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KELLY J. BARR, ESQ.
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January 31, 2007

Arizona Corporation Commission
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AZ CORP COMMISSION
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Mr. Ernest Johnson
Director, Utilities Division
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, AZ 85007

Re: Ten-Year Plan, Docket No. E-00000D-05-0040

Dear Mr. Johnson:

Enclosed are an original and thirteen (13) copies of The Salt River Project's 2007-2016 Ten-Year Plan filed pursuant to A.R.S. Section §40-360-02.

Please contact Mr. Robert Kondziolka, Manager, Transmission Planning Department at (602) 236-0971 if you have any questions concerning this plan.

Sincerely,

Kelly J. Barr

KJB/bjh

Enclosures (14)

SALT RIVER PROJECT

10 YEAR PLAN
2007 — 2016

Delivering more than power.™

06-2668-01 12/2006

SALT RIVER PROJECT

TEN-YEAR PLAN

2007 - 2016

Prepared for the

Arizona Corporation Commission

January 2007

SALT RIVER PROJECT

OVERALL TRANSMISSION REVIEW

2007 - 2016

This report updates and replaces the ten-year transmission plan of the Salt River Project Agricultural Improvement and Power District (SRP), submitted January 2006 pursuant to A.R.S. Section 40-360.02. The following general review is intended to complement and clarify the individual tabular pages included herein.

Any future facilities which might have appeared in previous ten-year plans, but which are not shown in this plan, are either completed or are no longer scheduled in the period covered.

REGIONAL PLANNING FORUMS

SRP is actively involved in numerous regional planning organizations, providing technical support and leadership. SRP's primary goal in its involvement in these regional planning entities is to provide a reliable and economical transmission system connected to available energy sources to provide reliable power at reasonable prices to our customers.

The regional planning organizations operate in public forums, perform study work cooperatively, and develop plans in a collaborative fashion while disseminating study results to a broad spectrum of interested and affected parties. Load growth and generation dispatch dynamics continue to be the most challenging issues facing SRP, the state of Arizona, and the southwest with respect to meeting electric system reliability. The regional planning organizations are addressing these challenges and SRP relies on the results generated through these organizations to develop and submit its ten-year plan.

Some of the regional planning organizations in which SRP participates are the Western Electricity Coordinating Council (WECC), specifically the Planning Coordination Committee (PCC) and the Transmission Expansion Planning Policy Committee (TEPPC), the Southwest Area Transmission Planning Group (SWAT), and the Southwest Expansion Planning Group (STEP). Due to the broadening of the regional planning processes, the Central Arizona Transmission System (CATS) study group is no longer an independent regional planning entity and now is a technical study work group within the SWAT organization. The CATS-Extra High Voltage (EHV) and CATS-High Voltage (HV) work groups still address the transmission issues within their defined areas in Arizona.

CATS-HV PINAL COUNTY TRANSMISSION STUDY

This past year the CATS-HV group completed a study that looked at the transmission needs in the Pinal County area. SRP's interest in the group's study efforts is twofold: 1) SRP's service territory includes a large portion of Pinal County, and 2) Condition 23 of the Certificate of Compatibility (CEC) for the Pinal West – Southeast Valley/Browning Project (Case No. 126) requires SRP to submit a written study to the ACC that describes the proposed 230kV facilities planned for this project in conjunction with other long-term plans identified to meet the load serving needs of the region. Additional details of the study are provided below and the final report is included as Appendix 1 (CATS-HV Saturated Load and Transmission Study, A Transmission Option to Serve Saturated Loads in Pinal County, Arizona). The Interim CATS-HV Saturated Load Study Report was submitted in SRP's 2006 Ten Year Plan filing.

As noted in the Final Report of the CATS-HV Saturated Load and Transmission Study, the basic infrastructure in the Pinal County area must be expanded to address the tremendous growth experienced to date and the growth anticipated in the next 15-20 years. At the request of the SWAT oversight committee, the CATS-HV subcommittee projected the potential ultimate electric

load in Pinal County and developed a transmission infrastructure system that could serve that ultimate load. The CATS-HV subcommittee performed a broad review of the 230kV needs in the Casa Grande/Coolidge/Florence/Eloy/Marana area by modifying an existing long-term case and adding loads representative of the land uses envisioned by the planning authorities within the area. Where there were no land use plans, the subcommittee used an estimate of load based on projections in the vicinity tempered by proximity to major transportation corridors. The result of this study anticipates a load in excess of 10,000 MW at full build out for southern Pinal County (current load is approximately 500 MW). Thus, there is a need for additional generation and transmission infrastructure to serve the expected growth.

Based on this load estimate at build out, the subcommittee developed a conceptual network of 230kV transmission lines and 230kV stations utilizing existing transmission lines and corridors in the area, as well as linear features that are usable as transmission corridors. In order to serve this projected load, approximately 16 new stations (in addition to seven existing stations), 169 miles of existing 115kV transmission converted to 230kV, 184 miles of new 230kV transmission, and 267 additional miles of 500kV transmission lines will be needed. The new 500kV lines included the Southeast Valley Project and the Winchester-Pinal South 500 kV line.

