

2011 REGIONAL STUDY - FINAL REPORT
DEEP SUB-COMMITTEE (DEEP)
COLORADO COORDINATED PLANNING GROUP (CCPG)

December 2011

STUDY PARTICIPANTS

The following entities were participants in the 2011 DEEP Study Plan. The DEEP Sub-Committee (DEEP SC) wishes to express its appreciation to the Transmission Planners providing support in the development of this study.

- Colorado Springs Utilities
- Black Hills Power
- Tri-State Generation & Transmission Association
- Public Service Company of Colorado
- Western Area Power Administration

BACKGROUND

The DEEP SC of the Colorado Coordinated Planning Group (CCPG) focuses on regional transmission planning in the Southern Front Range area of Colorado, and is defined by the general geographic area of Douglas, Elbert, El Paso and Pueblo Counties. The DEEP SC is included in the CCPG charter. A 2011 Study Plan was drafted and submitted for approval to the CCPG Oversight Committee at the CCPG meeting. The 2011 Study Plan as proposed and adopted is contained in Attachment A to this final report.

This report summarizes the 2011 Study Plan and completes the responsibilities of the DEEP SC to the CCPG as identified in the 2011 Study Plan. It is expected that the DEEP SC will continue to exist under the CCPG to fulfill its stated purposes.

PURPOSE AND NEED

No horizon year overloads were identified in the 2010 DEEP study. Overloads that had appeared in previous studies in the general area of the DEEP footprint were no longer

evident. Declining load projections and new, scheduled projects were the primary reasons.

It is expected however that with an improving economy load projections will again begin to increase. The potential also exists for new generation interconnects within and to the south of the DEEP footprint. Both of these factors mean that loading issues will probably reappear at some point in the future, and that there is a continuing need to monitor the region.

STUDY APPROACH

The WECC 21HS1A base case was modified by CCPG Transmission Planners (TP's) and a 2022HS case was created. The WECC 16HS1 base case was also modified by CCPG TP's, and a 2017HS case was created. Both of these cases were studied for the 2011 DEEP regional planning study. The 2011 study plan called for 2016 and 2021 heavy study cases. CCPG developed the 2017 and 2022 heavy summer cases for other purposes and consequently these were used for the 2011 DEEP study (this was discussed at the 4/27/2011 CCPG meeting).

The trend toward lower load forecasts over the past several years has resulted in fewer potential overload situations. The 2010 DEEP study evaluated Category A and B events. The 2011 study looked at Category A, B, and C events. Including Category C outages was an addition to the 2011 study plan. In order to include N-2 outages two subsystems were created for the DEEP area to better manage the large volume of results.

N-0 & N-1 POWER FLOW RESULTS

N-0 and N-1 load flow simulations were conducted on the modified 2017 and 2022 HS base cases to identify/quantify overloaded BES elements. Two bus subsystems were created for the DEEP area. Elements on selected buses were included in the contingencies and monitored for overloads. The DEEP North subsystem includes all 115 kV and higher voltage buses from roughly Waterton and Daniels Park to Midway and Taryall to Parker. The DEEP South subsystem includes CSU to Walsenburg and Poncha to Lamar. The CSU area including Midway and all 345 kV elements from Daniels Park to Comanche and east to Energy Center are in both subsystems. The bus subsystems are shown in Attachment D.

2017 Heavy Summer N-0 and N-1 Results

N-0 power flow simulation of the 2017 Heavy Summer base case revealed no overloaded BES elements within the DEEP footprint. N-1 power flow simulation revealed one overload within the DEEP footprint. No new voltage issues were identified (issues that are currently being studied by TP's are not discussed in this report).

The N-1 overload was a result of the loss of Comanche Unit 3 along with an assumed increase in generation west of Colorado. If the replacement power for Comanche 3 is generated in the Front Range area this overload is eliminated. No voltage issues were identified.

Outage	OVERLOADED ELEMENT	RATING OF ELEMENT (MW)	WORST CASE % OVERLOAD
COMANCHE 3	PONCHA TO SMELTER 115 KV	48	106.9

PSCo will review the Poncha to Smelter 115 kV line rating and loading.

2022 Heavy Summer N-0 and N-1 Results

N-0 and N-1 power flow simulation of the 2022 Heavy Summer base case revealed no new overloaded BES elements or voltage issues within the DEEP footprint.

Category C Outages

Category C outages were studied for both 2017 and 2022 Heavy Summer cases. All N-2 combinations of outages were included. The studies were run as if the N-1 events were simultaneous as a screening mechanism for Category C3. N-2 events with overloads greater than 30% or voltages less than 80% were then studied to see if there was a reasonable system adjustment to alleviate the overload or voltage problem. N-2 problems that appear to be specific to one utility or are potentially being resolved through other existing planned projects were not studied.

2017 Heavy Summer N-2 Results

The 2017 Heavy Summer N-2 results indicated one new overload above 30%. The WAPA Midway 230-115 kV auto transformer overloads up to 48% for one N-2 event (without adjustment).

Outage	OVERLOADED ELEMENT	RATING OF ELEMENT (MW)	WORST CASE % OVERLOAD
NIXON-MIDWAY 230 MIDWAY-FULLER 230	MIDWAY 230-115 TRANSFORMER (WAPA)	100	147.7

Three other overloads above 30% and several voltage issues were identified but are already being studied by TP's. The 2017 Heavy Summer summary is included in Attachment B.

2022 Heavy Summer N-2 Results

The 2022 Heavy Summer N-2 results indicated one new overload above 30%. The WAPA Midway 230-115 kV auto transformer overloads up to 42% for one N-2 event (without adjustment).

Outage	OVERLOADED ELEMENT	RATING OF ELEMENT (MW)	WORST CASE % OVERLOAD
NIXON-MIDWAY 230 MIDWAY-FULLER 230	MIDWAY 230-115 TRANSFORMER (WAPA)	100	142.2

Two other overloads above 30% and several voltage issues were identified but are already being studied by TP's. The 2022 Heavy Summer summary is included in Attachment C.

CONCLUSION

The WAPA Midway 230-115 kV auto transformer should be studied in 2012 by DEEP and potential joint solutions explored. System adjustments for the N-1-1 event potentially impact the PSCo Midway 230-115 kV auto transformer, the Tri-State Midway-Rancho 115 kV line, the BHE Desert Cove – West Station 115 kV line, and the CSU Nixon – Midway 230 kV and 115 kV lines.

ATTACHMENT A

DEEP SUB-COMMITTEE

2011 STUDY PLAN

Submitted to CCPG 1/26/2011

The DEEP Sub-Committee (DEEP SC) of the CCPG focuses on a regional transmission planning approach for the load serving transmission system in the general geographic area of Douglas, Elbert, El Paso and Pueblo Counties in the Southern Front Range of Colorado. Within this scope, and in accordance with the CCPG Charter, the DEEP SC submits this 2011 Study Plan to the CCPG Oversight Committee for approval.

GENERAL CONSTRUCT OF THE DEEP SUB-COMMITTEE

The DEEP SC is open to participation from all stakeholders. Meeting announcements, minutes, and other pertinent materials will be posted to the WestConnect web site under CCPG – DEEP Sub-Committee (www.westconnect.com). Stakeholders may obtain direct notification by submitting their contact information to the DEEP SC sub-committee chair:

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The following Transmission Planning organizations are participants in the DEEP SC:

- Colorado Springs Utilities
- Black Hills Corporation
- Public Service Company of Colorado
- Tri-State Generation and Transmission Association
- Western Area Power Administration

The focus of the DEEP SC does not include generator interconnection. The FERC Large Generator Interconnection Procedures govern this process, and parties interested in interconnection are referred to this process.

