

ORIGINAL



0000061490

57

**BEFORE THE ARIZONA POWER PLANT AND
TRANSMISSION LINE SITING COMMITTEE**

IN THE MATTER OF THE APPLICATION
OF SOUTHERN CALIFORNIA EDISON
COMPANY AND ITS ASSIGNEES IN
CONFORMANCE WITH THE
REQUIREMENTS OF ARIZONA REVISED
STATUTES SECTIONS 40-360.03 AND
40-360.06 FOR A CERTIFICATE OF
ENVIRONMENTAL COMPATIBILITY
AUTHORIZING CONSTRUCTION OF A
500kV ALTERNATING CURRENT
TRANSMISSION LINE AND RELATED
FACILITIES IN MARICOPA AND LA PAZ
COUNTIES IN ARIZONA ORIGINATING
AT THE HARQUAHALA GENERATING
STATION SWITCHYARD IN WESTERN
MARICOPA COUNTY AND
TERMINATING AT THE DEVERS
SUBSTATION IN RIVERSIDE COUNTY,
CALIFORNIA

) Docket No. L-00000A-06-0295-00130

) Case No. 130

**NOTICE OF FILING
COMMITTEE EXHIBITS**

RECEIVED
2006 SEP 18 P 3:50
AZ CORP COMMISSION
DOCUMENT CONTROL

NOTICE OF FILING

Robert Kondziolka and Bob Smith, by and through their undersigned counsel,
hereby file copies of slides to be utilized during their testimony as Arizona Power Plant
and Transmission Line Siting Committee witnesses on September 25, 2006. The slides
are labeled Committee Exhibit 2.

Dated this 18th day of September, 2006.

Arizona Corporation Commission
DOCKETED

SEP 18 2006

DOCKETED BY NR

By: Laura Raffaelli
Laura Raffaelli
Salt River Project Agricultural
Improvement and Power District
Law Department

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

1 Mail Station PAB 207
2 P.O. Box 52025
3 Phoenix, Arizona 85072
4 Attorney for Robert Kondziolka

5 Karilee Ramaley
6 Pinnacle West Capital Corporation
7 Mail Station 8695
8 P.O. Box 5399
9 Phoenix, Arizona 85072
10 Attorney for Bob Smith

11 ORIGINAL and 35 copies of the
12 foregoing filed on this 18th day
13 of September, 2006, with

14 Docket Control
15 ARIZONA CORPORATION COMMISSION
16 1200 W. Washington
17 Phoenix, Arizona 85007

18 Copy of the foregoing mailed on this
19 18th day of September, 2006, to:

20 Laurie Woodall
21 Office of the Attorney General
22 1275 West Washington Street
23 Phoenix, Arizona 85007

24 Ernest G. Johnson
25 ARIZONA CORPORATION COMMISSION
26 1200 W. Washington Street
Phoenix, Arizona 85007

Copy of the foregoing sent by electronic mail
on this 18th day of September, 2006,
to all parties of record.



Testimony of Robert Kondziolka and Bob Smith

**Palo Verde to Devers II
Transmission Line Siting Hearing
Case No. 130
September 25, 2006**

Committee Exhibit 2

1

Robert Kondziolka Witness Background

- Educational Background
 - BS Engineering, University of Arizona
- Professional Background
 - SRP Manager Transmission Planning 1999-2006
 - 27 years experience in electric utility design, construction, maintenance, project management, and planning
 - Registered Professional Engineer – Arizona
 - Southwest Area Transmission (SWAT) - Chair
 - Western Electricity Coordinating Council
 - Planning Coordination Committee – Vice Chair
 - Joint Guidance Committee – Chair
 - Western Congestion Analysis Task Force – Chair
 - Transmission Expansion Planning Policy Committee

Bob Smith Witness Background

- Educational Background
 - BS Pharmacy, University of Utah
 - MSEE, New Mexico State University
- Professional Background
 - APS transmission operations manager 1997-2002
 - APS transmission planning manager since November 2002
 - 20 years experience in electric utility industry transmission operations and planning
 - Arizona registered professional engineer
 - 15 years extensive involvement with WECC
 - Member of various planning committees, e.g. SWAT and STEP
 - Co-Chair of STEP

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

3

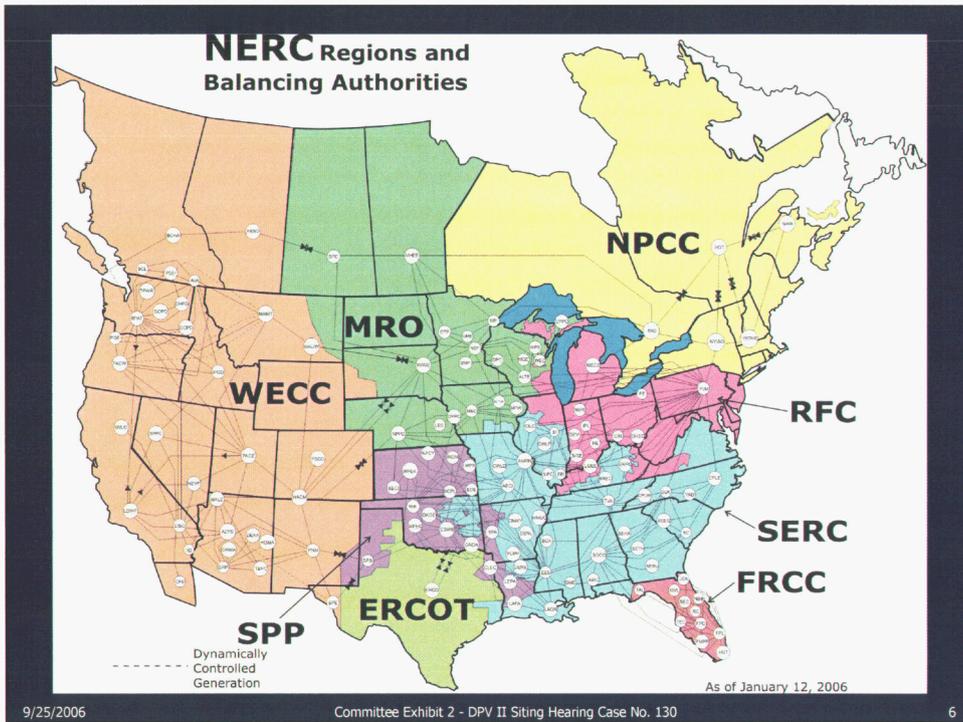
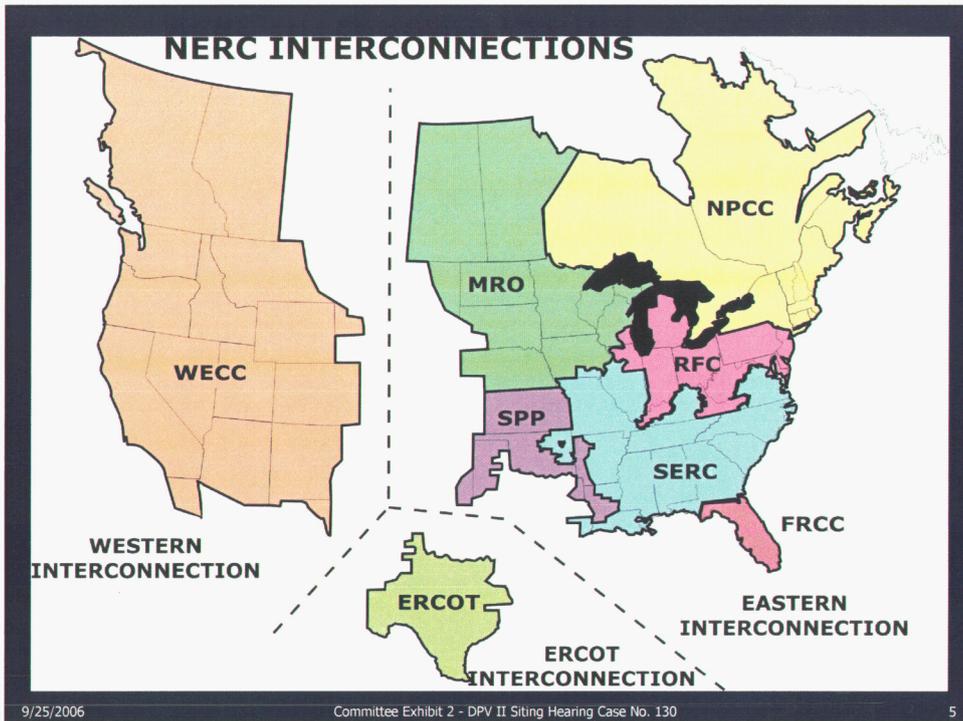
Overview of Testimony