The study included some sensitivity analysis of load level and resource location. In the 50% load case, some local and remote generation was included. In the 75% load case, more remote generation was added and in the 100% load case, mostly remote generation was added.

The final report was approved by the CATS-HV Subcommittee and the SWAT Oversight Committee in late 2006. The report is included in Appendix 1 with SRP's ten year plan submittal as documentation for a number of projects reported in this and other entities' ten-year plans.

500kV TRANSMISSION

The SRP 500kV transmission system is shown on Attachment A. This system provides major support to SRP's local transmission network and generally delivers bulk power from remote generation to the Valley.

Hassayampa - Pinal West

In May 2004, SRP, acting as project manager (for SRP, Arizona Public Service[1], Tucson Electric Power Company, Southwest Transmission Cooperative, Electric District 2, Electric District 3, and Electric District 4 of Pinal County), received a CEC (Case No. 124) for two parallel single circuit 500kV transmission lines from the Palo Verde hub (Hassayampa Switchyard) to a new Pinal West Substation in the Maricopa/Stanfield area. Either or both lines may be looped into the Jojoba Switchyard. The Hassayampa - Pinal West project participants have initiated an interconnection request to interconnect the new 500kV line into the Jojoba Switchyard. SRP has retained a design firm to undertake the final line design for the first line, and to determine the centerline within the approved corridor for both of the lines. The first line to Pinal West is planned to be complete in 2008. The interconnection of the first line into Jojoba could be completed as early as the first quarter 2009. The second line is currently beyond the ten-year planning timeframe; the timing of the second line will be dependent on load growth and location of future generation.

Pinal West – Southeast Valley/Browning

In August 2005, SRP received a CEC for this joint participation project (Case No. 126), with an amendment to the CEC approved in November 2005. This 500kV project begins at the Pinal West Substation and ends at the Browning Substation, approximately 100 miles in length. SRP was also granted authority to construct an optional 230kV circuit on the 500kV structures between the Santa Rosa and Southeast Valley (SEV) Substations once the appropriate study work has been

[1] Arizona Public Service withdrew from participation in the project on September 15, 2005.

submitted to the ACC to support the need for the 230kV circuit. The segment of the line from SEV to the Browning Substation was certificated for a double circuit 500/230kV transmission line and does not require additional study work.

SRP is in the process of designing the individual segments that comprise this transmission line project and plans to construct the project in segments. The 500kV circuit from Pinal West to Browning is expected to be in service by 2011. The completion dates for the individual substations and the various segments of the 500 and 230kV circuits are discussed below.

Pinal West - Santa Rosa Segment

A new 500/230kV substation will be constructed at the Santa Rosa Substation with a "To Be Determined" in-service date. The principals in the development of that station will determine the need date through further study. The estimated in-service date for the Pinal West to Santa Rosa segment of the 500kV line is 2011.

Santa Rosa – Pinal South Segment

The segment from Santa Rosa to the proposed Pinal South Substation is being proposed as a double circuit 500/230kV line and should be completed in 2011. SRP plans to use a portion of the 230kV segment from Santa Rosa to Pinal South for the Desert Basin Power Line Project (Desert Basin – Pinal South 230kV line). The initial station development of the Pinal South Substation will be constructed concurrently with the Desert Basin Power Line Project with an in-service date of 2011.

Pinal South - SEV/RS22 Segment

The segment from Pinal South to the SEV Substation is also being proposed as a double circuit 500/230kV line and is expected to be in-service in 2011. The segment is being proposed to provide

for access to new generating resources that may be developed in the area and that may be available to SRP customers. The SEV Substation currently has a "To Be Determined" in-service date. The purpose of the SEV Substation is twofold. It will provide interconnections into the EHV system to bring generation resources into the SRP service territory and it will also provide service to native SRP load. Either of these drivers could bring the in-service date forward. The proposed SEV Substation will also include a co-location of a proposed 230/69kV substation, referenced as RS22. Like the SEV Substation, the RS22 Substation has a completion date of "To Be Determined".

SEV/RS22 - Dinosaur Segment

The 230kV segment from SEV/RS22 to Dinosaur has an undetermined date as of this report, but is being reported because the need may move into the ten year timeframe if load growth occurs, driving the need for the development of additional facilities to serve customer load. The 500kV segment will be in-service in 2011. A 230/69kV substation is being constructed at the Dinosaur Substation site and will be completed in 2007.

Dinosaur - Browning Segment

The 230kV portion of the double circuit 500/230kV transmission line from the Dinosaur Substation to the existing Browning Substation in the southeast valley is expected to be completed in 2007, while the 500kV component will be in-service in 2011.

