DPV2 500 kV Transmission Project

Status Report

STEP Informational Item

June 29, 2005

Regulatory Filings

- Filed with CPUC on April 11, 2005
- Filed with BLM on May 5, 2005
- Expect to file with ACC in November 2005

Simultaneous Study Results w/ Mohave On

Analysis	Total Reactive Support (MVAr) [B]	Nomogram	Operating Procedure	SPS
Non-Simultaneous	0	No	Yes [C]	No
SCIT Nomogram	400	No	No	No
Path 26	400	No	No	No
Path 27	400	No	No	No
Path 41	550	Yes [D]	No	No
Path 42 [E]	N/A	N/A	N/A	N/A
Path 61	1,200 [G]	Yes [F]	Yes [G]	No
Path 64	800	No	No	Yes
Path 65	400	No	No	No
Centennial Path	800	No	No	Yes

A – All analyses assume the following core plan of service elements:
1. Build new Harquahala-Devers 500 kV line
2. Rebuild Devers-San Bernardino 230 kV lines #1 and #2
3. Rebuild Devers-Vista 230 kV lines #1 and #2

B – The Reactive Support level shown represents the total amount required uniquely for each analysis (e.g. 800 MVAr is required for the conditions assumed in the Path 64 analysis, however, only 400 MVAr would be required for the conditions assumed in the Path 65 analysis; i.e. they are not additive).

C – Implement an OP to relieve thermal overloads on 3 transmission facilities for DPV1 and DPV2 outage.

D – Implement a nomogram to meet the stability criteria for the Hassayampa-N.Gila 500 kV line outage in lieu of adding 150 MVAr shunt capacitor at Devers 500 kV bus.

E – The request to perform the Path 42 analysis was made for the Mohave Off Line scenario only.

F – Implement an OP to relieve a thermal overload on Victorville-Lugo 500 kV line for 5 line outages.

G – Implement a nomogram to meet the stability criteria for Hassayampa-N.Gila 500 kV line outage in lieu of installing an additional 400 MVAr SVC at Lugo 500 kV bus (i.e. to not exceed the 800 MVAr reactive power capability identified for Path 64 and the Centennial path, which is the basis for the reactive support equipment in the plan of service).

Simultaneous Study Results w/ Mohave Off

Analysis	Total Reactive Support (MVAr) [B]	Nomogram	Operating Procedure	SPS
Non-Simultaneous	0	No	Yes [C]	No
SCIT Nomogram	500	No	No	No
Path 26	500	No	No	No
Path 27	500	No	No	No
Path 41	500	No	No	No
Path 42	500	No	No	No
Path 61	1,400 [E]	Yes [E]	Yes [D]	Yes [F]
Path 64	1,300	No	No	Yes
Path 65	500	No	No	No
Centennial Path	1,300	No	No	Yes

A – All analyses assume the following core plan of service elements:
1. Build new Harquahala-Devers 500 kV line
2. Rebuild Devers-San Bernardino 230 kV lines #1 and #2
3. Rebuild Devers-Vista 230 kV lines #1 and #2

B – The Reactive Support level shown represents the total amount required uniquely for each analysis (e.g. 1,300 MVAr is required for the conditions assumed in the Path 64 analysis, however, only 500 MVAr would be required for the conditions assumed in the Path 65 analysis; i.e. they are not additive).

C – Implement an OP to relieve thermal overloads on 3 transmission facilities for DPV1 and DPV2 outage.

D – Implement an OP to relieve a thermal overload on Victorville-Lugo 500 kV line for 3 line outages.

E – Implement a nomogram to meet the stability criteria for Hassayampa-N.Gila 500 kV line outage in lieu of installing an additional 100 MVAr SVC at Devers 500 kV bus (i.e. to not exceed the 1,200 MVAr reactive power capability identified for Path 64 and the Centennial path, which is the basis for the reactive support equipment in the plan of service).

F – Install an SPS to trip up to 400 MW of generation in the Palo Verde area and up to 400 MW of load in Southern California to meet the post-transient voltage deviation criteria for DPV1 and DPV2 outage.