- Reliability Organizations
- System Overview
- DOE Congestion Study
- STEP Analysis of DPV2
- Regional Transmission Projects
- Transmission Outage Data
- Double Circuit Standards
- WECC Path Rating Process

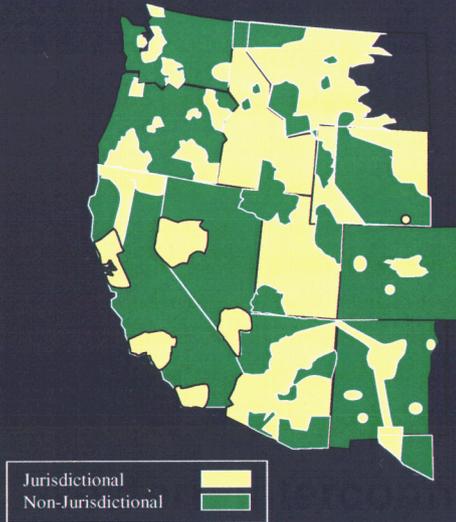
9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

4



Western Interconnection Utilities under FERC Jurisdiction



9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

7

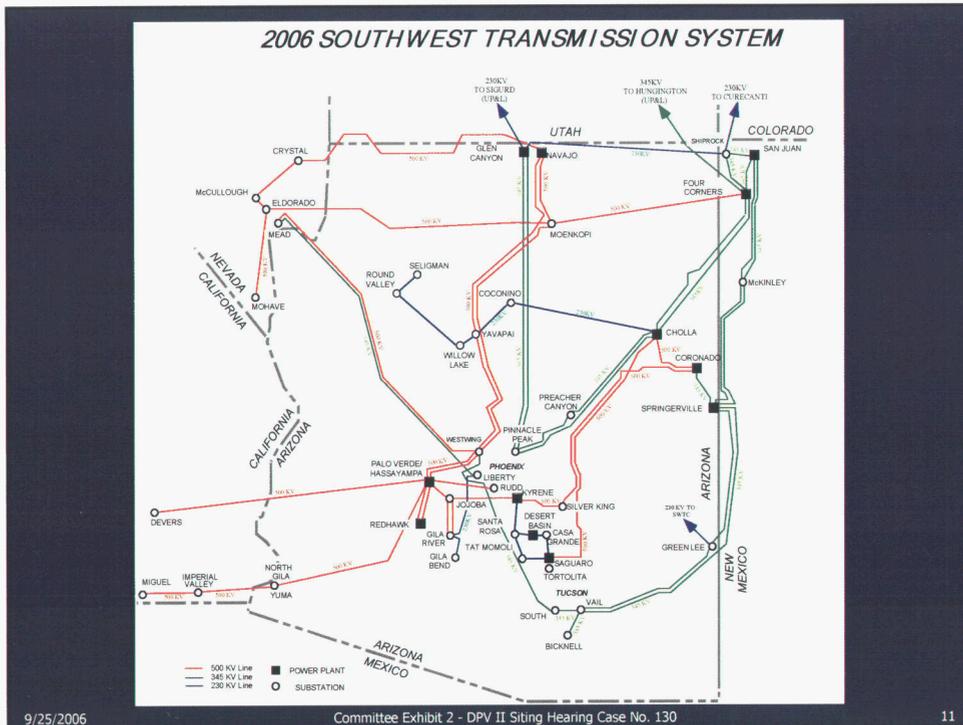
Interconnection Wide Issues



9/25/2006

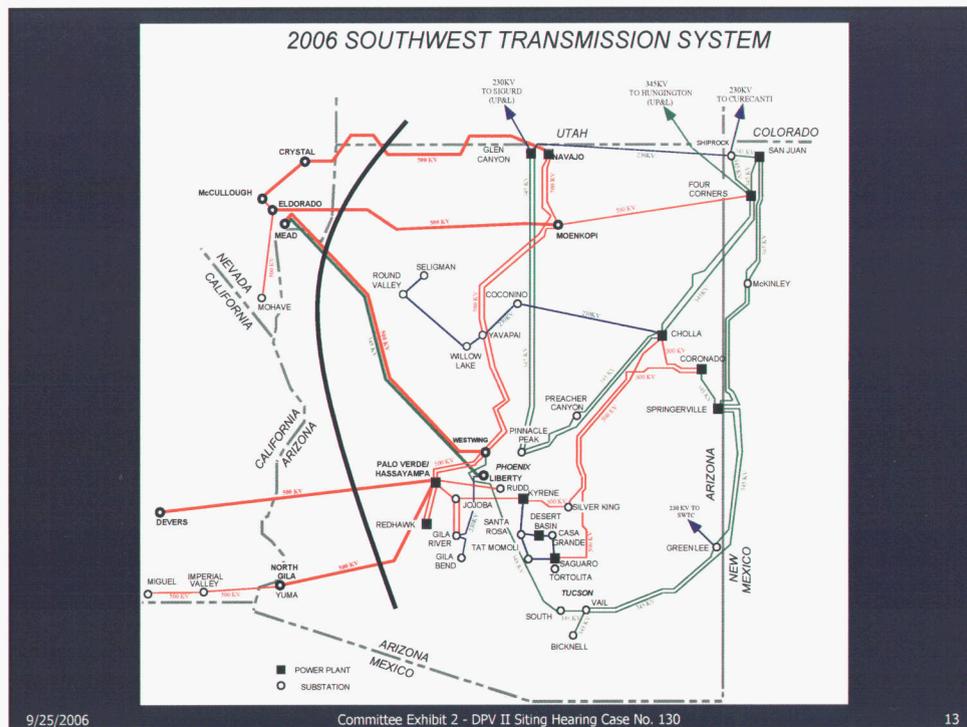
Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