Palo Verde – TS5, TS5 – Raceway (TS9)

SRP is participating in the siting and permitting work for two new 500kV lines. The first line is from the Palo Verde Nuclear Generating Station (or a new switchyard at Arlington Valley Energy facility) to a new 500/230kV station, TS5, to be located on the south side of the Central Arizona Project near the Hassayampa Pump Station (approximately T4N, R4W). APS received a CEC (Case No.

128) for this segment of the project in August 2005. The second line will originate from TS5 and terminate at a new 500kV station (TS9) to be sited near the existing Raceway 230kV Substation in northwest Phoenix. APS will be the project manager. This project is reflected in two separate detail sheets: Palo Verde - TS5 and TS5 - Raceway (TS9). The parties expect that the Palo Verde – TS5 line will be in service in 2009 and the TS5 - Raceway (TS9) line to be completed by 2012.

TS9 – Pinnacle Peak

SRP is also participating in the plan for a new 500kV line from the proposed TS9 Substation (planned to be constructed in the vicinity of the Raceway Substation) to a newly developed 500kV station at the Pinnacle Peak complex. APS is the project manager and has already submitted an application for a CEC (Case No. 131). This project reflects a 2010 in-service date.

Second Knoll

APS has made a request to interconnect into SRP's Coronado – Cholla 500kV line to provide service to a new 69kV distribution substation north of Snowflake, Arizona. The new station is tentatively named Second Knoll. The expected completion date for this project is 2009. SRP is showing this in its ten-year plan for informational purposes, as this is an APS project.

Palo Verde - North Gila

SRP is a participant in the siting of a new 500kV line from the Palo Verde Switchyard to the North Gila 500/69kV Substation. This new line will provide SRP with access to geothermal resources in the Imperial Valley area. APS is the project manager. The estimated in-service date for this line is 2012.

230kV TRANSMISSION

The SRP 230kV transmission system is shown on Attachments B (eastern 230kV system) and C (western 230kV system). SRP's 230kV transmission network is used to transmit power from the bulk power stations on the periphery of the Phoenix metropolitan area to the various load centers in SRP's service territory. Additional transmission capacity will be required during the next ten years to meet load growth and for system reliability.

Rudd Loop-in of Liberty - Orme and Anderson - Orme

Two 230kV projects have been identified in this year's plan. Both are expected to be in service during 2007. The first project is a loop-in of the existing Liberty – Orme 230kV line into the Rudd Substation. Because this requires station work only, a CEC is not required. The second project is a new circuit from the Anderson Substation in south Phoenix to the Orme Substation in southwest Phoenix. The current transmission line between the two substations is built double circuit with the two circuits paralleled. Reconfiguring the current facilities will create the new circuit but no new structures will be needed. Thus, a CEC is not required for this project.

Dinosaur Substation

Dinosaur has been in SRP's plans for several years. Currently the 230/69kV station is under construction to be in service in 2007. Dinosaur will be a key facility in the ability to serve load in the eastern Queen Creek and southern Apache Junction areas as well as new development in this area. As mentioned in the Pinal West – Southeast Valley/Browning 500kV project description, SRP plans to serve Dinosaur from the Browning Substation in Mesa using the second circuit position of the Pinal West – Browning 500/230kV transmission line.

Desert Basin Power Line Project (Desert Basin – Pinal South)

The Desert Basin Power Line Project was reported in last year's ten year plan as having the potential for two lines, one terminating at Santa Rosa and the other terminating at Pinal South. After an open season solicitation and further refinement of requirements, the project was narrowed to a single line from Desert Basin Generating Station to the proposed Pinal South Substation.

The first component of the project is to construct approximately six miles of new 230kV transmission line that will originate at the Desert Basin Generating Station in Casa Grande and terminate at a point along Cornman Road where it will intersect with the already certificated Pinal West – Southeast Valley/Browning 500/230kV Project (Case 126, Decision No. 68093). It is this first component of the project for which SRP will be seeking a CEC. The second component of the project will utilize the 500/230kV Pinal West – Southeast Valley/Browning route, where SRP will attach the 230kV circuit to the 500kV structures for approximately 15 miles to the Pinal South Substation south of Coolidge. SRP received authority to place the 230kV circuit on the 500kV structures for the 15 mile segment in CEC Decision No. 68093 and in Decision No. 69183 that approved SRP's compliance filing pursuant to Condition 23 of the CEC decision. SRP expects to file an application for a CEC for the six mile segment of this project in 2007.

SRP currently has a transmission service contract for the delivery of the output from the Desert Basin Generating Station that runs through 2011. This project will improve performance of the Desert Basin Generating Station operations by eliminating the existing remedial action scheme that currently restricts operation of the plant. As identified in the CATS-HV report, a new 230kV line out of the Desert Basin Generating Station will be the first component of the CATS-HV system, will provide for additional transmission capacity in the local area for load service, and will provide additional transmission capacity to deliver future resource development to customer loads.