Reactive Requirement Summary w/ Mohave On

Post-DPV2 With Mohave On Line

Path	Reactive Support to Meet the Planning Criteria			Stability Results
	New Shunt Capacitor @ Devers 500 kV (MVAr)	Add New 2nd SVC @ Devers 500 kV (MVAr)	Install New SVC @ Lugo 500 kV (MVAr)	Transient Voltage Dip (%) and Damping
NERC/WECC Planning Standard - Category B (Loss of Single Element)				
SCIT Benchmark	None	400	None	Valleysc 500 - 24.1 Devrsvc 500 - 23.7 Hi Deser 115 - 23.7 System < 20 cycles Damping >0
26 (Midway-Vincent)	None	400	None	Hi Deser 115 - 18.50 Devers 500 - 19.1 Devrsvc1 500 - 19.1 System < 20 cycles Damping >0
27 (IPPDC)	None	400	None	Hi Deser 115 - 23.7 Valleysc 500 - 24.2 Devrsvc1 500 - 23.8 Hi Deser 115 - 20 cycles Damping >0
41 (Sylmar)	150	400	None	Hi Deser 115 - 23.4 Valleysc 500 - 23.9 Devrsvc1 500 - 23.6 2 SCE 115 = 20 cycles Damping >0
42 (IID-SCE)				
61 (Victorville-Lugo)	300	500	400	El Nido 66 - 25.9 Valleysc 500 - 24.6 Olinda 66 - 24.4 System <= 20.2 cycles Damping >0
64 (Marketplace-Adelanto)	300	500	None	Padua 66 - 24.5 Valleysc 500 - 25.0 Valysvc2 500 - 24.0 System <= 20 cycles Damping >0
65 (PDCI)	None	400	None	Hi Deser 115 - 23.9 Valleysc 500 - 24.2 Devrsvc1 500 - 24.0 System <= 20.2 cycles Damping >0
Centennial	300	500	None	Hi deser 115 - 22.9 Valleysc 500 - 23.7 Devrsvc1 500 - 22.8 System < 20 cycles Damping >0

Reactive Requirement Summary w/ Mohave Off

Post-DPV2 With Mohave Off Line

Path	Reactive Support to Meet the Planning Criteria			Stability Results
	New Shunt Capacitor @ Devers 500 kV (MVAr)	Add New 2nd SVC @ Devers 500 kV (MVAr)	Install New SVC @ Lugo 500 kV (MVAr)	Transient Voltage Dip (%) and Damping
NERC/WECC Planning Standard - Category B (Loss of Single Element)				
SCIT Benchmark	None	500	None	Valleysc 500 - 23.5 Devrsvc 500 - 22.7 Hi Desert 115 - 22.8 System < 20 cycles Damping >0
26 (Midway-Vincent)	None	500	None	Hi Deser 115 - 18.7 Devers 500 - 19.2 Devrsvc1 500 - 19.2 System < 20 cycles Damping >0
27 (IPPDC)	None	500	None	Hi Deser 115 - 22.9 Valleysc 500 - 23.6 Devrsvc1 500 - 22.8 System < 20 cycles Damping >0
41 (Sylmar)	None	500	None	Villa Pk 66 - 24.5 Valleysc 500 - 24.7 Valysvc2 115 - 23.7 30 SCE 115 = 20 cycles Damping >0
42 (IID-SCE)	None	500	None	N. Gila 69 - 11.5 Horsmesa 115 - 11.7 Devrsvc1 500 - 11.0 System < 20 cycles Damping >0
61 (Victorville-Lugo)	300	700	400	Villa pk 66 - 24.9 Serrano 230 - 23.8 Olinda 66 - 23.3 System <= 20.2 cycles Damping >0
64 (Marketplace-Adelanto)	300	600	400	Padua 66 - 23.8 Victorvl 287 - 24.7 Adelsvc 500 - 24.3 System <= 20 cycles Damping >0
65 (PDCI)	None	500	None	Hi Deser 115 - 22.3 Valleysc 500 - 22.8 Devrsvc1 500 - 22.4 System < 20 cycles Damping >0
Centennial	300	600	400	Padua 66 - 24.0 Victorvl 287 - 25.0 Adelsvc 500 - 24.6 System <= 20 cycles Damping >0

EOR9000+ Sensitivity

Analysis	Violation[1]	Additional Mitigation
Thermal	Yes	Op Procs
Stability	Yes	FCs&SVCs[2]
Post Transient	Yes	SPS[2,3]

1 Caused by DPV2 and EOR9000+
2 Nomogram may also be employed
3 Trip 840 MW of Harquahala generation and 821 MW of SOCAL load

