 1 |
| SCRDLOF9 | BOW\_FMR1 | BOW | BOW | 1 |
| SGARROM8 | GARZA\_69A1 | GARZA | GARZA | 1 |
| DSTPWHI5 | VAN\_VNDB\_1 | VANBLT | VNDBLTS | 1 |
| DTWIDIV5 | ORNT\_REDCRE1\_1 | ORNT | REDCREEK | 1 |
| DHILELM5 | MAR\_SKY\_1 | MARION | SKYLINE | 1 |
| DLONOR58 | LASPUL\_RAYMND1\_1 | LASPULGA | RAYMND2 | 1 |
| SSWDMGS8 | 6585\_\_A | TRNT | ESKSW | 2 |
| DAUSSND5 | 211T147\_1 | GILLCR | MCNEIL\_ | 1 |
| SLULLOC8 | 124T157\_1 | LOCKHA | MAGNME | 1 |