Fountain Hills

SRP has identified the need for a 345/69kV, 230/69kV or 115/69kV receiving station in the Fountain Hills area. The projected load in the area will stress the underlying 69kV system to its limits by approximately 2014. Three methods of serving this station are being investigated. One method is to use the 115kV system and to construct a line from either Goldfield or Stewart Mountain into the Fountain Hills area. Another possibility is to construct a 230kV line from Goldfield (along the Salt River) into the Fountain Hills area. The third alternative is to interconnect to the APS Cholla - Pinnacle Peak 345kV line that runs north of the Rio Verde area. The final line routing will be determined through a public and environmental process to support preparation of an application for a CEC.

RS17

SRP has identified the need for the future RS17 230/69kV Receiving Station in the Gilbert/Queen Creek area to support the forecasted customer load growth for the area. However, the need date has moved beyond SRP's ten-year planning window. The station site was established during a previous environmental study for the RS16 (Schrader) transmission line siting process (Case No. 86). Initial service to the RS17 Receiving Station will utilize existing transmission lines constructed in 1998 for the Schrader Project.

Dinosaur – RS21

In this year's report, SRP has also included a potential line from the proposed Dinosaur (RS19) Receiving Station to the proposed RS21 Receiving Station. This project would support the future load growth requirements in the east valley/north Pinal County portion of SRP's service territory. While the anticipated need for this project is beyond SRP's ten-year planning window, SRP is including this project in the event the project schedule is accelerated.

RS17 to RS24 and RS24 to RS22/Southeast Valley (SEV)

Preliminary study work based on new load projections for the southeast valley indicate the need to provide additional transformer capacity to meet residential, commercial, and industrial load requirements. The RS24 Substation, to be located in the Queen Creek area, and the transmission lines connecting the substation to the system will provide the additional capacity needed. The need for the facilities is beyond the ten year planning horizon, but significant growth in the southeast valley may require accelerating the development of this project.

Potential Future Projects

A key element of SRP's transmission planning function is to utilize existing transmission corridors and open circuit positions on existing transmission structures, where feasible. The following projects have been included in this plan as informational items that may become firm plans, as system studies look farther into the future. These potential projects include:

- Rogers to Browning
- Silver King to Browning
- Silver King to Browning 230kV/Superior tie
- Westwing to Pinnacle Peak
- Pinnacle Peak to Brandow with a possible loop into Rogers or Thunderstone
- Rogers to Corbell

When system conditions are such that these facilities are needed, more definitive descriptions and schedules will be provided.

SRP is continuing to assess its transmission needs in the northern Pinal County and eastern Maricopa County to accommodate the tremendous growth in that area. On Attachment B, SRP's eastern 230kV system, we show some concepts of a plan to provide for the growth envisioned in

the area. These facilities are not described in detail in the narrative of this report but are included in the description sheets because while the need is apparent, the timeframe is beyond that of this report.

SRP has identified requirements for future generation. Logical locations for new generation exist throughout Arizona. The Santa Rosa - CATSHV03 or the Pinal South – Southeast Valley Projects offers opportunity to build a 230kV line to connect possible future generation to SRP's load service territory. These lines were identified as components of the CATS-HV Pinal County system study. The 230kV lines would be attached to the 500kV structures approved in the Pinal West – Southeast Valley/Browning Project, Case 126. These projects would require a compliance filing in accordance with Condition 23 of the CEC for Case 126 (Decision No. 68093) prior to constructing either of the lines. The in-service date for these projects has not been determined.

115kV TRANSMISSION

Carrel

A new 115/12kV distribution substation, designated as the Carrel Substation, is currently under construction to provide service to growing loads in the Apache Junction area. SRP is planning to loop the existing Spurlock to Goldfield line into this new substation. SRP received a CEC for this project in November 2005 and expects to complete the project by Summer 2007.

EASTERN MINING AREA TRANSMISSION

Additional transmission facilities will eventually be required in SRP's Eastern Mining Area (Attachment D). If mining loads increase between Superior and Hayden, a 230kV line from Silver King to New Hayden may be required. Depending on where new load is added, this 230kV line may have an intermediate termination at Knoll Station. The line may be constructed in phases, with the Silver King to Knoll line being constructed first, followed by Knoll to New Hayden line, when

required. The existing 115kV line from Kearny to Hayden will be looped into the New Hayden Station. The in-service dates for these lines are contingent upon customer need, but are currently projected beyond this ten-year plan.

Attached as Appendix 2 to this report is a summary of SRP's six-year planning work of this past year to support the need for the work reflected in this report.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2007

LINE DESIGNATION:		Carrel 115/12kV Distribution Substation
SIZE:		
(a)	Voltage	115kV
(b)	Capacity	28MVA
(c)	Point of Origin	Carrel Substation SEC 36, T1N, R8E
(d)	Point of Termination	N/A
(e)	Length	Less than one mile

ROUTING: From the existing Spurlock to Goldfield 115kV line to the proposed station site immediately adjacent to the transmission line corridor.

PURPOSE: Serve the increasing load in the Pinal County/Gold Canyon Ranch area.