2011 STUDY PLAN

PURPOSE AND NEED

No horizon year overloads were identified in the 2010 DEEP study. Overloads that had appeared in previous studies in the general area of the DEEP footprint were no longer evident. Declining load projections and new, scheduled projects were the primary reasons.

It is expected however that with an improving economy load projections will again begin to increase. The potential also exists for new generation interconnects within and to the south of the DEEP footprint. Both of these factors mean that loading issues will probably reappear at some point in the future, and that there is a continuing need to monitor the region.

OBJECTIVES

The objective of the 2011 Study Plan is to study the DEEP area using the most recent set of base cases, and evaluate the loading within the scope and footprint of the DEEP SC. It is expected that this will be a recurring, annual effort. Participants will have the opportunity to request that other specific issues within the DEEP footprint be studied. Progress reports will be made at the regularly scheduled meetings of the CCPG.

ASSUMPTIONS AND STUDY PERFORMANCE CRITERIA

Studies will be conducted utilizing expected heavy summer loads and resources. Base cases will be developed for evaluation representing the years 2016 and 2021. Studies

will focus on N-0 and N-1 performance, and will apply the same performance criteria used by the CCPG NERC Compliance Sub-Committee in their studies.

DEVELOPMENT OF BASE CASES AND OTHER DATA

The WECC approved base cases for 2016HS and 2021HS (posted in September and October of 2010 respectively) will be used for the study. Study participants will be asked to provide updates to both cases before study work begins.

METHODOLOGY & DESCRIPTION OF CONTINGENCIES TO BE EXAMINED

Studies will be conducted with models in the PTI format and will be shared in this format only. Area overloads will be identified through an automated N-0 and N-1 analysis on model zones 757, 700, 704, 712, 791. Alternatives will be developed to relieve the overloads identified. These alternatives will be presented to the CCPG and form the basis for additional study efforts.

SCHEDULE

The DEEP SC will have as a goal to present initial alternatives for mitigation of identified overloads at the August CCPG meeting. A final report will be completed by December 30, 2011.

ASSIGNMENT/ALLOCATION OF STUDY WORK

Colorado Springs Utilities has agreed to perform the studies.

ATTACHMENT B

2017 Heavy Summer Results

BRANCH		CONTINGENCY	
70327 PONCHA	115 70394 SMELTER	115	1 OPEN LINE FROM BUS 70654 [COMANCHE]
PSCO - Upgrade terminal equipment or dispatch replacement generation from Front Range area			
345.00	TO BUS 70777 [COMAN_3]	27.000	CKT U1

MVAFLOW	AMPFLOW	RATE A/B	% FLOW
52.09	51.30	48.00	106.87

Report Options Used:
 Solution type = contingency
 Rating to use to calculate Base Case percentage overload = A
 Rating to use to calculate Contingency Case percentage overload = B
 Exclude elements with base case loading violations from contingency reports = True
 Exclude buses with base case voltage range violations from contingency reports = True
 Percent of flow rating = 100
 Minimum contingency case flow change for overload reports = 0 MVA
 Minimum contingency case voltage change for voltage range violations = 0 pu
 Bus mismatch tolerance = 0.5 MVA
 System mismatch tolerance = 5 MVA

Note: RATE column label is Base Case Rating/Contingency case rating.

2017 HS DEEP N-1 Voltage Violations

BUS	RECORD	TYPE	MINIMUM	MAXIMUM	CONTINGENCY	VOLTAGE
70452 VILAS	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO]	115.00] TO BUS 70452 [VILAS] 115.00] CKT 1 0.7122 Voltage ok -Capacitor turned off in model
70378 AREQUGCH	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 70378 [AREQUGCH]	115.00] TO BUS 70550 [W.CANON] 115.00] CKT 1 0.8483 BHE to study new capacitor

2017 HS DEEP N-1 Non-converged Network

OPEN LINE FROM BUS 70061 [BOONE 230.00] TO BUS 70254 [LAMAR_CO 230.00] CKT 1

2017 HS DEEP N-2 Overloads (highest overload only is shown)

North Subsystem

BRANCH		CONTINGENCY		MVAFLOW AMPFLOW RATE A/B % FLOW							
73412 MIDWAYBR	115 73413 MIDWAYBR	230	1 OPEN LINE FROM BUS 70286 [MIDWAYPS]	230.00	TO BUS 73477 [FULLER]	230.00	CKT 1	-147.70	147.70	100.00	147.70
DEEP to study in 2012											
70115 HPCYN	115 70138 DANIELPK	115	1 OPEN LINE FROM BUS 70463 [WATERTON]	115.00	TO BUS 73419 [RD_NIXON]	230.00	CKT 1	143.37	146.86	120.00	122.38
OPEN LINE FROM BUS 70517 [PARKERPS]											
73476 FORESTLK	115 70476 WOODLAND	115	1 OPEN LINE FROM BUS 70427 [TARRYALL]	230.00	TO BUS 70518 [BAYOU]	115.00	CKT 1	-94.81	93.81	80.00	117.26
OPEN LINE FROM BUS 70654 [COMANCHE]											
73384 BIRDSALE	115 73422 TEMPLTON	115	1 OPEN LINE FROM BUS 73391 [CTTNWD N]	115.00	TO BUS 70464 [WATERTON]	230.00	CKT 1	-151.43	149.98	131.00	114.49
OPEN LINE FROM BUS 73397 [DRAKE N]											
73477 FULLER	230 73481 FULLER	115	1 OPEN LINE FROM BUS 73410 [KETTLECK]	115.00	TO BUS 73425 [WOODMEN]	115.00	CKT 1	114.40	114.40	100.00	114.40
OPEN LINE FROM BUS 73412 [MIDWAYBR]											
70115 HPCYN	115 70117 CRWFVTVLY	115	1 OPEN LINE FROM BUS 70463 [WATERTON]	115.00	TO BUS 73416 [RANCHO]	115.00	CKT 1	-130.62	135.85	120.00	113.21
OPEN LINE FROM BUS 70517 [PARKERPS]											
73407 KELKER N	230 73409 KELKER W	115	1 OPEN LINE FROM BUS 73404 [FOUNTAIN]	115.00	TO BUS 70522 [ROXBOROU]	115.00	CKT 1	-298.69	298.69	291.00	102.64
OPEN LINE FROM BUS 73408 [KELKER E]											
70463 WATERTON	115 70522 ROXBOROU	115	1 OPEN LINE FROM BUS 70138 [DANIELPK]	115.00	TO BUS 73417 [RD_NIXON]	115.00	CKT 1	-138.06	141.56	139.00	101.84
OPEN LINE FROM BUS 70139 [DANIELPK]											
73397 DRAKE N	115 73430 FAIRVWCS	115	1 OPEN LINE FROM BUS 70517 [PARKERPS]	115.00	TO BUS 70138 [DANIELPK]	230.00	CKT T1	152.39	150.00	149.00	100.67
OPEN LINE FROM BUS 73387 [BIRDSALW]											
73404 FOUNTAIN	115 73417 RD_NIXON	115	1 OPEN LINE FROM BUS 73392 [CTTNWD N]	230.00	TO BUS 70518 [BAYOU]	115.00	CKT 1	-215.91	213.37	212.00	100.65
OPEN LINE FROM BUS 73407 [KELKER N]											
OPEN LINE FROM BUS 73419 [RD_NIXON]											