8



Path 49 = East of the River (EOR)

Line	Control Area	Owners	Allocation of Rating (MW)
Navajo-Crystal	LADWP	NPC - 26%	371
		LADWP - 49%	695
		USBR - 25%	356
		TOTAL = 1422	
Moenkopi-El Dorado	APS	APS (SCE) - 100%	1555
Perkins-Mead	WAPA	APS - 18%	236
		SRP - 18%	236
		WAPA - 32%	412
		LADWP - 32%	416
		TOTAL = 1300	
Liberty-Mead	WAPA	WAPA - 100%	450
Palo Verde-Devers	CAISO	SCE - 100%	1802
Hassayampa-North Gila	CAISO	APS - 11%	168
		IID - 13%	195
		SDG&E - 76%	1163
		TOTAL = 1526	
TOTAL			8055



Physics and Line Flows

- **Factors in determining flows on lines**
 - Load
 - Generation
 - System configuration
 - Lines and/or Transformers out of service

Commercial Utilization

- **Transmission Line/Path Ratings**
- **Transmission Rights**
 - Ownership
 - Contracts
 - Transmission Reservations (FERC OATT)
- **Transmission Schedules (Energy Transactions)**
 - Must have right to schedule
 - Schedule on hourly basis
 - Submitted day ahead
 - May be adjusted up to hour ahead

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

15

Each Control Area contains:
Transmission System
Distribution System
Generation
Load

Control Area Balancing



Net Flow Export = 200 MW
Net Scheduled Export = 300 MW
Difference = -100 MW

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

16

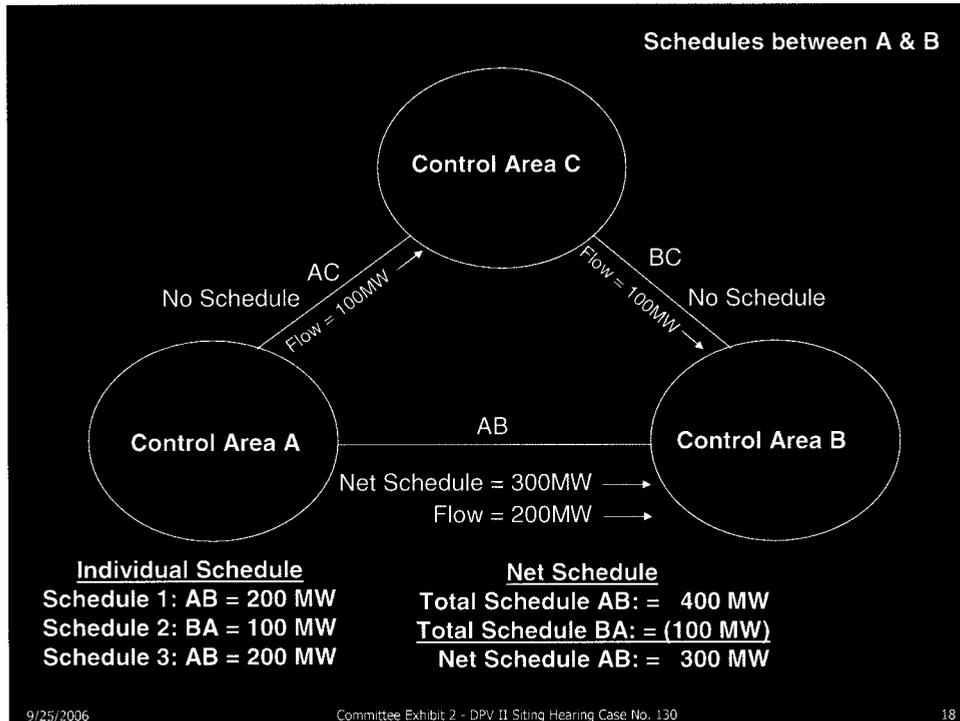
Control Areas

- Each generation, transmission and distribution facility, and load is assigned to one and ONLY one control area
- Control area balancing responsibility
 - Generation = load + losses + sum of all export schedules
- Automatic Generation Control (AGC) program
 - Part of Energy Management System (EMS)
 - Goal is sum of interconnection flows = sum of export schedules
 - Continuous monitoring of interconnection flows
 - Continuous signals sent to move generators up or down to meet goal
- WECC has 34 control areas
 - Arizona has APS, SRP, TEP, WAPA as load control areas

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

17



9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

18

Which Way Are We Going?

- **Each Transmission line operated as two paths**
 - Separate path in each direction
- **Ratings, Rights, and Schedules are determined separately for each direction**
 - In the Southwest rating usually same in both directions but may be different
 - Ownership usually in both directions
 - Rights defined in one direction
 - Two sets of rights for a line (one for each direction)
 - Individual schedules implemented in one direction
 - May be two sets of schedules on line (one for each direction)
- **Net schedule for an hour**
 - Add up schedules in each direction separately
 - Subtract one total from the other
 - Result is the net schedule

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

19

Review

Q: Does Flow always = Schedule?

A: No

Q: Can flow be in both directions at same time?

A: No

Q: Can flow change directions during hour?

A: Yes

Q: Can individual schedules (transactions) be implemented in both directions during an hour?