DATE:

(a) Start ROW/Property Acquisition:	2003
(b) Construction to Start:	2006
(c) Estimated In-Service Date:	2007

NOTES:
CEC for Case No. 129 was awarded in November 2005 (ACC Decision # 68308). The in-service date has slipped to this year due to problems obtaining rights of way for the 12kV work associated with the station construction.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2007

LINE DESIGNATION:		Anderson – Orme
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Anderson Substation SEC 12, T1S, R3E
(d)	Point of Termination	Orme Substation SEC 19, T1N, R2E
(e)	Length	Existing, no new construction

ROUTING: Second circuit on the existing Anderson – Orme 230kV line

PURPOSE: Relieve 230kV transmission overloads.

DATE:

(a) Right of Way/Property Acquisition:	N/A
(b) Construction to Start:	2006
(c) Estimated In-Service Date:	2007

NOTES:
This project entails breaking the parallel of the existing circuits and adding conductor to the existing circuits. The original construction of this line predates the siting statute. No new transmission line construction is necessary. A CEC is not required for this project.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2007

LINE DESIGNATION:		Rudd Loop-in of Liberty – Orme 230kV Line
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Orme Substation SEC 19, T1N, R2E
(d)	Intermediate Point	Rudd Substation SEC 24, T1N, R1W
(e)	Point of Termination	Liberty Substation SEC 19, T1N, R2W
(f)	Length	No additional construction

ROUTING: Loop-in of existing transmission line into an existing station. No new transmission construction.

PURPOSE: Relieve 230kV transmission overloads.

DATE:

(a) Right of Way/Property Acquisition:	N/A
(b) Construction to Start:	2006
(c) Estimated In-Service Date:	2007

NOTES:
The construction of this line predates the siting statute. This loop-in is contained within the station site and will not require a CEC.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2007, 2011

LINE DESIGNATION:		Pinal West – Southeast Valley/Browning
SIZE:		
(a)	Voltage	500kV / 230kV
(b)	Capacity	1500MVA
(c)	Point of Origin	Pinal West Substation SEC 18, T5S, R2E
(d)	Intermediate Point	Santa Rosa Substation SEC 30, T5S, R4E
(e)	Intermediate Point	Pinal South Substation SEC 30, T6S, R8E
(f)	Intermediate Point	Future RS22 and Southeast Valley Substation SEC 19, T3S, R9E
(g)	Intermediate Point	Dinosaur Substation SEC 10, T2S, R8E
(h)	Point of Termination	Browning Substation SEC 12, T1S, R7E
(i)	Length	Approximately 100 miles

ROUTING: South and east from the Pinal West substation to approximately Teel Road, then east to the Santa Rosa substation. From Santa Rosa easterly to approximately the Santa Rosa Wash, then generally south to approximately a half mile north of I-8 where it turns east again. Then it runs easterly to about the location of the ED2 substation (Sec 25, T6S, R7E). From that point the line continues east to the Union Pacific Railroad, where it turns north. It generally runs north from this point to the Southeast Valley substation in the vicinity of the Magma Railroad and the CAP (approximate location of SEV), then north along the CAP to the existing 500kV corridor between Elliot and Guadalupe Roads. At that point it turns west into the Browning substation.

PURPOSE: The Central Arizona Transmission System Study identified a number of system additions necessary to accommodate load growth and access to energy sources in the central Arizona area. This transmission line is the second segment of a series of transmission lines to serve the central Arizona region. This segment will initially provide an interconnection with the Palo Verde market area to market power to the Phoenix and central Arizona areas, and to accommodate the growth in development and population in Pinal County.

DATE:

(a) Right of Way/Property Acquisition:	2005
(b) Construction to Start:	2006
(c) Est. In-Service for Pinal West to Santa Rosa 500kV:	2011
(d) Est. In-Service for Santa Rosa:	To be determined
(e) Est. In-Service for Santa Rosa to Pinal South 500kV:	2011
(f) Est. In-Service for Pinal South:	2011
(g) Est. In-Service for Pinal South to SEV/RS22 500kV:	2011
(h) Est. In-Service for SEV:	To be determined
(i) Est. In-Service for RS22:	To be determined
(j) Est. In-Service for SEV/RS22 to Dinosaur 230kV:	To be determined
(k) Est. In-Service for SEV/RS22 to Dinosaur 500kV:	2011
(l) Est. In-Service for Dinosaur:	2007
(m) Est. In-Service for Dinosaur to Browning 230kV:	2007
(n) Est. In-Service for Dinosaur to Browning 500kV:	2011

NOTES:
CEC for Case No. 126 was awarded in 2005 (ACC Decision # 68093 and # 68291)

SRP is lead and project manager for the development of this project. Participants include SRP, Tucson Electric Power, Southwest Transmission Cooperative, and Electric Districts 2, 3, and 4.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2008, 2009

LINE DESIGNATION:		Hassayampa - Pinal West
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	1500MVA
(c)	Point of Origin	Hassayampa Switchyard SEC 15, T1S, R6W
(d)	Intermediate Point	Jojoba Switchyard SEC 25, T2S, R4W
(e)	Point of Termination	Pinal West Substation SEC 18, T5S, R2E
(f)	Length	Approximately 51 Miles

ROUTING: South and east of the Hassayampa Switchyard along the existing Palo Verde - Kyrene 500kV line to a point where the gas pipeline splits from the transmission line, then generally along the pipeline (except in the Maricopa County Mobile Planning Area) to the new Pinal West Substation.

