Attachments

Attachment 1

Central Arizona Transmission Study (CATS)

Phase I
STUDY PLAN

1. Introduction

Over the last ten years Arizona has seen significant increases in business and residential growth. While future projections suggest that growth may slow, Arizona's electric utility industry continues a breakneck pace to keep up with existing and future growth expectations. At the same time, resource developers vie for opportunities to site and build new generation to access market opportunities in the Palo Verde area. Virtually all Arizona utilities are looking for opportunities to either maximize their existing transmission investments through increased transmission utilization or to build new transmission to serve their customer's needs.

Presently, the central Arizona region between the Phoenix Valley, Palo Verde, and Tucson is attracting the most attention. The Central Arizona Transmission Study (CATS) is proposed to provide an opportunity for Arizona utilities to jointly work with each other to address their common transmission needs.

This document proposes a scope of study to assess proposed transmission development in the central Arizona region.

2. Objective

Assess the impact of proposed central Arizona transmission opportunities on the interconnected Arizona transmission system.

3. Scope

The scope of the study is described below.

Study Time Frame – A 2005/2006 to 2012-study time frame is proposed. This time frame can be adjusted based on availability of base cases either within the WSCC Data Bank or through a study participant. The study will be broken down into two phases: Phase 1 will concentrate on the 2005/2006 time frame were phase 2 will concentrate on the 2012 time frame.

Generation Sites – The Generation sites have group into three (3) separate generation groups. A complete list of new Generation modeled in the CATs base case is listed in Appendix A.

A. Generation at or near the Palo Verde Site

B. Generation at or near Saguaro and Coolidge area

1. Saguaro Generation
2. Coolidge Generation

C. Generation at or near Tucson, Springerville and Mexico

1. Tucson Generation
2. Springerville Generation
3. Mexico Generation

Load Areas – The following major load centers will be studied.

A. Phoenix Area: APS/SRP valley load on a 45%/55% split.

B. Tucson Area Load

C. Southern Arizona Area (Can include deliveries to Mexico)

D. Southern California

Phoenix Imports - The following imports into Phoenix will be studied.

A. North to South

B. South to North

C. Deliveries to California

Sensitivities:

A. North to South with Heavy deliveries to California

B. North to South with Light deliveries to California

C. South to North with Heavy deliveries to California

D. South to North with Light deliveries to California

Transmission Alternatives:

1. Palo Verde-Gila Bend 500kV, Palo Verde-SW Valley 500kV, Gila Bend-Santa Rosa (500kV or 230kV), Gila Bend-Santa Rosa 500kV, Saguaro-Tucson Area (230kV or 500kV), Loop Silver King into the Cholla-Saguaro 500kV line.

2. Palo Verde-SW Valley 500kV, Palo Verde- Saguaro 500kV, Saguaro-Tucson Area (230kV or 500kV), Gila Bend-Santa Rosa 230kV, Loop Silver King into the Cholla-Saguaro 500kV line.

3. Palo Verde-Mobile 500kV, Mobile-Saguaro 500kV, Westwing-SW Valley 345kV, Mobile-SW Valley 500kV, Saguaro-Tucson Area (230kV or 500kV), Mobile-South (345kV or 500kV), Loop Silver King into the Cholla-Saguaro 500kV line. **(DELETED)**

4. Palo Verde-Jojoba 500kV, Jojoba-Mobile 500kV, Mobile-SW Valley 500kV, Mobile-Saguaro 500kV, Saguaro-Tucson Area (500kV or 230kV), Gila Bend-Santa Rosa 230kV, Mobile-Santa Rosa 230kV, Westwing-SW Valley 345kV, Mobile-South (345kV or 500kV), Loop Silver King into the Cholla-Saguaro 500kV line.

5. Palo Verde-Mobile 500kV, Palo Verde-SW Valley 500kV, Westwing-Mobile (345kV or 500kV), Saguaro-Mobile 500kv, Saguaro-Tucson Area (230kV or 500kV), Mobile-South (345kV or 500kV), Mobile-Hayden 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Saguaro-Tortolita 500kV.