A: Yes

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

20

System Operation

- **Line operation and maintenance**
 - Switching
 - Taking equipment out of service
 - Physical work on equipment
- **Control Area operation**
 - Implement schedules
 - Balance energy demand and resources
 - Maintain system within reliability limits
 - Flow < rating
 - Net schedule < rating
 - Respond to system disturbances

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

21

Physical Congestion

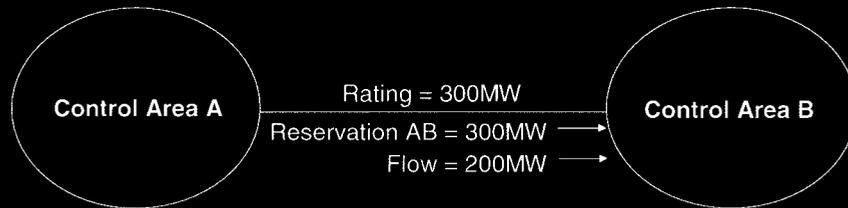


9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

22

Contractual Congestion



Reservations AB = 300 MW
Reservations BA = 100 MW

Schedule 1: AB = 300 MW
Schedule 2: BA = 100 MW
Net Schedule = 200 MW

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

23

Congestion

- Inability to add transactions on a line or path
- Physical congestion
 - Line or path flow near or at rating
- Contractual congestion
 - Line or path flow may be significantly less than rating
 - No available transmission for additional reservations

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

24

Arizona Transmission Services

- **Transmission providers administer OATTs which determine costs and terms of transmission services**
- **One line may have multiple owners and therefore multiple OATT administrators**
- **Control area operator implements schedules and ensures reliable operation**
- **If transaction crosses multiple providers, it will incur multiple transmission charges**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

25

California Transmission Services (for CAISO participants)

- **CAISO administers single grid-wide OATT**
- **CAISO is control area operator**
- **Transmission access charges**
- **Grid management charges**
- **FTRs**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

26

Energy Policy Act (EPAcT) 2005

August 2005

- **Section 1221 – Siting of Interstate Electric Transmission Facilities**
 - DOE to determine criteria for designating possible National Interest Electric Transmission Corridors (NIETC)
 - Evaluation of existing studies and congestion modeling of the eastern and western interconnection
- **Section 368 – Energy ROW Corridors on Federal Lands**
Title III Oil and Gas, Subtitle F Access to Federal Lands
 - Applies to U.S. Department of Agriculture (Forest Service), U.S. Department of Interior (Bureau of Land Management), and U.S. Department of Defense
 - Draft Programmatic Environmental Impact Statement (PEIS) Fall 2006
 - PEIS in 11 Western states to be completed by August 2007

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

29

EPAcT 2005 Section 1221

Title XII Electricity

Subtitle Transmission Infrastructure Modernization

- The Energy Policy Act of 2005 requires DOE to issue a national transmission congestion study for comment by August 2006 and every three years thereafter.
- Based on the study and public comments, DOE to recommend and Secretary of Energy to designate selected geographic areas as National Interest Electric Transmission Corridors (NIETC). No time frame stipulated for designating NIETC.
- FERC Backstop Siting Authority - Authority to issue construction permits in NIETCs when states do not approve siting within one year of application or place undue restrictions upon them.

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

30

DOE Congestion Study

Background

- DOE is not mandated to prescribe solutions
- DOE would like to see necessary steps taken by the states and regions to address problems in designated corridors
- DOE does not plan to prescribe solutions that address congestion for a designated corridor
- DOE does not see new transmission lines as the only solution to address a congested corridor

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

31

Western Congestion Assessment Task Force Report Objectives

- Identify congested areas
- Identify major assumptions and congestion drivers
- Identify economic impact of congestion
- Identify sensitivity of congestion to assumptions (gas prices, hydro levels, etc)
- Limitations of the analysis

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

32

Studies/Reports – Related to DOE Task 1

SSG-WI 2003 Study Program – *SSG-WI Report*
SSG-WI 2003 Path Utilization Study – *SSG-WI Report*
Canada – NW – California Transmission – *NTAC Report*
Colorado Long Range Transmission Planning Study – *CCPG Report*
Conceptual Plans for Electricity Transmission in the West – *WGA Report*
T4 Wind Project – *Nevada State Office of Energy Report*
Rocky Mountain Area Transmission Study – *RMATS Report*
Puget Sound Upgrade Project – *NTAC Report*
Montana Northwest Transmission Equal Angle Report – *NTAC Report*
West of Hawaii System Upgrade Project – *NTAC Report*
Central Arizona Transmission Study – *SWAT Report*
Path 49 (East of River) Transmission Upgrades - *STEP Report*
CEC Strategic Transmission Investment Plan – *CEC Report*
Imperial Valley – San Felipe 500 kV Transmission Project – *IID Report*
Tehachapi Wind Integration Transmission Study – *CPUC Report*
Canada to Northwest Intertie Expansion – *BCTC Report*
Protecting and Managing an Increasingly Congested
Transmission System – *BPA Report*
Review of WECC Coordinated Phase Shifter Operation – 2001 to 2005 *WECC Report*
LEAPS and TE-VS Project – *Nevada Hydro Company Report*

Studies/Reports – Related to DOE Task 3

SSG-WI 2005 Study Program (2008 and 2015) – *SSG-WI/WECC Report*
W.I. 2006 Path Utilization Study – *SSG-WI/WECC Report*
Clean and Diversified Energy Initiative – *WGA Report*

Historical Path Flow Analysis

- Actual physical flow based on hourly MW average
- 1999 through 2005
- Seasonal Analysis
 - Spring (April & May)
 - Summer (June through October)
 - Winter (November through March)
- Usage over peak season (one season over all years)
- Usage over peak season (highest individual period)

Model Simulation Program

- **ABB GridView**
- **Least cost dispatch**
- **Transmission limitations**
- **Startup costs, ramp rates and variable O&M costs**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

35

Modeling Assumptions 2008 & 2015

- **Three gas prices (\$5, \$7, & \$9 per MMBTU Henry Hub)**
- **Average losses**
- **Hydro and Wind are hard wired into the model**
- **Medium Hydro year**
- **WECC 2005 Load & Resource load forecast (modified)**
- **Hourly load shapes were developed using FERC 714**
- **WECC path ratings and nomograms were modeled**
- **Unit forced outage rates are modeled, using EIA data**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

36

2015 Modeling Assumptions

- Incremental resource reflect utility Integrated Resource Plans (IRP), state Renewable Portfolio Standards (RPS), and approved Load and Resource (L&R) plans
- Incremental transmission was added to a WECC 2008 case to represent 2015 network topology

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

37

Basis of Congestion in Results

Historical Flow	All top 10 ranked WECC Paths for U75 and U90 (U75>40% and U90>5%)
2008 Model Study	All WECC paths or lines ranked in top 10 in one of three categories for \$5, \$7, and \$9 gas U75 (>80%) U90 (>50%) Shadow Price Binding Hours
2015 Model Study	All WECC paths or lines ranked in top 10 in one of five categories for \$5, \$7, and \$9 gas U75 (>80%) U90 (>60%) ULimit (>50%) Shadow Price (Average) Congestion Rent

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

38

Origin of Congestion in Results

	No. of WECC Paths/Lines Identified	No. of Areas Identified	No. of Areas Identified Sub-Regional Groups
Existing Studies	16	11	6
Historical Flows	13	10	
2008 Study	17	10	
2015 Study	12	8	
Total	24	14	6