South Subsystem

70336 PUEB_TP	115 70412 STMBEACH	115	1 OPEN LINE FROM BUS 70459 [WALSENBG]	230.00	TO BUS 70961 [CALUMET]	230.00	CKT 1	164.66	167.36	77.00	217.35
To be resolved with SLV-Calument-Walsenburg-Comanche Project											
70327 PONCHA	115 70394 SMELTER	115	1 OPEN LINE FROM BUS 70459 [WALSENBG]	230.00	TO BUS 70961 [CALUMET]	230.00	CKT 2	-99.39	102.31	48.00	213.14
PSCO to review line rating											
70336 PUEB_TP	115 70456 W.STATON	115	1 OPEN LINE FROM BUS 70330 [PORTLAND]	115.00	TO BUS 70390 [SKALA]	115.00	CKT 1	193.01	196.16	95.00	206.49
OPEN LINE FROM BUS 73413 [MIDWAYBR]											
To be resolved with SLV-Calument-Walsenburg-Comanche Project											
70253 LAMAR_CO	115 70254 LAMAR_CO	230 T1	1 OPEN LINE FROM BUS 70459 [WALSENBG]	230.00	TO BUS 70961 [CALUMET]	230.00	CKT 1	-171.46	171.46	100.00	171.46
OPEN LINE FROM BUS 70705 [TWNBUTTE]											
May require load shedding (CCPG compliance study)											
70247 LAJUNTAT	115 70472 WILOW_CK	115	1 OPEN LINE FROM BUS 70061 [BOONE]	230.00	TO BUS 70254 [LAMAR_CO]	230.00	CKT 1	-132.26	141.35	109.00	129.68
OPEN LINE FROM BUS 70700 [CO_GRN]											
70007 OVERTON	115 70301 NTHRIDGE	115	1 OPEN LINE FROM BUS 70061 [BOONE]	230.00	TO BUS 70254 [LAMAR_CO]	230.00	CKT 1	131.18	131.05	105.00	124.81
OPEN LINE FROM BUS 70031 [BACULITE]											
70022 NYBERG	115 70031 BACULITE	115	1 OPEN LINE FROM BUS 70031 [BACULITE]	115.00	TO BUS 70456 [W.STATON]	115.00	CKT 1	-148.84	148.48	120.00	123.73
OPEN LINE FROM BUS 70031 [BACULITE]											
70449 DESRICOV	115 70456 W.STATON	115	1 OPEN LINE FROM BUS 70031 [BACULITE]	115.00	TO BUS 70456 [W.STATON]	115.00	CKT 1	-124.66	125.24	105.00	119.28
OPEN LINE FROM BUS 70286 [MIDWAYPS]											
70378 AREQUGCH	115 70306 PP_MINE	69 T2	1 OPEN LINE FROM BUS 70286 [MIDWAYPS]	230.00	TO BUS 73413 [MIDWAYBR]	230.00	CKT 1	35.67	35.67	30.00	118.90
OPEN LINE FROM BUS 70086 [CANONCTY]											
70060 BOONE	115 70062 BOONE	69 T1	1 OPEN LINE FROM BUS 70378 [AREQUGCH]	115.00	TO BUS 70085 [CANONCTY]	69.000	CKT T1	35.75	35.75	33.00	108.33
OPEN LINE FROM BUS 70060 [BOONE]											
70031 BACULITE	115 70456 W.STATON	115	2 OPEN LINE FROM BUS 70247 [LAJUNTAT]	115.00	TO BUS 70249 [LAJUNTAW]	115.00	CKT 1	229.37	228.81	222.00	103.07
OPEN LINE FROM BUS 70031 [BACULITE]											
70086 CANONCTY	115 70550 W.CANON	115	1 OPEN LINE FROM BUS 70352 [READER]	115.00	TO BUS 70456 [W.STATON]	115.00	CKT 1	116.66	122.19	120.00	101.83
OPEN LINE FROM BUS 70330 [PORTLAND]											
70459 WALSENBG	230 70961 CALUMET	230	1 OPEN LINE FROM BUS 70330 [PORTLAND]	115.00	TO BUS 70456 [W.STATON]	115.00	CKT 2	-251.30	241.48	239.00	101.04
OPEN LINE FROM BUS 70336 [PUEB_TP]											
73017 B.SANDY	115 73125 LSCHANCE	115	1 OPEN LINE FROM BUS 70459 [WALSENBG]	230.00	TO BUS 70961 [CALUMET]	230.00	CKT 2	104.95	109.05	109.00	100.04
OPEN LINE FROM BUS 73018 [B.SANDY]											
OPEN LINE FROM BUS 73413 [MIDWAYBR]											

2017 HS DEEP N-2 Voltage Violations

BUS	RECORD	TYPE	MINIMUM	MAXIMUM	CONTINGENCY	VOLTAGE
70253 LAMAR_CO	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO]	115.00] TO BUS 70254 [LAMAR_CO] 230.00] CKT T1 0.3708
May require load shedding (CCPG compliance study)						
70452 VILAS	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO]	115.00] TO BUS 70472 [WILOW_CK] 115.00] CKT 1 0.3908
May require load shedding (CCPG compliance study)						
OPEN LINE FROM BUS 70253 [LAMAR_CO] 115.00] TO BUS 70254 [LAMAR_CO] 230.00] CKT T1						
OPEN LINE FROM BUS 70253 [LAMAR_CO] 115.00] TO BUS 70452 [VILAS] 115.00] CKT 1						

70378 AREQUGCH	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70086 [CANONCTY	115.00]	TO BUS 70550 [W.CANON	115.00]	CKT 1	0.7375
	BHE to study new capacitor		OPEN LINE FROM BUS 70378 [AREQUGCH	115.00]	TO BUS 70550 [W.CANON	115.00]	CKT 1	
70253 LAMAR_CO	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00]	TO BUS 70254 [LAMAR_CO	230.00]	CKT T1	0.7618
	May require load shedding (CCPG compliance study)		OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00]	TO BUS 70452 [VILAS	115.00]	CKT 1	
70472 WILLOW_CK	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00]	TO BUS 70254 [LAMAR_CO	230.00]	CKT T1	0.7747
	May require load shedding (CCPG compliance study)		OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00]	TO BUS 70452 [VILAS	115.00]	CKT 1	
70390 SKALA	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70330 [PORTLAND	115.00]	TO BUS 70390 [SKALA	115.00]	CKT 1	0.7820
	BHE to study new capacitor		OPEN LINE FROM BUS 73413 [MIDWAYBR	230.00]	TO BUS 73551 [W CANON	230.00]	CKT 1	
70086 CANONCTY	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70330 [PORTLAND	115.00]	TO BUS 70390 [SKALA	115.00]	CKT 1	0.7878
	BHE to study new capacitor		OPEN LINE FROM BUS 73413 [MIDWAYBR	230.00]	TO BUS 73551 [W CANON	230.00]	CKT 1	
70550 W.CANON	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70330 [PORTLAND	115.00]	TO BUS 70390 [SKALA	115.00]	CKT 1	0.8052
	BHE to study new capacitor		OPEN LINE FROM BUS 73413 [MIDWAYBR	230.00]	TO BUS 73551 [W CANON	230.00]	CKT 1	
70412 STMBEACH	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70336 [PUEB_TP	115.00]	TO BUS 70412 [STMBEACH	115.00]	CKT 1	0.8525
			OPEN LINE FROM BUS 70412 [STMBEACH	115.00]	TO BUS 70458 [WALSENBG	115.00]	CKT 1	
70249 LAJUNTAW	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70060 [BOONE	115.00]	TO BUS 70249 [LAJUNTAW	115.00]	CKT 1	0.8717
			OPEN LINE FROM BUS 70247 [LAJUNTAT	115.00]	TO BUS 70249 [LAJUNTAW	115.00]	CKT 1	
70247 LAJUNTAT	115 DEEP SOUTH RANGE	0.90	1.10 OPEN LINE FROM BUS 70060 [BOONE	115.00]	TO BUS 70247 [LAJUNTAT	115.00]	CKT 1	0.8832
			OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00]	TO BUS 70254 [LAMAR_CO	230.00]	CKT T1	