PURPOSE: The Central Arizona Transmission System Study identified a number of system additions necessary to accommodate load growth and access to energy sources in the central Arizona area. This project, comprised of two transmission lines, is one of the first segments of a series of transmission lines to serve the central Arizona region.

DATE:

(a) Right of Way/Property Acquisition:	2004
(b) Construction to Start:	2007
(c) Estimated In-Service Date:	2008 (1st line) 2009 (loop-in of 1st line into Jojoba Station) To be determined (2nd line)

NOTES:
CEC for Case No. 124 was awarded in May 2004 (ACC Decision # 67012).
SRP is lead and project manager for development of this project. Participants include SRP, Tucson Electric Power, Southwest Transmission Cooperative, and Electric Districts 2, 3, and 4.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2009

LINE DESIGNATION:		Palo Verde - TS5
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	To be determined
(c)	Point of Origin	Palo Verde Switchyard or a new switchyard at Arlington Valley Energy facility
(d)	Point of Termination	TS5 500/230kV substation to be constructed SEC 29, T4N, R4W
(e)	Length	Approximately 45 miles of single-circuit line

ROUTING: Generally west from Palo Verde/Hassayampa and then north and east for approximately 45 miles.

PURPOSE: This line will provide a 500kV interconnection to the APS transmission system and serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. The project will increase the import capability into the valley and the export capability out of the Palo Verde/Hassayampa area.

DATE:

(a) Right of Way/Property Acquisition:	2005
(b) Construction to Start:	2007
(c) Estimated In-Service Date:	2009

NOTES:
CEC issued to APS in August 2005 for Case No. 128 (ACC Decision # 68063).

APS is the lead and project manager on the development of this project. SRP was a participant in the environmental siting work and anticipates being a participant in the development of the facilities.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2009

LINE DESIGNATION:		Second Knoll (APS) Loop-in of Coronado – Cholla 500kV line
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	240MVA
(c)	Point of Origin	Coronado-Cholla 500kV line SEC 9, T14N, R21E
(d)	Point of Termination	A new Second Knoll Substation SEC 9, T14N, R21E
(e)	Length	Loop-in of existing line immediately adjacent to substation

ROUTING: The Second Knoll Substation will be built adjacent to the existing Coronado – Cholla 500kV line.

PURPOSE: Provide service to residential loads in Show Low and the surrounding area.

DATE:

(a) Right of Way/Property Acquisition:	N/A
(b) Construction to Start:	2008
(c) Estimated In-Service Date:	2009

NOTES:
SRP is responding to an interconnection request from APS. This project entails building a new station immediately adjacent to an existing line. APS is the lead and project manager for this project.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2010

LINE DESIGNATION:		TS9 – Pinnacle Peak
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	To be determined
(c)	Point of Origin	TS9 500kV Substation (adjacent to the Navajo - Westwing 500kV line and near the existing Raceway Substation) SEC 33, T6N, R1E
(d)	Point of Termination	Pinnacle Peak 500kV Substation SEC 10, T4N, R4E
(e)	Length	Approximately 26 miles

ROUTING: East from TS9 500kV Substation to a new Pinnacle Peak 500kV Substation

PURPOSE: This line is a result of joint planning through the SWAT forum. The project will increase the import capability of the system serving the Phoenix Metropolitan area and strengthen the transmission system on the east side of the Phoenix Metropolitan valley. The loop-in of the Navajo - Westwing 500kV line into TS9 will be part of the project.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	2008
(c) Estimated In-Service Date:	2010

NOTES:
An application for a CEC has been filed by APS. A decision is anticipated during the first quarter of 2007. SRP is a participant; APS is the lead and project manager.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2011

LINE DESIGNATION:		Desert Basin – Pinal South
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	To be determined
(c)	Point of Origin	Desert Basin Power Plant Switchyard SEC 13, T6S, R5E
(d)	Point of Termination	Pinal South 230kV Substation SEC 30, T6S, R8E
(e)	Length	Approximately 21 miles

ROUTING: For approximately 6 miles from the Desert Basin Generating Station in Casa Grande near Burris and Kortsen Roads generally south and east to a point on the certificated SEV 500kV line near Cornman and Thornton Roads (vicinity of the proposed CATSHV03 Substation). Then the 230kV line will be attached to the 500kV structures for approximately 15 miles to the proposed Pinal South Substation south of Coolidge, AZ.