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

39

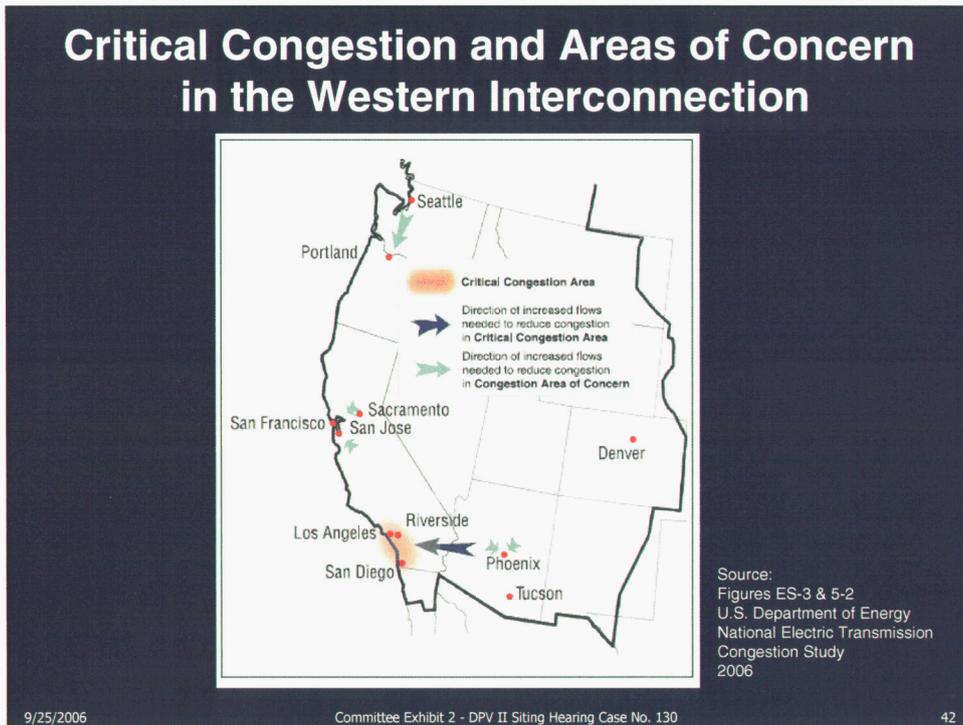
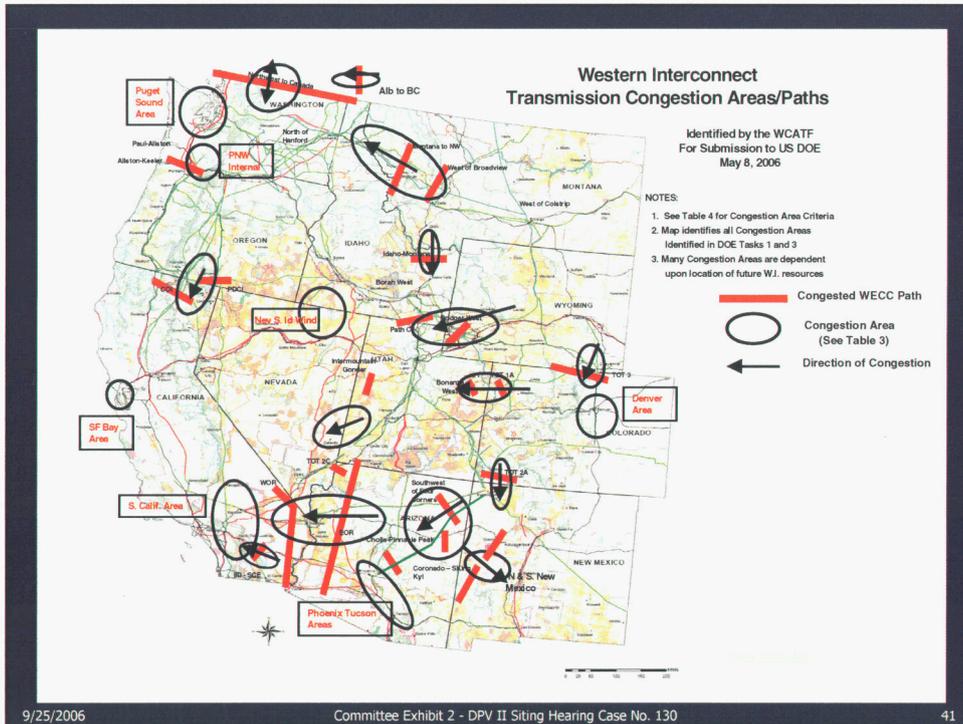
Key Caveats

- Results are highly dependent upon gas prices, hydro conditions and location of future resources
- The WCATF study focused on the identification of transmission congestion; it did not specifically identify resource/load Constraint Areas (as defined by DOE)
- The WCATF Congestion Areas were not ranked due to the variability and inconsistency in the alternative metric ranking methods
- Additional studies are required to determine if it is necessary or economical to add new or upgrade existing facilities to reduce congestion

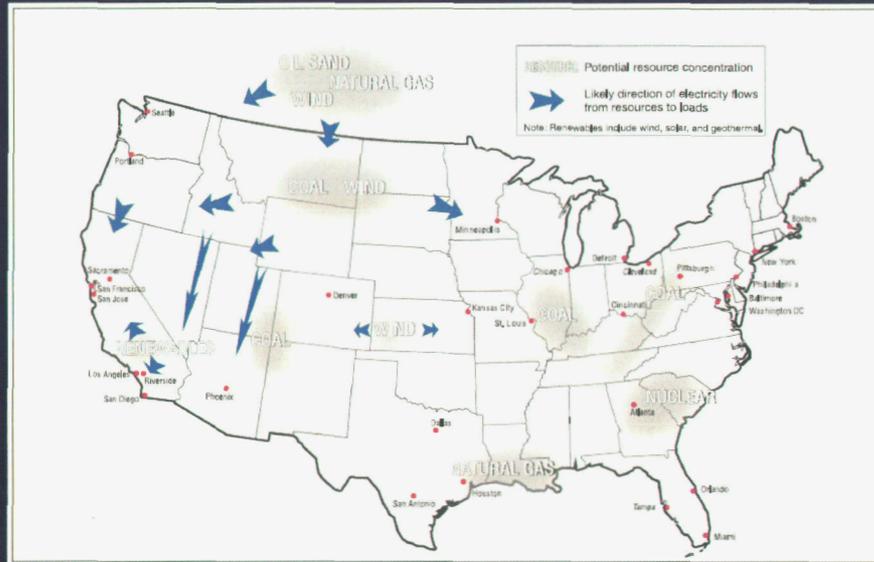
9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

40



Conditional Constraint Areas



Source: Figures ES-4 & 5-5, U.S. Department of Energy, National Electric Transmission Congestion Study, 2006

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

43



CALIFORNIA ISO

California Independent
System Operator

STEP's Goal – “To provide a forum where all interested parties are encouraged to participate in the planning, coordination, and implementation of a robust transmission system between the Arizona, Nevada, Mexico, and southern California areas that is capable of supporting a competitive, efficient, and seamless west-wide wholesale electricity market while meeting established reliability standards. The wide participation envisioned in this process is intended to result in a plan that meets a variety of needs and has a broad basis of support.”