2017 HS DEEP N-2 Non-converged Network

OPEN LINE FROM BUS 70061 [BOONE	230.00]	TO BUS 70254 [LAMAR_CO	230.00]	CKT 1
All				
OPEN LINE FROM BUS 70086 [CANONCTY	115.00]	TO BUS 70390 [SKALA	115.00]	CKT 1
OPEN LINE FROM BUS 70086 [CANONCTY	115.00]	TO BUS 70550 [W.CANON	115.00]	CKT 1
OPEN LINE FROM BUS 70086 [CANONCTY	115.00]	TO BUS 70550 [W.CANON	115.00]	CKT 1
OPEN LINE FROM BUS 70330 [PORTLAND	115.00]	TO BUS 70390 [SKALA	115.00]	CKT 1
OPEN LINE FROM BUS 70336 [PUEB_TP	115.00]	TO BUS 70456 [W.STATON	115.00]	CKT 1
OPEN LINE FROM BUS 70412 [STMBEACH	115.00]	TO BUS 70458 [WALSENBG	115.00]	CKT 1
OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70375 [SANLSVLY	230.00]	CKT T1
OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70375 [SANLSVLY	230.00]	CKT T2

ATTACHMENT C

2022 Heavy Summer Results

2022 HS DEEP N-1 Overloads

BRANCH	CONTINGENCY	MVAFLOW	AMPFLOW	RATE	A/B	%	FLOW	Report Options Used:
None								Solution type = contingency Rating to use to calculate Base Case percentage overload = A Rating to use to calculate Contingency Case percentage overload = B Exclude elements with base case loading violations from contingency reports = True Exclude buses with base case voltage range violations from contingency reports = True Percent of flow rating = 100 Minimum contingency case flow change for overload reports = 0 MVA Minimum contingency case voltage change for voltage range violations = 0 pu Bus mismatch tolerance = 0.5 MVA System mismatch tolerance = 5 MVA
								Note: RATE column label is Base Case Rating/Contingency case rating.

2022 HS DEEP N-1 Voltage Violations

BUS	RECORD	TYPE	MINIMUM	MAXIMUM	CONTINGENCY	VOLTAGE
73017 B.SANDY	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 73017 [B.SANDY 115.00] TO BUS 73018 [B.SANDY 230.00] CKT 1	0.8570 Voltage ok -Reactor turned on in model
70452 VILAS	115 DEEP SOUTH	RANGE	0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO 115.00] TO BUS 70452 [VILAS 115.00] CKT 1	0.6563 Voltage ok -Capacitor turned off in model