6. Mobile-Hayden 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Browning-RS19 (230kV or 500kV), RS19-Hayden (230kV or 500kV), Hayden-Coolidge 230kV.

6-1. Mobile-Hayden 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Browning-RS19 (230kV or 500kV), RS19-Hayden (230kV or 500kV), Hayden-Browning 230kV, Hayden-Silver King 230kV.

6-2. Mobile-Hayden 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Browning-RS19 (230kV or 500kV), RS19-Hayden (230kV or 500kV), Loop Queen Valley into the Browning Silver King 500kV line, Browning-Queen Valley 230kV, Silver King Queen Valley 230kV, Hayden-Queen Valley 230kV.

6-3. Mobile-Hayden 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Rogers-Browning 230kV, Browning-RS19 230kV, Hayden-RS19 230kV, RS19-Coolidge 230kV.

6-4. Mobile-Hayden 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Rogers-Browning 230kV, Browning-RS19 230kV, Hayden-RS19 230kV, RS19-Coolidge 230kV, Loop Queen Valley into the Browning Silver King 500kV line, Browning-Queen Valley 230kV, Silver King Queen Valley 230kV, Hayden-Queen Valley 230kV.

7. Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Rogers-Browning 230kV, Browning-RS19 230kV, Queen Valley-Mobile 500kV, Loop Queen Valley into the Browning Silver King 500kV line, Queen Valley-RS19 230kV, Browning-Queen Valley 230kV

8. Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Rogers-Browning 230kV, Browning-RS19 230kV,RS19-Florence 230kV,Coolidge-Florence 230kV, Florence-Hayden 230kV, Loop Queen Valley into the Browning Silver King 500kV line, Browning-Queen Valley 230kV, Silver King Queen Valley 230kV, Florence-Queen Valley 230kV.

9. Mobile-Coolidge 500kV, Mobile-Saguaro 500kV, Loop Hayden into the Cholla-Saguaro 500kV line, Loop Silver King into the Cholla-Saguaro 500kV line, Rogers-Browning 230kV, Browning-RS19 230kV, Hayden-Coolidge 500kV, Loop Queen Valley into the Browning Silver King 500kV line, Browning-Queen Valley 230kV, Queen Valley-Coolidge 230kV.

Study Matrix:

A study-matrix has been developed to define what Generation/Load/Alternative combinations will be studied. The Matrix defines the Generation source, the load center, and the alternatives, which will be studied for various Generation/Load scenarios. The Study Matrix is located in Appendix B.

Base Cases – Base cases used for this study will come from either the WSCC Data Bank or from the study participants and will be in GE PSLF format. The study participants will all take an active role in the selection and development of these cases to represent the study period being evaluated. Since the study will be concentrating on the Central Arizona area of the WSCC system. It has been recommended that a reduced version of the chosen WSCC base case should be used. The WSCC 2002 Light Summer base case has been selected for development for this study. The load will be grown and the facilities added to represent the Central Arizona area for the 2005 summer peak. Load will be grown to 90% of the 2005 summer peak projected load.

Arizona is predominately a summer peaking system and, as such, represents the period of time when Arizona's transmission system is under the most stress. The need to evaluate other seasons can be assessed at any time.

Analysis Requirements – Study analysis for the first phase of this study will include power flow only, using the WSCC standard GE PSLF program to facilitate the communication of information between the study participants. The need to perform short circuit and Stability analysis will be assessed on a case-by-case basis.

Study Guidelines/Criteria - Study guidelines and criteria will be based on WSCC Reliability Criteria and individual utility criteria, where applicable. All study participants will be required to provide system representation and rating information for their facilities.

Methodology – It is recognized that developing base cases beyond six to seven years has become much more difficult to manage over the last several years. It is suggested that studies be performed over two time periods, short term and long term. The short-term analysis will be the 2005/06 time frames and will focus on assessing the system performance and the system impact of the proposed transmission alternatives on the existing Arizona transmission system. It is expected that the majority of study time will be spent in this time frame. The long-term analysis will be based on the short-term results and will focus on system performance to help facilitate the development of an "ultimate" transmission configuration to meet the needs of all the study participants.

