

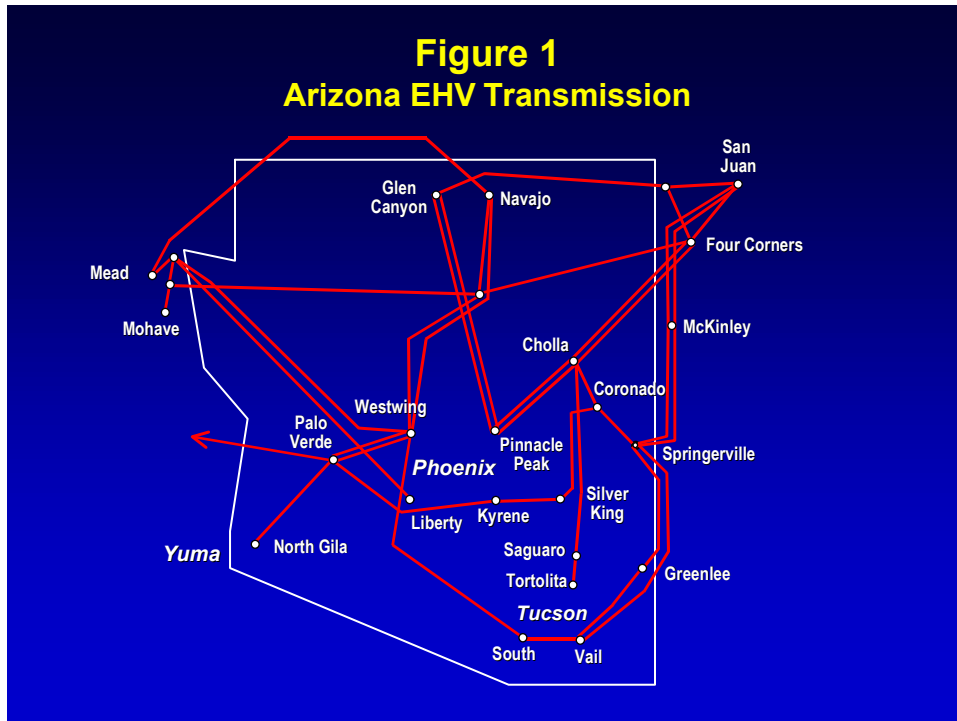
Central Arizona Transmission System (CATS) Phase II

A. Report Summary

I. Introduction

Historically, Arizona's EHV transmission system has been developed to interconnect large generating resources to major load centers primarily located in the Phoenix and Tucson metropolitan areas. Consequently a major portion of the EHV transmission development within Arizona occurred in the northern, eastern and western parts of the state. While the resultant transmission development interconnected large generation facilities with their consumers located in the Phoenix and Tucson areas, they also provided stronger ties to neighboring states such as California, New Mexico, Colorado, and Utah. In the early stages of developing the transmission system for the Palo Verde generation facility, consideration was given to building a 500kV line from Palo Verde to the Tucson area. However, the final Palo Verde transmission system design moved towards strengthening EHV transmission interconnection in the Phoenix area, resulting in the construction of the second Palo Verde-Westwing 500kV line. This left development of additional EHV transmission ties between the Phoenix and Tucson areas for future consideration. A map of Arizona's EHV Transmission is shown on Figure 1.

Figure 1
Arizona EHV Transmission



Over the last ten years Arizona has experienced significant increases in business and residential growth in the Phoenix and Tucson areas. As Arizona's electric utility industry continues a breakneck pace to keep up the increasing growth and demand, resource developers vie for opportunities to site and build new generation to access market opportunities in the Arizona and California areas.

Under these newer growth scenarios, Arizona's EHV system capability continues to experience higher flows and denser utilization. As projected growth continues to challenge the ability of the Phoenix and Tucson transmission system's ability to deliver needed energy to their respective areas, new generation proposals are also placing significant burden on the existing transmission system. Both the new and future resources additions are seeking to tap all existing transmission capability to achieve access to as many markets as possible.

Arizona is an attractive state to site new generation for developers. Due to the attractiveness of the Palo Verde switchyard as a market hub, existing gas pipeline location, and the existing Phoenix and Tucson growth markets, much of the proposed generation, in excess of 10,000 MW, is being sited in the CATS study area, within the central Arizona region between Palo Verde, Phoenix, and Tucson.