2022 HS DEEP N-1 Non-converged Network

None

2022 HS DEEP N-2 Overloads (highest overload only shown)

North Subsystem				BRANCH	CONTINGENCY	MVAFLOW	AMPFLOW	RATE	A/B	%	FLOW
73412 MIDWAYBR	115	73413 MIDWAYBR	230	1 OPEN LINE FROM BUS 70286 [MIDWAYPS 230.00] TO BUS 73477 [FULLER 230.00] CKT 1	-142.22	142.22	100.00	142.22			
DEEP to study in 2012				OPEN LINE FROM BUS 73413 [MIDWAYBR 230.00] TO BUS 73419 [RD_NIXON 230.00] CKT 1							
73391 CTTNWD N	115	73410 KETTLECK	115	1 OPEN LINE FROM BUS 72105 [CALHANTP 115.00] TO BUS 73456 [PEYTON 115.00] CKT 1	219.41	215.97	180.00	119.98			
				OPEN LINE FROM BUS 73389 [BRIARGAT 115.00] TO BUS 73393 [CTTNWD S 115.00] CKT 1							
73384 BIRDSALE	115	73422 TEMPLTON	115	1 OPEN LINE FROM BUS 73391 [CTTNWD N 115.00] TO BUS 73425 [WOODMEN 115.00] CKT 1	-158.09	156.24	131.00	119.27			
				OPEN LINE FROM BUS 73397 [DRAKE N 115.00] TO BUS 73430 [FAIRVWCS 115.00] CKT 1							
70139 DANIELPK	230	70601 DANIELPK	345 T4	1 OPEN LINE FROM BUS 70139 [DANIELPK 230.00] TO BUS 70601 [DANIELPK 345.00] CKT T2	-650.25	650.25	560.00	116.12			
				OPEN LINE FROM BUS 70139 [DANIELPK 230.00] TO BUS 70601 [DANIELPK 345.00] CKT T3							
73407 KELKER N	230	73409 KELKER W	115	1 OPEN LINE FROM BUS 73404 [FOUNTAIN 115.00] TO BUS 73417 [RD_NIXON 115.00] CKT 1	325.31	325.31	291.00	111.79			
				OPEN LINE FROM BUS 73408 [KELKER E 115.00] TO BUS 73446 [KELKER S 230.00] CKT 1							
70115 HPCYN	115	70138 DANIELPK	115	1 OPEN LINE FROM BUS 70308 [PALMER 115.00] TO BUS 73414 [MONUMENT 115.00] CKT 1	131.61	134.13	120.00	111.78			
				OPEN LINE FROM BUS 70517 [PARKERPS 115.00] TO BUS 70518 [BAYOU 115.00] CKT 1							
73404 FOUNTAIN	115	73417 RD_NIXON	115	1 OPEN LINE FROM BUS 73407 [KELKER N 230.00] TO BUS 73419 [RD_NIXON 230.00] CKT 1	-237.50	234.45	212.00	110.59			
				OPEN LINE FROM BUS 73419 [RD_NIXON 230.00] TO BUS 73446 [KELKER S 230.00] CKT 1							
70139 DANIELPK	230	70527 SANTEFE	230	1 OPEN LINE FROM BUS 70139 [DANIELPK 230.00] TO BUS 70323 [PRAIRIE3 230.00] CKT 1	-322.28	339.96	319.00	106.57			
				OPEN LINE FROM BUS 70139 [DANIELPK 230.00] TO BUS 70331 [PRAIRIE1 230.00] CKT 1							
73389 BRIARGAT	115	73393 CTTNWD S	115	1 OPEN LINE FROM BUS 72105 [CALHANTP 115.00] TO BUS 73456 [PEYTON 115.00] CKT 1	206.11	203.65	192.00	106.07			
				OPEN LINE FROM BUS 73391 [CTTNWD N 115.00] TO BUS 73410 [KETTLECK 115.00] CKT 1							
73397 DRAKE N	115	73430 FAIRVWCS	115	1 OPEN LINE FROM BUS 73384 [BIRDSALE 115.00] TO BUS 73422 [TEMPLTON 115.00] CKT 1	158.95	155.64	149.00	104.46			
				OPEN LINE FROM BUS 73391 [CTTNWD N 115.00] TO BUS 73425 [WOODMEN 115.00] CKT 1							
70115 HPCYN	115	70117 CRWFTVLY	115	1 OPEN LINE FROM BUS 70308 [PALMER 115.00] TO BUS 73414 [MONUMENT 115.00] CKT 1	-119.08	122.73	120.00	102.27			
				OPEN LINE FROM BUS 70517 [PARKERPS 115.00] TO BUS 70518 [BAYOU 115.00] CKT 1							
70463 WATERTON	115	70484 MARTN2TP	115	1 OPEN LINE FROM BUS 70463 [WATERTON 115.00] TO BUS 70263 [LITTLEL1 115.00] CKT 1	150.93	148.38	146.00	101.63			
				OPEN LINE FROM BUS 70464 [WATERTON 230.00] TO BUS 70100 [CHATFLD 230.00] CKT 1							
73408 KELKER E	115	73446 KELKER S	230	1 OPEN LINE FROM BUS 73404 [FOUNTAIN 115.00] TO BUS 73417 [RD_NIXON 115.00] CKT 1	-324.75	324.75	322.00	100.85			
				OPEN LINE FROM BUS 73407 [KELKER N 230.00] TO BUS 73409 [KELKER W 115.00] CKT 1							
South Subsystem				BRANCH	CONTINGENCY	MVAFLOW	AMPFLOW	RATE	A/B	%	FLOW
70327 PONCHA	115	70394 SMELTER	115	1 OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70390 [SKALA 115.00] CKT 1	-115.88	121.79	48.00	253.72			
PSCo to review line rating				OPEN LINE FROM BUS 70550 [W.CANON 115.00] TO BUS 73551 [W CANON 230.00] CKT T1							
70374 SANLSVLY	115	70376 SANLSVLY	69 T4	1 OPEN LINE FROM BUS 70374 [SANLSVLY 115.00] TO BUS 70025 [ALMSA_TM 115.00] CKT 1	55.37	55.37	42.00	131.83			
To be resolved with SLV-Calument-Walsenburg-Comanche Project				OPEN LINE FROM BUS 70374 [SANLSVLY 115.00] TO BUS 70376 [SANLSVLY 69.000] CKT T3							
70550 W.CANON	115	73551 W CANON	230 T1	1 OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70456 [W.STATON 115.00] CKT 1	-126.09	126.09	100.00	126.09			
				OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70456 [W.STATON 115.00] CKT 2							
70459 WALSENBG	230	70961 CALUMET	230	1 OPEN LINE FROM BUS 70336 [PUEB_TP 115.00] TO BUS 70456 [W.STATON 115.00] CKT 1	293.21	286.83	239.00	120.01			
				OPEN LINE FROM BUS 70459 [WALSENBG 230.00] TO BUS 70961 [CALUMET 230.00] CKT 2							
70330 PORTLAND	115	70456 W.STATON	115	1 OPEN LINE FROM BUS 70086 [CANONCTY 115.00] TO BUS 70550 [W.CANON 115.00] CKT 1	129.87	144.07	122.00	118.09			
				OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70456 [W.STATON 115.00] CKT 2							
70060 BOONE	115	70249 LAJUNTAW	115	1 OPEN LINE FROM BUS 70060 [BOONE 115.00] TO BUS 70247 [LAJUNTAT 115.00] CKT 1	-78.74	93.91	80.00	117.39			
				OPEN LINE FROM BUS 70253 [LAMAR_CO 115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1							
70449 DESRTOCV	115	70456 W.STATON	115	1 OPEN LINE FROM BUS 70286 [MIDWAYPS 230.00] TO BUS 73413 [MIDWAYBR 230.00] CKT 1	-121.69	120.65	105.00	114.91			
				OPEN LINE FROM BUS 70286 [MIDWAYPS 230.00] TO BUS 73477 [FULLER 230.00] CKT 1							
70007 OVERTON	115	70301 NTHRIDGE	115	1 OPEN LINE FROM BUS 70031 [BACULITE 115.00] TO BUS 70456 [W.STATON 115.00] CKT 1	122.22	119.53	105.00	113.84			
				OPEN LINE FROM BUS 70031 [BACULITE 115.00] TO BUS 70456 [W.STATON 115.00] CKT 2							
70022 NYBERG	115	70031 BACULITE	115	1 OPEN LINE FROM BUS 70030 [APT_PARK 115.00] TO BUS 70031 [BACULITE 115.00] CKT 1	-139.59	136.18	120.00	113.49			
				OPEN LINE FROM BUS 70031 [BACULITE 115.00] TO BUS 70456 [W.STATON 115.00] CKT 1							
70086 CANONCTY	115	70550 W.CANON	115	1 OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70456 [W.STATON 115.00] CKT 1	129.67	135.69	120.00	113.08			
				OPEN LINE FROM BUS 70330 [PORTLAND 115.00] TO BUS 70456 [W.STATON 115.00] CKT 2							
70336 PUEB_TP	115	70456 W.STATON	115	1 OPEN LINE FROM BUS 70458 [WALSENBG 115.00] TO BUS 70459 [WALSENBG 230.00] CKT T2	104.14	103.53	95.00	108.98			
				OPEN LINE FROM BUS 70458 [WALSENBG 115.00] TO BUS 70459 [WALSENBG 230.00] CKT T3							
70458 WALSENBG	115	70457 WALSENBG	69 T1	1 OPEN LINE FROM BUS 70336 [PUEB_TP 115.00] TO BUS 70412 [STMBEACH 115.00] CKT 1	40.04	40.04	37.00	108.23			
				OPEN LINE FROM BUS 70412 [STMBEACH 115.00] TO BUS 70458 [WALSENBG 115.00] CKT 1							
70060 BOONE	115	70062 BOONE	69 T1	1 OPEN LINE FROM BUS 70060 [BOONE 115.00] TO BUS 70249 [LAJUNTAW 115.00] CKT 1	-35.39	35.39	33.00	107.24			
				OPEN LINE FROM BUS 70247 [LAJUNTAT 115.00] TO BUS 70249 [LAJUNTAW 115.00] CKT 1							

70458 WALSENBG	115	70459 WALSENBG	230 T2	OPEN LINE FROM BUS 70336 [PUEB_TP	115.00]	TO BUS 70456 [W.STATON	115.00]	CKT 1	-104.95	104.95	100.00	104.95
				OPEN LINE FROM BUS 70458 [WALSENBG	115.00]	TO BUS 70459 [WALSENBG	230.00]	CKT T3				
70374 SANLSVLY	115	70375 SANLSVLY	230 T2	OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70375 [SANLSVLY	230.00]	CKT T1	-169.21	169.21	165.00	102.55
				OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70025 [ALMSA_TM	115.00]	CKT 1				