JMiller/GrdPing

2

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

44



Three Study Phases

- Phase 1 – Short-term Solutions - Projects that can be implemented in a few years such as increasing the ratings of the series capacitors in the Southwest Power Link (SWPL).
- Phase 2 – Mid-term Solutions - Major new bulk transmission facilities such as a major new 500 kV line.
- Phase 3 – Long-term Vision - Conceptual future plan



Development of STEP Alternatives

- Analyzed 26 Alternatives in Powerflow
- 6 Selected for Detailed Study
- 4 are AC Alternatives and 2 are DC Alternatives



Parameters for each alternative

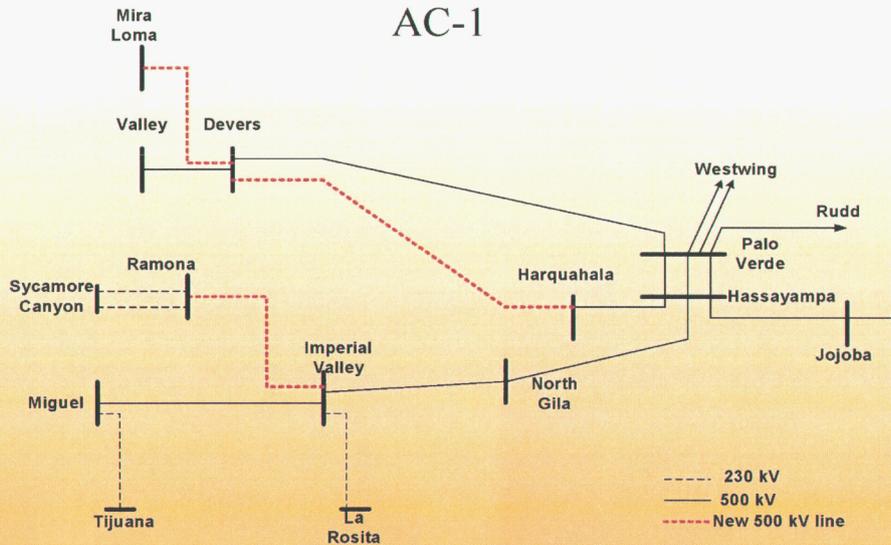
- Miles of new transmission lines
- Rating of new and existing series capacitors
- Number of new transformers/phase shifters
- Overloads (under normal and single line contingency conditions)
- Losses
- VAR support
- Flows across various WECC paths/interfaces
- Sufficient transfer capability requires at least one new line from the Palo Verde area into California and at least one new line into San Diego