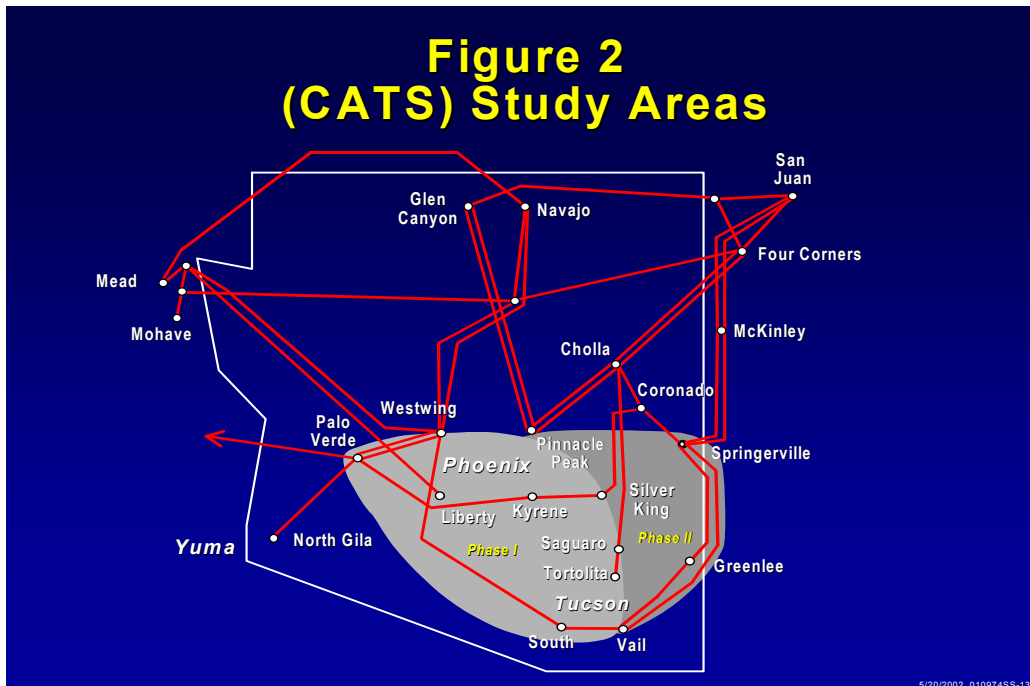
Unfortunately, EHV transmission is limited in this area and local utilities are struggling to keep pace with their near term transmission infrastructure

requirements to accommodate the expected growth in customer load while posturing themselves to tap the pool of proposed resource additions that are being proposed. Others are looking at opportunities to use proposed CATS transmission alternatives to facilitate siting of their generation in a manner that would stimulate economical and reliable transmission service from their facility to existing and future energy markets. Early discussion of these transmission needs occurred between Salt River Project (SRP), Arizona Public Service (APS), and Tucson Electric Power (TEP). In principle, the utilities agreed that a regional transmission planning effort was needed to assess EHV transmission needs and opportunities in the central Arizona area and would help facilitate the development of their transmission system in a prudent manner.

From this discussion, the Central Arizona Transmission System (CATS) study effort evolved. The initial participants included all of Arizona's transmission utilities including Arizona Public Service, Salt River Project, Tucson Electric Company, Southwest Transmission Cooperative (SWTC) formerly Arizona Electric Power Cooperative, Citizens Communications Company, Western Area Power Administration, and the Arizona Corporation Commission Staff.

It was recognized early in the study effort that all stakeholders in the process needed to be involved in the study effort. An invitation letter was sent to SWRTA (Southwest Regional Transmission Association) members and other interested parties. Consequently those involved with the CATS effort included many more participants. A current list of CATS Study participants is listed in the Appendix portion of this report.

Today the central Arizona region for the CATS study encompasses an area bounded by the Phoenix Metropolitan area to the north, the Tucson Metropolitan area to the south, the Palo Verde Generating Station to the west and the Arizona/New Mexico border to the east. This area includes Coolidge, Casa Grande, Eloy, Marana, Florence, Maricopa as well as the major metropolitan areas of Phoenix and Tucson. A map of the study area is shown in the highlighted areas on Figure 2.