PURPOSE: Remove the Remedial Action Scheme that was previously installed on Desert Basin Generating Station; improve reliability of the 230kV system in the region by reducing the loading on existing lines in the area; increase local area system capacity; reduce reliance on second party transmission system; create the first 230kV component of the CATS-HV proposed transmission system for the central Arizona area; and establish the Pinal South Substation, identified as one of the future injection points of power and energy into the expanding central Pinal County load area, which will help local utilities serve local load.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	2009
(c) Estimated In-Service Date:	2011

NOTES:
Authority for the portion of the 230kV line to be attached to the 500kV structures is provided for in the CEC granted in Case No. 126, awarded in 2005 (ACC Decision # 68093 and # 68291), and subsequently confirmed in Decision # 69183, which approved SRP's compliance filing for Condition 23 of the CEC.

SRP will file an application for a CEC in the first quarter of 2007 for the approximately six mile portion of the project not previously permitted from Desert Basin Generating Station to the vicinity of Cornman and Thornton Roads south of Casa Grande.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2012

LINE DESIGNATION:		Palo Verde - North Gila (APS)
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	To be determined
(c)	Point of Origin	Palo Verde Switchyard or nearby 500kV substation To be determined
(d)	Point of Termination	North Gila 500/69kV Substation or another station adjacent to North Gila SEC 11, T8S, R22N
(e)	Length	Approximately 115 miles of single-circuit line

ROUTING: Generally west from Palo Verde/Hassayampa to the Yuma area

PURPOSE: For SRP, this line will provide access to geothermal resources in the Imperial Valley area.

DATE:

(a) Construction to Start:	2008
(b) Estimated In-Service Date:	2012

NOTES:
An application for a CEC is expected to be filed in 2007.

SRP is a participant in this project; APS is the lead and project manager.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2012

LINE DESIGNATION:		TS5 – TS9 (Raceway 500kV)
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	To be determined
(c)	Point of Origin	TS5 500/230kV Substation SEC 29, T4N, R4W
(d)	Point of Termination	TS9 (Raceway 500kV Substation) SEC 33, T6N, R1E
(e)	Length	Approximately 40 miles

ROUTING: North from TS5 substation and then in a northeasterly direction to the TS9 Substation

PURPOSE: This line will be needed to serve projected electric energy load in the area immediately north and west of the Phoenix Metropolitan area, and will increase the import capability into the Valley.

DATE:

(a) Right of Way/Property Acquisition:	N/A
(b) Construction to Start:	2010
(c) Estimated In-Service Date:	2012

NOTES:
An application for a CEC has not yet been filed. SRP is a participant; APS is the lead and project manager.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
2014

LINE DESIGNATION:		Fountain Hills Station
SIZE:		
(a)	Voltage	115kV, 230kV, or 345kV
(b)	Capacity	To be determined
(c)	Point of Origin	To be determined
(d)	Point of Termination	Fountain Hills Station Northeast Scottsdale/Fountain Hills area
(e)	Length	To be determined

ROUTING: SRP will embark upon a facilities siting/environmental assessment/public process to determine the location of the station and the transmission lines supplying the station. Contingent upon final plan of service for the station and the transmission lines supplying the station.

PURPOSE: Provide a source for the development occurring in and around the Fountain Hills area, as well as relieve the stress on the lower voltage system currently supplying the Fountain Hills/Rio Verde area.

DATE:

(a) Right of Way/Property Acquisition:	2010
(b) Construction to Start:	2012
(c) Estimated In-Service Date:	2014

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Palo Verde – Saguaro Line
SIZE:		
(a)	Voltage	500kV
(b)	Capacity	To be determined
(c)	Point of Origin	Palo Verde Generating Station Switchyard/Hassayampa Switchyard SEC 34, T1N, R6W
(d)	Potential Intermediate Point	Pinal West Substation SEC 18, T5S, R2E
(e)	Point of Termination	Saguaro Substation SEC 14, T10S, R10E
(f)	Length	Approximately 125 miles

ROUTING: Generally south and east from the Palo Verde area to a point near Gillespie Dam, then generally easterly until the point at which the Palo Verde – Kyrene 500kV line diverges to the north and east. The corridor then is generally south and east again adjacent to a gas line corridor until meeting up with the Tucson Electric Power Company's Westwing – South 345kV line. The corridor follows the 345kV line until a point due west of the Saguaro Generating Station. The corridor then follows a lower voltage line into the 500kV yard just south and east of the Saguaro generating station.

PURPOSE: This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system and permit increased power delivery throughout the state.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
A CEC was applied for and granted in March 1976 for this line (Case No. 24, ACC Decision # 46802). SRP is including this description sheet as a CATS participant with no defined in-service date.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		RS17 Loop-In
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	RS17 Substation SEC 1, T2S, R6E
(d)	Point of Termination	RS17 Substation SEC 1, T2S, R6E
(e)	Length	0

ROUTING: No new line construction.

PURPOSE: Service to customer load in the Gilbert/Queen Creek area.