Created By: Johan Galleberg

LST UPDT: June 19, 2003



AC-1



Created By: Johan Galleberg

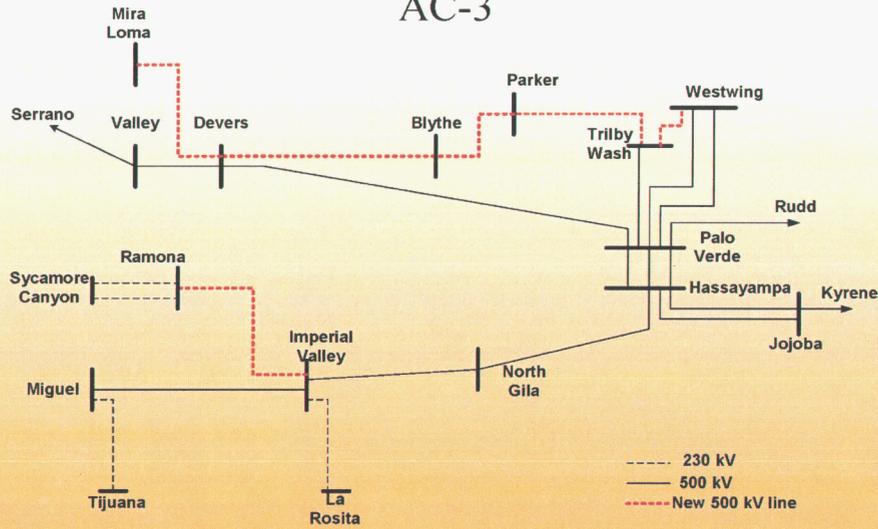
LST UPDT: 8/26/2003



CALIFORNIA ISO

California Independent System Operator

AC-3



Created By: Johan Galleberg

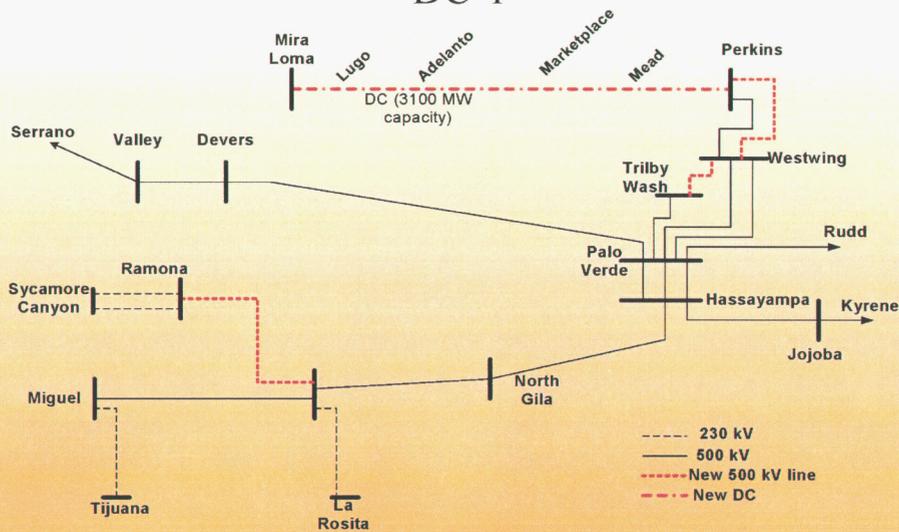
LST UPDT: 8/26/2003



CALIFORNIA ISO

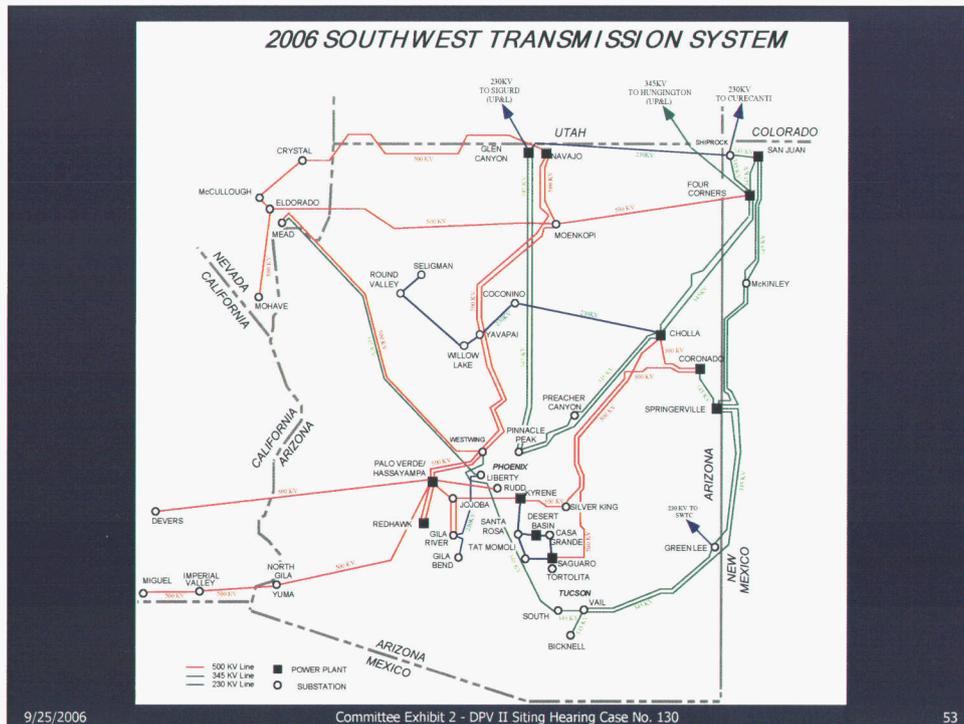
California Independent System Operator

DC-1



Created By: Johan Galleberg

LST UPDT: 8/26/2003



Frequency of Forced Transmission Outages in Arizona (APS & SRP) for HV and EHV lines between 1996-2005

Voltage Class	Number of Lines (as of 12/31/05)	Total Number of Outages	Average Number of Outages/circuit/year
230kV	70	388	0.6
345kV	4	67	1.7
500kV	25	178	0.8

Double Circuit Standards

**Reference: NERC/WECC
Planning Standards Foreword**

- **Adequacy – the ability of the electric system to supply the aggregate electrical demand and energy requirements of their customers at all times, taking into account scheduled and reasonably expected unscheduled outages of the system**
- **Security – the ability of the electric system to withstand sudden disturbances such as electric short circuit or unanticipated loss of system elements**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

55

Reference: NERC/WECC Planning Standards Introduction

- **To maintain the reliability of the bulk electric systems or interconnected transmission system or networks, the Regions and their members and all electric industry participants must comply with the NERC Planning Standards.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

56

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security – Discussion

- These systems must be planned, designed, and constructed to operate reliably within thermal, voltage, and stability limits while achieving their major purposes. These purposes are to:
 - Deliver Electric Power to Areas of Customer Demand – Transmission systems provide for the integration of electric generation resources and electric system facilities to ensure the reliable delivery of electric power to continuously changing customer demand under a wide variety of system conditions
 - Provide Flexibility for Changing System Conditions – Transmission capacity must be available on the interconnected transmission systems to provide flexibility to handle the shift in facility loadings caused by the maintenance of generation and transmission equipment, the forced outages of such equipment, and a wide range of other system variable conditions, such as construction delays, higher than expected customer demands, and generating unit fuel shortages
 - Reduce Installed Generating Capacity
 - Allow Economic Exchange of Electric Power Among Systems

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

57

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security – Discussion

- **All electric utilities, transmission providers, electricity suppliers, purchasers, marketers, brokers, and society at large benefit from having reliable interconnected bulk systems. To ensure that these benefits continue, all industry participants must recognize the importance of planning these systems in a manner that promotes reliability.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

58

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems - Introduction

- **Extreme but less probable contingencies measure the robustness of the electric systems and should be evaluated for risks and consequences. The risks and consequences of these contingencies should be reviewed by the entities responsible for the reliability of the interconnected transmission systems. Actions to mitigate or eliminate the risks and consequences are at the discretion of those entities.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

59

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – S4

- **The interconnected transmission system shall be evaluated for the risks and consequences of a number of the extreme contingencies that are listed under Category D of Table I.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

60

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – WECC-S2

- **The NERC Category C.5 initiating event of a non-three phase fault with normal clearing shall also apply to the common mode contingency of two adjacent circuits on separate towers unless the event frequency is determined to be less than one in thirty years.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

61

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – WECC-S5

- **For contingencies involving existing or planned facilities, the Table W-1 performance category can be adjusted based on on actual or expected performance (e.g. event outage frequency and consideration of impact) after going through the WECC Phase I Probabilistic Based Reliability Criteria (PBRC) Performance Category Evaluation (PCE) Process.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

62

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – WECC-S6

- **Any contingency adjusted to Category D must not result in a cascading outage unless the MTBF is greater than 300 years (frequency less than 0.0033 outages/year) or the initiating disturbances and corresponding impacts are confined to either a radial system or a local network.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

63

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – WECC-G6

- **The interconnected transmission systems should be planned to avoid excessive dependence on any one circuit, structure, right-of-way, or substation.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

64

Reference: NERC/WECC Planning Standards

I. System Adequacy and Security A. Transmission Systems – WECC-G5

- Consideration in determining the probability of occurrence of an outage of two adjacent circuits on separate towers should include line design; length; location; environmental factors; outage history; operational guidelines; and separation between circuits.