The study participants held it's initial meeting in March 2000 to evaluate the conceptual aspects of a proposed regional study for the central Arizona area. A kick-off meeting was held in June 2000 to formalize the study, develop study objectives and criteria, create organizational structure, and allocate resources to meet the scope of work and schedule. The CATS Phase I Study was completed and report published in July 2001.

II. CATS Conceptual Plan

The CATS Phase I Study analyzed individual transmission alternatives proposed by the CATS participants. Each alternative was compared to a benchmarked case to determine its performance. The alternatives, which performed the best, were carried forward into the CATS Phase II Study for further analysis.

CATS Phase I showed that single alternatives could provide benefits to individual participants. However, more regional benefits can be achieved by combining alternatives. CATS Phase II analyzed the combining of several Phase I alternatives, and integrating other proposed transmission

projects in Arizona that were not studied in CATS Phase I.

The first CATS Phase II meeting was held in August 2001. This meeting was held to define the scope of the CATS Phase II Study. Round table discussions were held to determine which Phase I Transmission lines and Alternatives would be carried over to CATS Phase II for further consideration and Analysis. The following is a list of Transmission lines and Transmission Alternatives that were identified for further evaluation at the August 2001 CATS Meeting.

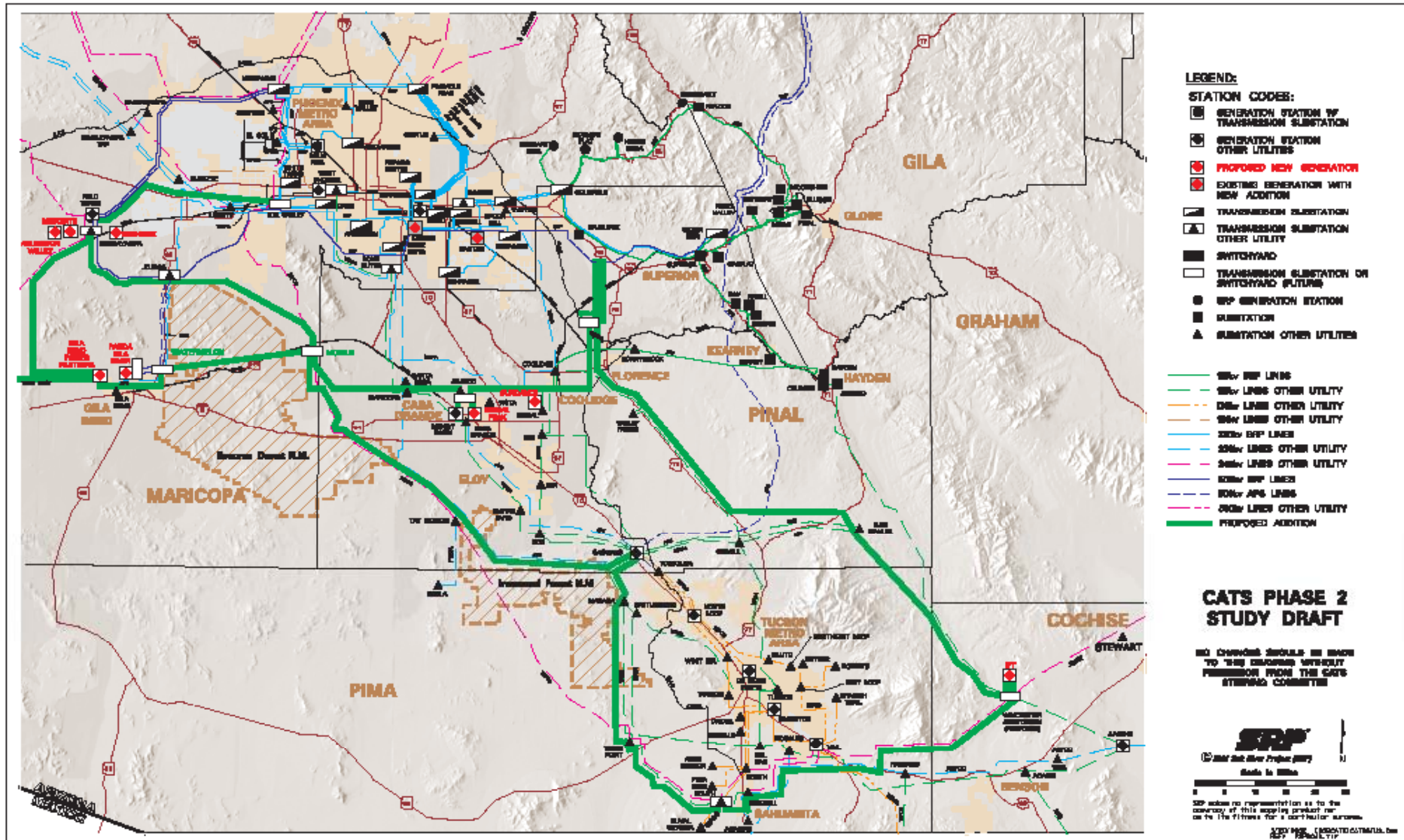
- Palo Verde To Jojoba 500kV Line
- Palo Verde To Gila Bend 500kV Line
- Gila Bend To Watermelon 500kV Line
- Watermelon To Mobile 500kV Line
- Jojoba To Mobile 500kV Line
- Mobile To Southeast Station 500kV Line
- Mobile To Saguaro 500kV Line
- Southeast Station Loop into Silver King/Browning 500kV Line
- Southeast Station To Winchester 500kV Line
- Saguaro To South 345kV Line
- Winchester To South 345kV Line