Study Schedule

A. Phase I

a. Develop short-term transmission alternatives.
b. Select and develop base cases.
c. Develop Study Matrix
d. Perform power flow analysis and Asses system performance.
e. Present results to the Steering Committee
f. Perform sensitivity studies
g. Prepare draft report.
h. Finalize report.

B. Phase II

a. Develop long-term transmission alternatives.
b. Select and develop base cases.
c. Develop Study Matrix
d. Perform power flow analysis and Asses system performance.
e. Present results to the Steering Committee
f. Perform sensitivity studies
g. Prepare draft report.
i. Finalize report.

APPENDIX A

Table of New Generation

GENERATION	BUS		PGEN	PMAX	QMIN	QMAX
Desert Basin	14501	DBG-CT1	165	175	35.5	90
	14502	DBG-CT2	165	175	36.1	90
	14503	DBG-ST1	180	190	39.6	58
Gila River	91001	GILRVCT1	170	540	-300	300
	91002	GILRVCT2	170	540	-300	300
	91003	GILRVST1	180	540	-300	300
	91004	GR-CT2-1	170	540	-300	300
	91005	GR-CT2-2	170	540	-300	300
	91006	GR-CT3-1	170	540	-300	300
	91007	GR-CT3-2	170	540	-300	300
	91008	GR-CT4-1	170	540	-300	300
	91009	GR-CT4-2	170	540	-300	300
	91010	GR-ST2-1	180	540	-300	300
	91011	GR-ST3-1	180	540	-300	300
	91012	GR-ST4-1	180	540	-300	300
Red Hawk	81001	RDHWKCT1	170	540	-300	300
	81002	RDHWKCT2	170	540	-300	300
	81003	RDHWKST1	180	540	-300	300
	81004	RH_CT2-1	170	540	-300	300
	81005	RH_CT2-2	170	540	-300	300
	81006	RH_CT3-1	170	540	-300	300
	81007	RH_CT3-2	170	540	-300	300
	81008	RH_CT4-1	170	540	-300	300
	81009	RH_CT4-2	170	540	-300	300
	81010	RH_ST2-1	180	540	-300	300
	81011	RH_ST3-1	180	540	-300	300
	81012	RH_ST4-1	180	540	-300	300
Kyrene Expansion	15918	KYRPGEN1	250	250	-68	70
Santan Expansion	15926	SANPGEN1	240	240	-68	70
	15927	SANPGEN1	162	162	-100	120
	15927	SANPGEN2	162	162	-100	120
	15927	SANPGEN3	162	162	-100	120

APPENDIX A
(CONTINUED)

Table of New Generation

GENERATION	BUS	PGEN	PMAX	QMIN	QMAX
Vail	16517 VAILCT#1	130	130	-15	57
	16518 VAILCT#2	500	500	-300	300
West Phoenix	14966 WPGEN1	155	175	-10	90
	14967 WPGEN2	155	175	-10	90
	14968 WPGEN3	155	175	-10	90
	14958 WPHXNCC	69	125	-35	64
South Point	19317 SOPOINT1	50	170	-52	77
	19318 SOPOINT2	100	175	55	82
	19319 SOPOINT3	100	175	-55	82
Griffith	19311 GRIFFTH1	50	214	-57	84
	19312 GRIFFTH2	100	214	-57	84
	19313 GRIFFTH3	100	214	-57	84
Sundance	19410 SUNDANCE1	0	250	-82	121
	19410 SUNDANCE2	0	250	-82	121
	19410 SUNDANCE3	0	250	-82	121

APPENDIX B

Central Arizona Transmission Study Matrix

Objective	Transmission Alternative	Generation Area	Load Area	Responsible Party
Schedule New Generation from Palo- Verde Area into the Phoenix Area	1,2,4,5	Palo Verde Area Generation (Group A. GEN)	Phoenix Area	SRP/APS
Schedule New Generation from Palo Verde Area into the Tucson Area	1,2,4,5	Palo Verde Area Generation (Group A. GEN)	Tucson Area	SRP/APS
Schedule new Generation from Palo Verde Area into the Tucson and Phoenix Area	1,2,4,5	Palo Verde Area Generation (Group A. GEN)	Phoenix and Tucson Area	SRP/APS
Schedule new Generation from Palo Verde Area into the Southern California Area	1,2,4,5	Palo Verde Area Generation (Group A. GEN)	Southern California	SRP/APS
Schedule new Generation from Saguaro Area into the Phoenix Area	1,2,4,5	Saguaro Area Generation (Group B1. Gen.)	Phoenix Area	WAPA
Schedule New Generation from Saguaro Area into the Tucson Area	1,2,4,5	Saguaro Area Generation (Group B1. Gen.)	Tucson Area	WAPA