2022 HS DEEP N-2 Voltage Violations

BUS	RECORD	TYPE	MINIMUM	MAXIMUM		CONTINGENCY	VOLTAGE
70253 LAMAR_CO	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	0.3318
	May require load shedding (CCPG compliance study)				OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70472 [WILLOW_CK 115.00] CKT 1	
70452 VILAS	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	0.3480
	May require load shedding (CCPG compliance study)				OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70452 [VILAS 115.00] CKT 1	
70378 AREQUGCH	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70330 [PORTLAND	115.00] TO BUS 70390 [SKALA 115.00] CKT 1	0.6887
	BHE to study new capacitor				OPEN LINE FROM BUS 70550 [W.CANON	115.00] TO BUS 73551 [W CANON 230.00] CKT T1	
70390 SKALA	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70330 [PORTLAND	115.00] TO BUS 70390 [SKALA 115.00] CKT 1	0.6945
	BHE to study new capacitor				OPEN LINE FROM BUS 70550 [W.CANON	115.00] TO BUS 73551 [W CANON 230.00] CKT T1	
70086 CANONCTY	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70330 [PORTLAND	115.00] TO BUS 70390 [SKALA 115.00] CKT 1	0.7014
	BHE to study new capacitor				OPEN LINE FROM BUS 70550 [W.CANON	115.00] TO BUS 73551 [W CANON 230.00] CKT T1	
70253 LAMAR_CO	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70060 [BOONE	115.00] TO BUS 70247 [LAJUNTAT 115.00] CKT 1	0.7180
	May require load shedding (CCPG compliance study)				OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	
70550 W.CANON	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70330 [PORTLAND	115.00] TO BUS 70390 [SKALA 115.00] CKT 1	0.7237
	BHE to study new capacitor				OPEN LINE FROM BUS 70550 [W.CANON	115.00] TO BUS 73551 [W CANON 230.00] CKT T1	
70472 WILLOW_CK	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70060 [BOONE	115.00] TO BUS 70247 [LAJUNTAT 115.00] CKT 1	0.7398
	May require load shedding (CCPG compliance study)				OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	
70412 STMBEACH	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70336 [PUEB_TP	115.00] TO BUS 70412 [STMBEACH 115.00] CKT 1	0.8022
					OPEN LINE FROM BUS 70412 [STMBEACH	115.00] TO BUS 70458 [WALSENBG 115.00] CKT 1	
73017 B.SANDY	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70601 [DANIELPK	345.00] TO BUS 70654 [COMANCHE 345.00] CKT 1	0.8190
					OPEN LINE FROM BUS 73017 [B.SANDY	115.00] TO BUS 73018 [B.SANDY 230.00] CKT 1	
70247 LAJUNTAT	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70060 [BOONE	115.00] TO BUS 70247 [LAJUNTAT 115.00] CKT 1	0.8333
					OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	
70249 LAJUNTAW	115 DEEP SOUTH RANGE		0.90	1.10	OPEN LINE FROM BUS 70060 [BOONE	115.00] TO BUS 70247 [LAJUNTAT 115.00] CKT 1	0.8384
					OPEN LINE FROM BUS 70253 [LAMAR_CO	115.00] TO BUS 70254 [LAMAR_CO 230.00] CKT T1	

2022 HS DEEP N-2 Non-converged Network

OPEN LINE FROM BUS 70336 [PUEB_TP	115.00]	TO BUS 70456 [W.STATON	115.00]	CKT 1
OPEN LINE FROM BUS 70412 [STMBEACH	115.00]	TO BUS 70458 [WALSENBG	115.00]	CKT 1
OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70375 [SANLSVLY	230.00]	CKT T1
OPEN LINE FROM BUS 70374 [SANLSVLY	115.00]	TO BUS 70375 [SANLSVLY	230.00]	CKT T2
OPEN LINE FROM BUS 70459 [WALSENBG	230.00]	TO BUS 70961 [CALUMET	230.00]	CKT 1
OPEN LINE FROM BUS 70459 [WALSENBG	230.00]	TO BUS 70961 [CALUMET	230.00]	CKT 2

ATTACHMENT D

DEEP Subsystems

2017

SUBSYSTEM 'DEEP NORTH'

BUS 70465 /MIDWAYPS 345
BUS 70466 /WATERTON 345
BUS 70601 /DANIELPK 345
BUS 70624 /MIS_SITE 345
BUS 70654 /COMANCHE 345
BUS 70960 /CALUMET 345
BUS 73582 /ENGYCNTR 345

BUS 70106 /CHEROK4 22
BUS 70115 /HPCYN 115
BUS 70138 /DANIELPK 115
BUS 70139 /DANIELPK 230
BUS 70463 /WATERTON 115
BUS 70464 /WATERTON 230
BUS 70621 /MISSILE_TAP 230
BUS 70622 /MIS_SITE 34.5
BUS 70623 /MIS_SITE 230
BUS 70625 /NEW WIND 34.5

BUS 70091 /CASTLRCK 115
BUS 70117 /CRWFTVLY 115
BUS 70157 /DIVIDE 115
BUS 70285 /MIDWAYPS 115
BUS 70286 /MIDWAYPS 230
BUS 70308 /PALMER 115
BUS 70381 /SEDALIA 115
BUS 70419 /LKGRGE 115
BUS 70426 /TARRYALL 115
BUS 70427 /TARRYALL 230
BUS 70514 /PLUMCRK 115
BUS 70517 /PARKERPS 115
BUS 70518 /BAYOU 115
BUS 70519 /WOLFSBRG 115
BUS 70520 /WOLFSBTP 115
BUS 70522 /ROXBOROU 115
BUS 70574 /FRANKTWN 115
BUS 70576 /SPRNGVLY 115
BUS 70582 /GREENLND 115
BUS 70584 /CRYSTVA 115

BUS 72105 /CAHANTP 115
BUS 72410 /PADDOCK 115
BUS 72411 /SANTAFES 115
BUS 72412 /SHAW RAN 115
BUS 72413 /STERLING 115
BUS 72414 /STERLING 115
BUS 72415 /ROLLINGH 115
BUS 72901 /STERLING R T 115
BUS 73380 /CLAREMNT 230
BUS 73384 /BIRDSALE 115
BUS 73387 /BIRDSALW 115
BUS 73388 /BRADLEY 115
BUS 73389 /BRIARGAT 115
BUS 73390 /CSOC 115
BUS 73391 /CTTNWD N 115

BUS 73392	/CTTNWD N 230
BUS 73393	/CTTNWD S 115
BUS 73394	/CTTNWD S 230
BUS 73397	/DRAKE N 115
BUS 73398	/DRAKE S 115
BUS 73400	/EMIL AND 115
BUS 73402	/FALCONMV 115
BUS 73404	/FOUNTAIN 115
BUS 73405	/GEESEN 115
BUS 73407	/KELKER N 230
BUS 73408	/KELKER E 115
BUS 73409	/KELKER W 115
BUS 73410	/KETTLECK 115
BUS 73411	/FONTERO 115
BUS 73412	/MIDWAYBR 115
BUS 73413	/MIDWAYBR 230
BUS 73414	/MONUMENT 115
BUS 73416	/RANCHO 115
BUS 73417	/RD_NIXON 115
BUS 73419	/RD_NIXON 230
BUS 73420	/ROCKISLD 115
BUS 73421	/STETSON 230
BUS 73422	/TEMPLTON 115
BUS 73425	/WOODMEN 115
BUS 73430	/FAIRVWCS 115
BUS 73445	/GRESHAM 115
BUS 73446	/KELKER S 230
BUS 73452	/BLACKFOR 115
BUS 73455	/BLKFORTP 115
BUS 73456	/PEYTON 115
BUS 73458	/LORSONRANCH 115
BUS 73459	/MERDNRCH 115
BUS 73460	/BLK SQMV 115
BUS 73476	/FORESTLK 115
BUS 73477	/FULLER 230
BUS 73481	/FULLER 115
BUS 73490	/RAMPART 115
BUS 73496	/ATMELSUB 115
BUS 73559	/FRTRANGE 230
BUS 73575	/DRAKE E 115
BUS 73576	/FLYHORSE 115
BUS 73601	/SANTA FE 115