The scope also included the alternative of replacing one of the 500kV lines between Jojoba and Mobile as well as between Mobile and Saguaro with a 2-345kV system.

The loop-in of the Cholla to Saguaro 500kV line into Silver King with two additional alternatives to this loop-in was also studied.

In Figure 3 is a conceptual map of the CATS Phase II EHV transmission system (shown in green). This is the Base system that was studied in CATS Phase II. This map represents the vision or high level EHV transmission plan for Central Arizona. It should be viewed as work-in-progress. It is not intended to show specific line routes. These need to be developed through the appropriate environmental process, by those who fund and construct specific facilities.

CATS CONCEPTUAL PLAN CATS PHASE II BASE SYSTEM Figure 3



III. CATS Phase II Objectives

The objectives of the CATS Phase II study, which have been expanded from Phase I, are listed below:

- Improve the use of the existing transmission system for future load growth in Phoenix and southern Arizona.
- Increase the power transfer import level into the Phoenix area.
- Increase the power transfer import level into the Tucson area.
- Increase the power transfer capability between the Phoenix and Tucson areas.
- Encourage future generation additions south of Phoenix and north of Tucson.
- Provide additional transmission capacity to and from the Palo Verde hub.
- Assess the impact of the Transmission Alternatives identified in Phase I and develop a Transmission configuration and/or Transmission Alternatives, which can be carried on to Phase III for further consideration and analysis.

IV. CATS Phase II Conclusions

Based on the results of the CATS Phase II study, the following was concluded.

- 1) Both of the Palo Verde to Mobile options: Two 500kV Lines from Jojoba to Mobile or one 500kV line from Jojoba and one 500kV line from Watermelon had similar performance.
- 2) Looping the Cholla to Saguaro 500kV line into Silver King was a better alternative than looping this line into South East Valley. There was little or no benefit looping the Cholla to Saguaro 500kV line into both Southeast Valley and Silver King.
- 3) An EHV transmission line from the Phoenix metro area to Saguaro 500kV substation (second EHV line to Saguaro) strengthens this station, making it a strong source for southern Arizona.

- 4) There are several good options to strengthen the ties to Saguaro.

These options are:

- a) A 500kV line from Mobile to Saguaro.
- b) Two 345kV lines from Mobile to Saguaro.
- c) A 500 kV line from Southeast Station to an intermediate switching station (initially named Carpas substation). From Carpas, a 500 kV line connecting to Winchester and another 500 kV line connecting to Saguaro. This can be enhanced with the loop-in of the Cholla to Saguaro 500kV line into Silver King

Each of the above options would require additional facilities to reinforce the remaining Southern Arizona system.

- 5) The development of Winchester substation and a 500kV line connection from the north reinforces the existing eastern EHV feed into Tucson and Southern Arizona from the east.
- 6) The transfer capability from the Palo Verde Hub and from Central Arizona to the combined Tucson/Mexico area increased with the alternative of 1-500kV line and 2-345kV lines over the CATS base system (2-500kV lines).
- 7) Additional studies are needed to determine how these alternatives can be staged and integrated.