Reactive Requirements w/ EOR9000+

Contingency	Transient Voltage Dip (%) and Damping (%)						
	New Shunt Capacitor @ Devers 500 kV (MVAr)	Add Shunt Capacitor @ Valley 500 kV (MVAr)	Upgrade Existing SVC @ both Valley 115 kV (MVAr)	Add New 2nd SVC @ Devers 500 kV (MVAr)	Install New SVC @ Lugo 500 kV (MVAr)	Post-Project w/ Mohave On Line	Post-Project w/ Mohave Off Line
NERC/WECC Planning Standard - Category B (Loss of Single Element)							
Hassayampa-N.Gila 500 kV	None	None	None	400	None	Cnturyld 230 - 99.8 Castaic 230 - 99.0 Olinda 66 - 95.7 System > 20 cycles Collapse	
Hassayampa-N.Gila 500 kV	700	100	None	1200	800	Villa pk 66 - 29.8 Victorvl 287 - 30.3 Adelsvc 500 - 30.0 System > 20 cycles Damping >0	
Hassayampa-N.Gila 500 kV	700	100	100	1200	800	Villa pk 66 - 26.5 Victorvl 287 - 26.4 Adelsvc 500 - 26.1 System > 20 cycles Damping >0	
Hassayampa-N.Gila 500 kV	700	100	200	1200	600	Villa pk 66 - 27.5 Victorvl 287 - 28.1 Adelsvc 500 - 27.8 System > 20 cycles Damping >0	
Hassayampa-N.Gila 500 kV	700	100	200	1200	800	Villa pk 66 - 24.5 Victorvl 287 - 24.5 Adelsvc 500 - 24.2 System < 20 cycles Damping >0	
Hassayampa-N.Gila 500 kV	None	None	None	500	None		Sylmar3 230 - 97.8 Rinaldi 230 - 92.8 Olinda 66 - 91.7 System > 20 cycles Collapse
Hassayampa-N.Gila 500 kV	800	100	200	1200	800		Gould 66 - 39.6 Cntury1 287 - 39.6 Olinda 66 - 38.1 System > 20 cycles Damping >0
Hassayampa-N.Gila 500 kV	800	100	200	1500	1200		Villa pk 66 - 22.9 Victorvl 287 - 22.6 Adelsvc 500 - 22.1 System < 20 cycles Damping >0

PV-TS5 Sensitivity

Analysis	Violation[1]	Additional Mitigation
Thermal	No	None
Stability	No	None
Post Transient	No	None

1 Caused by DPV2 and PV-TS5

Midpoint Substation Sensitivity

Midpoint-Buck Blvd 230 kV	Power Flow (MW) w/ PS[1]	w/o PS[1]
Mohave On Line	-2.4	-8.5
Mohave Off Line	-1.2	-5.2

1 – Phase shifter at Buck Blvd (Midpoint phase shifter out in both cases)

IID 200 MW Sensitivity

Analysis	Violation[1]	Additional Mitigation
Thermal	No	None
Stability	Yes	more SVC capacity
Post Transient	No	None

1 Caused by DPV2 with 1,400 MW increase on Path 49

MWD Pump Load Sensitivity

Analysis	Violation[1]	Additional Mitigation
Thermal	No	None

1 Caused by DPV2 with MWD pump loads off line

Final DPV2 Path 49 Report

- Submitted Draft Report on 06/17/05
- PRG provides comments by 07/18/05
- Conference call or meeting on 07/19/05
- Submit Final Report to WECC on 07/20/05 requesting Phase 3 status

Rating Study Schedule

	Target Completion Date
PRG Meeting #1	07/21/04
Draft Working Study Plan Reviewed	07/23/04
EOR pre-project Base Cases Approved	09/27/04
Working Study Plan Rev. 2 Approved	10/06/04
PRG Meeting #2	10/06/04
EOR post-project Base Cases Approved	10/18/04
Pre-Project Simultaneous Base Cases Approved	12/15/04
Non-Simultaneous EOR Studies Submitted	12/29/04
PRG Meeting #3	01/11/05
Simultaneous SCIT Studies	02/23/05
PRG Meeting #4	02/28/05
Remaining Simultaneous Studies	04/13/05
PRG Meeting #5	04/20/05
Sensitivity Studies	05/31/05
PRG Meeting #6	06/21/05
PRG Meeting #7 (?)	07/19/05
Submit Final Report to WECC	07/20/05

Parallel Studies Update

- SSR
  - Nearing completion – preparing report
- Short Circuit
  - Nearing completion – need to address queuing
- PV Hub – Extreme Contingencies
  - On-going study involving APS, SRP & ACC
  - PV Hub, Hassayampa Hub and N-3 of HQ-HA Hub Ties
- SPS
  - On-going study to evaluate gen & load drop sizes & locations and arming strategy