SUBSYSTEM 'DEEP SOUTH'

BUS 70465 /MIDWAYPS 345
BUS 70466 /WATERTON 345
BUS 70601 /DANIELPK 345
BUS 70624 /MIS_SITE 345
BUS 70654 /COMANCHE 345
BUS 70960 /CALUMET 345
BUS 73582 /ENGYCNTR 345

BUS 70002 /BURNTMIL 115
BUS 70004 /GREENHRN 115
BUS 70007 /OVERTON 115
BUS 70019 /PDA_5 115
BUS 70022 /NYBERG 115
BUS 70030 /APT_PARK 115
BUS 70031 /BACULITE 115
BUS 70060 /BOONE 115
BUS 70061 /BOONE 230
BUS 70086 /CANONCTY 115
BUS 70158 /DOT 115
BUS 70159 /DOT_TAP 115
BUS 70193 /FTN_VLY 115
BUS 70236 /HYDEPARK 115
BUS 70247 /LAJUNTAT 115
BUS 70249 /LAJUNTAW 115
BUS 70253 /LAMAR_CO 115
BUS 70254 /LAMAR_CO 230
BUS 70301 /NTHRIDGE 115
BUS 70330 /PORTLAND 115
BUS 70339 /PUEBPLNT 115
BUS 70352 /READER 115
BUS 70378 /AREQUGCH 115
BUS 70390 /SKALA 115
BUS 70394 /SMELTER 115
BUS 70449 /DESRTCOV 115
BUS 70452 /VILAS 115
BUS 70456 /W.STATON 115
BUS 70472 /WILOW_CK 115
BUS 70549 /APT_MEM 115
BUS 70550 /W.CANON 115
BUS 70560 /LAMAR_DC 230
BUS 70700 /CO_GRN 230
BUS 70705 /TWNBUTTE 230
BUS 71006 /RTLSNAKE 115

BUS 70327 /PONCHA 115
BUS 79054 /PONCHABR 230
BUS 70375 /SANLSVLY 230
BUS 70374 /SANLSVLY 115
BUS 70397 /SOLARTAP 115
BUS 73017 /B.SANDY 115
BUS 73018 /B.SANDY 230

BUS 70068 /BURROCYN 115
BUS 70094 /CF&IFURN 230
BUS 70096 /CF&ISE1 115
BUS 70098 /CF&ISE2 115
BUS 70121 /COMANCHE 115
BUS 70122 /COMANCHE 230
BUS 70272 /LUDLOTAP 115
BUS 70285 /MIDWAYPS 115
BUS 70286 /MIDWAYPS 230
BUS 70321 /PINONCYN 115
BUS 70335 /PUEB_W 115
BUS 70336 /PUEB_TP 115

BUS 70412 /STMBEACH 115
BUS 70458 /WALSENBG 115
BUS 70459 /WALSENBG 230
BUS 70961 /CALUMET 230

BUS 72105 /CAHANTP 115
BUS 72410 /PADDOCK 115
BUS 72411 /SANTAFES 115
BUS 72412 /SHAW RAN 115
BUS 72413 /STERLING 115
BUS 72414 /STERLING 115
BUS 72415 /ROLLINGH 115
BUS 72901 /STERLING R T 115
BUS 73380 /CLAREMNT 230
BUS 73384 /BIRDSALE 115
BUS 73387 /BIRDSALW 115
BUS 73388 /BRADLEY 115
BUS 73389 /BRIARGAT 115
BUS 73390 /CSOC 115
BUS 73391 /CTTNWD N 115
BUS 73392 /CTTNWD N 230
BUS 73393 /CTTNWD S 115
BUS 73394 /CTTNWD S 230
BUS 73397 /DRAKE N 115
BUS 73398 /DRAKE S 115
BUS 73400 /EMIL AND 115
BUS 73402 /FALCONMV 115
BUS 73404 /FOUNTAIN 115
BUS 73405 /GEESEN 115
BUS 73407 /KELKER N 230
BUS 73408 /KELKER E 115
BUS 73409 /KELKER W 115
BUS 73410 /KETTLECK 115
BUS 73411 /FONTERO 115
BUS 73412 /MIDWAYBR 115
BUS 73413 /MIDWAYBR 230
BUS 73414 /MONUMENT 115
BUS 73416 /RANCHO 115
BUS 73417 /RD_NIXON 115
BUS 73419 /RD_NIXON 230
BUS 73420 /ROCKISLD 115
BUS 73421 /STETSON 230
BUS 73422 /TEMPLTON 115
BUS 73425 /WOODMEN 115
BUS 73430 /FAIRWCS 115
BUS 73445 /GRESHAM 115
BUS 73446 /KELKER S 230
BUS 73452 /BLACKFOR 115
BUS 73455 /BLKFORTP 115
BUS 73456 /PEYTON 115
BUS 73458 /LORSONRANCH 115
BUS 73459 /MERDNRCH 115
BUS 73460 /BLK SQMV 115
BUS 73476 /FORESTLK 115
BUS 73477 /FULLER 230
BUS 73481 /FULLER 115
BUS 73490 /RAMPART 115
BUS 73496 /ATMELSUB 115
BUS 73559 /FRTRANGE 115
BUS 73575 /DRAKE E 115
BUS 73576 /FLYHORSE 115
BUS 73601 /SANTA FE 115

DEEP Subsystems

2022

SUBSYSTEM 'DEEP NORTH'

BUS 70465 /MIDWAYPS 345
BUS 70466 /WATERTON 345
BUS 70601 /DANIELPK 345
BUS 70624 /MIS_SITE 345
BUS 70654 /COMANCHE 345
BUS 70960 /CALUMET 345
BUS 70904 /ENGYCNTR 345
BUS 73905 /LAMAR 3456
BUS 73906 /BURLNGTN 345
BUS 73907 /BSANDY 345

BUS 70105 /CHER2X1 15
BUS 70115 /HPCYN 115
BUS 70138 /DANIELPK 115
BUS 70139 /DANIELPK 230
BUS 70463 /WATERTON 115
BUS 70464 /WATERTON 230
BUS 70623 /MIS_SITE 230

BUS 70091 /CASTLRCK 115
BUS 70117 /CRWFTVLY 115
BUS 70157 /DIVIDE 115
BUS 70285 /MIDWAYPS 115
BUS 70286 /MIDWAYPS 230
BUS 70308 /PALMER 115
BUS 70381 /SEDALIA 115
BUS 70419 /LKGRGE 115
BUS 70426 /TARRYALL 115
BUS 70427 /TARRYALL 230
BUS 70514 /PLUMCRK 115
BUS 70517 /PARKERPS 115
BUS 70518 /BAYOU 115
BUS 70519 /WOLFSBRG 115
BUS 70520 /WOLFSBTP 115
BUS 70522 /ROXBOROU 115
BUS 70574 /FRANKTWN 115
BUS 70576 /SPRNGVLY 115
BUS 70582 /GREENLND 115
BUS 70584 /CRYSTVA 115

BUS 72105 /CALHANTP 115
BUS 72410 /PADDOCK 115
BUS 72411 /SANTAFES 115
BUS 72412 /SHAW RAN 115
BUS 72413 /STERLING 115
BUS 72414 /STERLING 115
BUS 72415 /ROLLINGH 115