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

65

Table I. Transmission System Standards –Normal and Contingency Conditions

Category	Contingencies	Elements Out of Service	System Limits or Impacts				
			Thermal Limits	Voltage Limits	System Stable	Loss of Demand or Curtailed Firm Transfers	Cascading Outages
A - No Contingencies	All Facilities in Service	None	Applicable Rating * (AR)	Applicable Rating * (AR)	Yes	No	No
B - Event resulting in the loss of a single element	Single Line Ground (SLG) or 3-Phase (3P) Fault, with Normal Clearing	Single	AR	AR	Yes	No	No
	1. Open-air 2. Transmission Circuit 3. Transformer Loss of an Element without a Fault	Single Single Single Single	AR AR AR AR	AR AR AR AR	Yes Yes Yes Yes	No No No No	No No No No
	Single Pole Block, Normal Clearing 4. Single Pole 3-Phase Line Loss of an Element without a Fault	Single	AR	AR	Yes	No	No
C - Event(s) resulting in the loss of two or more (multiple) elements	SLG Fault, with Normal Clearing	Multiple	AR	AR	Yes	Planned/Controlled	No
	1. Bus Section 2. Breaker Failure or mis-set (Fault)	Multiple Multiple	AR AR	AR AR	Yes Yes	Planned/Controlled Planned/Controlled	No No
	SLG or 3P Fault, with Normal Clearing, Manual System Adjustments, followed by another SLG or 3P Fault, with Normal Clearing	Multiple	AR	AR	Yes	Planned/Controlled	No
	3. Category B (B1, B2, B3, or B4) contingency, manual system adjustments, followed by another Category B (B1, B2, B3, or B4) contingency	Multiple	AR	AR	Yes	Planned/Controlled	No
	Double Block, with Normal Clearing 4. Breaker (or) Line Fault (or) 3P, with Normal Clearing	Multiple Multiple	AR AR	AR AR	Yes Yes	Planned/Controlled Planned/Controlled	No No
5. Any two circuits of a multiple circuit transmission line	Multiple	AR	AR	Yes	Planned/Controlled	No	
6. Single Fault, with Delayed Clearing (stick broken or protection system failure)	Multiple	AR	AR	Yes	Planned/Controlled	No	
7. Generator 8. Transformer 9. Transmission Circuit 10. Bus Section	Multiple Multiple	AR AR	AR AR	Yes Yes	Planned/Controlled Planned/Controlled	No No	

Reference: NERC/WECC Planning Standards I. System Adequacy and Security – A. Transmission Systems

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

66

Table I. Transmission System Standards – Normal and Contingency Conditions

<p>D⁵ – Extreme event resulting in two or more (multiple) elements removed or cascading out of service</p>	<p>30 Fault, with Delayed Clearing¹ (stuck breaker or protection system failure):</p> <p>1. Generator 3. Transformer 2. Transmission Circuit 4. Bus Section</p>	<p>Evaluate for risks and consequences.</p> <ul style="list-style-type: none"> ▪ May involve substantial loss of customer demand and generation in a widespread area or areas. ▪ Portions or all of the interconnected systems may or may not achieve a new, stable operating point. ▪ Evaluation of these events may require joint studies with neighboring systems.
	<p>30 Fault, with Normal Clearing¹:</p> <p>5. Breaker (failure or internal fault)</p>	
	<p>Other:</p> <p>6. Loss of towerline with three or more circuits 7. All transmission lines on a common right-of-way 8. Loss of a substation (one voltage level plus transformers) 9. Loss of a switching station (one voltage level plus transformers) 10. Loss of all generating units at a station 11. Loss of a large load or major load center 12. Failure of a fully redundant special protection system (or remedial action scheme) to operate when required 13. Operation, partial operation, or misoperation of a fully redundant special protection system (or remedial action scheme) in response to an event or abnormal system condition for which it was not intended to operate 14. Impact of severe power swings or oscillations from disturbances in another Regional Council.</p>	

Reference: NERC/WECC Planning Standards
I. System Adequacy and Security – A. Transmission Systems

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

67

Footnotes to Table I.
Table I. Transmission System Standards – Normal and Contingency Conditions

- a) Applicable rating (A/R) refers to the applicable normal and emergency facility thermal rating or system voltage limit as determined and consistently applied by the system or facility owner. Applicable ratings may include emergency ratings applicable for short durations as required to permit operating steps necessary to maintain system control. All ratings must be established consistent with applicable NERC Planning Standards addressing facility ratings.
- b) Planned or controlled interruption of electric supply to radial customers or some local network customers, connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall security of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) electric power transfers.
- c) Cascading is the uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread service interruption which cannot be restrained from sequentially spreading beyond an area predetermined by appropriate studies.
- d) Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted firm (non-recallable reserved) electric power transfers may be necessary to maintain the overall security of the interconnected transmission systems.
- e) A number of extreme contingencies that are listed under Category D and judged to be critical by the transmission planning entity(ies) will be selected for evaluation. It is not expected that all possible facility outages under each listed contingency of Category D will be evaluated.
- f) Normal clearing is when the protection system operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed protection systems. Delayed clearing of a fault is due to failure of any protection system component such as a relay, circuit breaker, or current transformer (CT), and not because of an intentional design delay.
- g) System assessments may exclude these events where multiple circuit towers are used over short distances (e.g., station entrance, river crossings) in accordance with Regional exemption criteria

Reference: NERC/WECC Planning Standards
I. System Adequacy and Security – A. Transmission Systems

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

68

WECC Path Rating Process WECC Progress Reports

A process by which project sponsors report potential significant additions and changes to the system and WECC members are provided the opportunity to review and comment on these additions or changes

- Initial Progress Report
- Comprehensive Progress Report
- Supplemental Progress Report
- Review of Progress Reports By All TSS Members
- Informal Reports Presented At TSS Meetings

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

69

WECC Path Rating Process

- **This is a process intended to ensure that new projects are integrated into the existing system with an ensured rating while recognizing protected ratings of other facilities.**
- **Path Rating implemented through a three phase process**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

70

WECC Path Rating Process – Phase 1

- Project sponsor submits a report through the WECC Progress Report Policies and Procedures process
- Conduct sufficient studies to demonstrate the proposed non-simultaneous rating of the project
- Prepares a Comprehensive Progress Report

Completion of Phase 1

- Full project representation for inclusion in WECC base cases
- Distributed a Comprehensive Progress Report
- Submit a letter to TSS and PCC requesting Phase 2 Status
- If the above criteria are satisfied and no objections have been received within 60 days of WECC's receipt of the request to enter Phase 2
- Project sponsor(s) notify the TSS Chair and provide evidence that the project has satisfied all requirements

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

71

WECC Path Rating Process – Phase 2

- **Request participation in forming a Project Review Group**
- **Study work is validated**
 - Simultaneous transfer capability effects and the impact of the project on neighboring transmission systems are further assessed
 - Project Sponsor and Peer Review Group must document all the studies and findings in a report called Project Review Group Phase 2 Rating Report

Completion of Phase 2

- **30-day period for comments from Project Review Group on the Phase 2 Project Rating Report (starting from WECC distribution of the report)**
- **Address issues and concern of Review Group**
- **Distribute the Phase 2 Rating Report to PCC, TSS, and OC for 30 days for comment on conformance with Procedure**
- **Submit letter to PCC requesting Phase 3 Status**
- **Phase 2 is completed when the Phase 2 Rating Report is accepted and the project is granted an “Accepted Rating” by PCC Chair.**

9/25/2006

Committee Exhibit 2 - DPV II Siting Hearing Case No. 130

72

WECC Path Rating Process – Phase 3

- **Is a monitoring phase where major changes in assumptions and conditions are evaluated to assure the “Accepted Rating” is maintained.**
- **Construction begins**
- **Sponsor is committed to the project**
- **Considered to be part of the "existing system"**
 - **only "at risk" due to its failure to complete its own plan of service**
- **Is completed when the project is placed into service**