APPENDIX B
(CONTINUED)
Central Arizona Transmission Study Matrix

Objective	Transmission Alternative	Generation Area	Load Area	Responsible Party
Schedule new Generation from Saguaro Area into the Tucson and Phoenix Area	1,2,4,5	Saguaro Area Generation (Group B1. Gen.)	Phoenix and Tucson Area	WAPA
Schedule new Generation from Saguaro Area into the Southern California Area	1,2,4,5	Saguaro Area Generation (Group B1. Gen.)	Southern California	WAPA
Schedule New Generation from Coolidge Area into the Phoenix Area	1,2,4,5	Coolidge Area Generation (Group B2. GEN)	Phoenix Area	WAPA
Schedule New Generation from Coolidge Area into the Tucson Area	1,2,4,5	Coolidge Area Generation (Group B2. GEN)	Tucson Area	WAPA
Schedule new Generation from Coolidge Area into the Tucson and Phoenix Area	1,2,4,5	Coolidge Area Generation (Group B2. GEN)	Phoenix and Tucson Area	WAPA
Schedule new Generation from Coolidge Area into the Southern California Area	1,2,4,5	Coolidge Area Generation (Group B2. GEN)	Southern California	WAPA
Schedule new Generation from Tucson Area into the Phoenix Area	1,2,4,5	Tucson Area Generation (Group C1. Gen.)	Phoenix Area	TEP

APPENDIX B
(CONTINUED)
Central Arizona Transmission Study Matrix

Objective	Transmission Alternative	Generation Area	Load Area	Responsible Party
Schedule New Generation from Tucson Area into the Tucson Area	1,2,4,5	Tucson Area Generation (Group C1. Gen.)	Tucson Area	TEP
Schedule new Generation from Tucson Area into the Tucson and Phoenix Area	1,2,4,5	Tucson Area Generation (Group C1. Gen.)	Phoenix and Tucson Area	TEP
Schedule new Generation from Tucson Area into the Southern California Area	1,2,4,5	Tucson Area Generation (Group C1. Gen.)	Southern California	TEP
Schedule New Generation from Springerville Area into the Phoenix Area	1,2,4,5	Springerville Area Generation (Group C2. GEN)	Phoenix Area	TEP
Schedule New Generation from Springerville Area into the Tucson Area	1,2,4,5	Springerville Area Generation (Group C2. GEN)	Tucson Area	TEP
Schedule new Generation from Springerville Area into the Tucson and Phoenix Area	1,2,4,5	Springerville Area Generation (Group C2. GEN)	Phoenix and Tucson Area	TEP

APPENDIX B
(CONTINUED)
Central Arizona Transmission Study Matrix

Objective	Transmission Alternative	Generation Area	Load Area	Responsible Party
Schedule new Generation from Springerville Area into the Southern California Area	1,2,4,5	Springerville Area Generation (Group C2. GEN)	Southern California	TEP
Schedule new Generation from Mexico Area into the Phoenix Area	1,2,4,5	Mexico Area Generation (Group C3. GEN)	Phoenix Area	TEP
Schedule New Generation from Mexico Area into the Tucson Area	1,2,4,5	Mexico Area Generation (Group C3. GEN)	Tucson Area	TEP
Schedule new Generation from Mexico Area into the Tucson and Phoenix Area	1,2,4,5	Mexico Area Generation (Group C3. GEN)	Phoenix and Tucson Area	TEP
Schedule new Generation from Mexico Area into the Southern California Area	1,2,4,5	Mexico Area Generation (Group C3. GEN)	Southern California	TEP