BUS 72424	/CALHAN 115
BUS 72424	/SIMLA 115
BUS 72426	/PERSON 115
BUS 73380	/CLAREMNT 230
BUS 73384	/BIRDSALE 115
BUS 73387	/BIRDSALW 115
BUS 73388	/BRADLEY 115
BUS 73389	/BRIARGAT 115
BUS 73390	/CSOC 115
BUS 73391	/CTTNWD N 115
BUS 73392	/CTTNWD N 230
BUS 73393	/CTTNWD S 115
BUS 73394	/CTTNWD S 230
BUS 73397	/DRAKE N 115
BUS 73398	/DRAKE S 115
BUS 73400	/EMIL AND 115
BUS 73402	/FALCONMV 115
BUS 73404	/FOUNTAIN 115
BUS 73405	/GEESEN 115
BUS 73407	/KELKER N 230
BUS 73408	/KELKER E 115
BUS 73409	/KELKER W 115
BUS 73410	/KETTLECK 115
BUS 73411	/FONTERO 115
BUS 73412	/MIDWAYBR 115
BUS 73413	/MIDWAYBR 230
BUS 73414	/MONUMENT 115
BUS 73416	/RANCHO 115
BUS 73417	/RD_NIXON 115
BUS 73419	/RD_NIXON 230
BUS 73420	/ROCKISLD 115
BUS 73421	/STETSON 230
BUS 73422	/TEMPLTON 115
BUS 73425	/WOODMEN 115
BUS 73430	/FAIRWCS 115
BUS 73445	/GRESHAM 115
BUS 73446	/KELKER S 230
BUS 73452	/BLACKFOR 115
BUS 73455	/BLKFORTP 115
BUS 73456	/PEYTON 115
BUS 73458	/LORSONRANCH 115
BUS 73459	/MERDNRCH 115
BUS 73460	/BLK SQMV 115
BUS 73476	/FORESTLK 115
BUS 73477	/FULLER 230
BUS 73481	/FULLER 115
BUS 73490	/RAMPART 115
BUS 73496	/ATMELSUB 115
BUS 73559	/FRTRANGE 230
BUS 73575	/DRAKE E 115
BUS 73576	/FLYHORSE 115
BUS 73601	/SANTA FE 115

SUBSYSTEM 'DEEP SOUTH'

BUS 70465 /MIDWAYPS 345
BUS 70466 /WATERTON 345
BUS 70601 /DANIELPK 345
BUS 70624 /MIS_SITE 345
BUS 70654 /COMANCHE 345
BUS 70960 /CALUMET 345
BUS 70904 /ENGYCNTR 345
BUS 73905 /LAMAR 3456
BUS 73906 /BURLNGTN 345
BUS 73907 /BSANDY 345

BUS 70068 /BURROCYN 115
BUS 70094 /CF&IFURN 230
BUS 70096 /CF&ISE1 115
BUS 70098 /CF&ISE2 115
BUS 70121 /COMANCHE 115
BUS 70122 /COMANCHE 230
BUS 70272 /LUDLOTAP 115
BUS 70285 /MIDWAYPS 115
BUS 70286 /MIDWAYPS 230
BUS 70321 /PINONCYN 115
BUS 70335 /PUEB_W 115
BUS 70336 /PUEB_TP 115
BUS 70412 /STMBEACH 115
BUS 70458 /WALSENBG 115
BUS 70459 /WALSENBG 230
BUS 70961 /CALUMET 230

BUS 70327 /PONCHA 115
BUS 79054 /PONCHABR 230
BUS 70375 /SANLSVLY 230
BUS 70374 /SANLSVLY 115
BUS 73017 /B.SANDY 115
BUS 73018 /B.SANDY 230

BUS 70001 /VILAS 230
BUS 70002 /BURNTMIL 115
BUS 70004 /GREENHRN 115
BUS 70007 /OVERTON 115
BUS 70019 /PDA_5 115
BUS 70022 /NYBERG 115
BUS 70030 /APT_PARK 115
BUS 70031 /BACULITE 115
BUS 70060 /BOONE 115
BUS 70061 /BOONE 230
BUS 70086 /CANONCTY 115
BUS 70158 /DOT 115
BUS 70159 /DOT_TAP 115
BUS 70193 /FTN_VLY 115
BUS 70236 /HYDEPARK 115
BUS 70247 /LAJUNTAT 115
BUS 70249 /LAJUNTAW 115
BUS 70253 /LAMAR_CO 115
BUS 70254 /LAMAR_CO 230
BUS 70301 /NTHRIDGE 115
BUS 70330 /PORTLAND 115
BUS 70339 /PUEBPLNT 115
BUS 70352 /READER 115
BUS 70378 /AREQUGCH 115
BUS 70390 /SKALA 115
BUS 70394 /SMELTER 115
BUS 70449 /DESRTC OV 115
BUS 70452 /VILAS 115
BUS 70456 /W.STATON 115
BUS 70472 /WILOW_CK 115
BUS 70549 /APT_MEM 115
BUS 70550 /W.CANON 115
BUS 70560 /LAMAR_DC 230
BUS 70700 /CO_GRN 230

BUS 70705 /TWNBUTTE 230
BUS 71006 /RTLSSNAKE 115

BUS 72105 /CALHANTP 115
BUS 72410 /PADDOCK 115
BUS 72411 /SANTAFES 115
BUS 72412 /SHAW RAN 115
BUS 72413 /STERLING 115
BUS 72414 /STERLING 115
BUS 72415 /ROLLINGH 115
BUS 72424 /CALHAN 115
BUS 72424 /SIMLA 115
BUS 72426 /PERSON 115
BUS 73380 /CLAREMNT 230
BUS 73384 /BIRDSALE 115
BUS 73387 /BIRDSALW 115
BUS 73388 /BRADLEY 115
BUS 73389 /BRIARGAT 115
BUS 73390 /CSOC 115
BUS 73391 /CTTNWD N 115
BUS 73392 /CTTNWD N 230
BUS 73393 /CTTNWD S 115
BUS 73394 /CTTNWD S 230
BUS 73397 /DRAKE N 115
BUS 73398 /DRAKE S 115
BUS 73400 /EMIL AND 115
BUS 73402 /FALCONMV 115
BUS 73404 /FOUNTAIN 115
BUS 73405 /GEESEN 115
BUS 73407 /KELKER N 230
BUS 73408 /KELKER E 115
BUS 73409 /KELKER W 115
BUS 73410 /KETTLECK 115
BUS 73411 /FONTERO 115
BUS 73412 /MIDWAYBR 115
BUS 73413 /MIDWAYBR 230
BUS 73414 /MONUMENT 115
BUS 73416 /RANCHO 115
BUS 73417 /RD_NIXON 115
BUS 73419 /RD_NIXON 230
BUS 73420 /ROCKISLD 115
BUS 73421 /STETSON 230
BUS 73422 /TEMPLTON 115
BUS 73425 /WOODMEN 115
BUS 73430 /FAIRVWCS 115
BUS 73445 /GRESHAM 115
BUS 73446 /KELKER S 230
BUS 73452 /BLACKFOR 115
BUS 73455 /BLKFORTP 115
BUS 73456 /PEYTON 115
BUS 73458 /LORSONRANCH 115
BUS 73459 /MERDNRCH 115
BUS 73460 /BLK SQMV 115
BUS 73476 /FORESTLK 115
BUS 73477 /FULLER 230
BUS 73481 /FULLER 115
BUS 73490 /RAMPART 115
BUS 73496 /ATMELSUB 115
BUS 73559 /FRTRANGE 230
BUS 73575 /DRAKE E 115
BUS 73576 /FLYHORSE 115
BUS 73601 /SANTA FE 115