DATE:

(a) Construction to Start:	To be determined
(b) Estimated In-Service Date:	To be determined

NOTES:
Authority for this work is included in the RS16 Project CEC (Case No. 86, ACC Decision # 59791 and # 60099).

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		RS17 - RS24
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	RS17 Substation SEC 1, T2S, R6E
(d)	Point of Termination	Future RS24, Queen Creek area To be determined (T1 or 3S, R7 or 8E)
(e)	Length	To be determined

ROUTING: Generally south and east from a point on the Santan to Schrader 230kV line near the future RS17 substation to the proposed RS24 substation in the south and east of the Queen Creek area.

PURPOSE: To meet expected load growth in the eastern distribution area.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		RS24 – RS22/Southeast Valley
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Future RS24, Queen Creek area To be determined (T1 or 3S, R7 or 8E)
(d)	Point of Termination	RS22/Southeast Valley Substation SEC 19, T3S, R9E
(e)	Length	To be determined

ROUTING: Generally south and east from the proposed RS24 substation in the south and east of the Queen Creek area to the future RS22/Southeast Valley substation.

PURPOSE: To meet expected load growth in the eastern distribution area.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Dinosaur - RS21
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Dinosaur Substation SEC 10, T2S, R8E
(d)	Point of Termination	Future RS21, Florence Junction area To be determined (T1 or 2S, R10E)
(e)	Length	To be determined

ROUTING: Easterly from Dinosaur Substation (Queen Creek area) to the future RS21 Substation (Florence Junction area).

PURPOSE: To meet expected load growth in the eastern distribution area.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Rogers – Browning
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Rogers Substation SEC 13, T1N, R5E
(d)	Point of Termination	Browning Substation SEC 12, T1S, R7E
(e)	Length	Approximately 9 miles

ROUTING: To be determined through environmental and public processes, but generally east and south from Rogers, using existing right of way, where possible.

PURPOSE: Provide adequate transmission facilities to deliver reliable power and energy to SRP's customers in the eastern valley area.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Silver King - Browning
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Silver King Substation Parts of SEC 15 & 16, T1S, R13E
(d)	Point of Termination	Browning 500/230kV Substation SEC 12, T1S, R7E
(e)	Length	38 miles*

ROUTING: From Silver King in a westerly direction to Browning

PURPOSE: To deliver Coronado or other power in eastern Arizona into SRP's distribution service territory

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
A CEC exists for the segment of this line from the Browning Substation to a point on the Silver King – Kyrene 500kV line corridor in Apache Junction (T1S, R8E, Section 11 & 12) (Case No. 20).

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

* SRP proposes stringing 17 miles of conductor on existing lattice towers on Forest Service lands on structures built by Federal permit predating the AZ CEC process. The remaining 21 miles of the line will be new construction.

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Silver King - Browning 230kV/Superior Tie
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Point on the Silver King to Browning 230kV transmission line SEC 34, T1S, R12E
(d)	Point of Termination	Superior Substation SEC 34, T1S, R12E
(e)	Length	Approximately 1/2 mile

ROUTING: Southeast from the proposed Silver King to Browning Line to the existing Superior Substation.

PURPOSE: To provide adequate transmission capacity to meet future load growth and/or to improve electric system reliability in SRP's eastern distribution service area.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Westwing - Pinnacle Peak
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Westwing Substation SEC 12, T4N, R1W
(d)	Point of Termination	Pinnacle Peak Substation SEC 10, T4N, R4E
(e)	Length	Approximately 22 miles

ROUTING: Second circuit on APS Westwing - Pinnacle Peak 230kV transmission line (APS' North Valley Project).

PURPOSE: To provide additional transfer capability from the northwest Phoenix area to the northeast Phoenix area. In the event that Case 131 is approved, the need for this project is avoided.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
A CEC for this route was issued in June 2003 (Case No. 120, Decision # 64473, North Valley Project). In the event that Case 131 is approved, the need for this project is avoided. APS is the lead and project manager.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Pinal South – Southeast Valley
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Pinal South SEC 30, T6S, R8E
(d)	Point of Termination	Southeast Valley SEC 19, T3S, R9E
(e)	Length	Approximately 30 miles

ROUTING: Second circuit on Pinal West to Browning 500kV line

PURPOSE: This transmission line was identified as a component of the CATS-HV Pinal County system study. SRP anticipates using the circuit for the delivery of remote generation in the area to the load service territory.

DATE:

(a) Right of Way/Property Acquisition:	As part of the Pinal West to Browning Project
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
The authorization for this line is provided for in the CEC for Case No. 126 (Pinal West to Browning), which was awarded in 2005 (ACC Decision # 68093 and # 68291). SRP must make a compliance filing in accordance with Condition 23 of the CEC for Case No. 126 prior to constructing this line.

This information is included in this ten-year plan on behalf of the participants in the Pinal West to Browning Project as a part of one of the conditions for the CEC.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Santa Rosa – CATSHV03
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Santa Rosa SEC 30, T5S, R4E
(d)	Point of Termination	CATSHV03 SEC 7, T7S, R6E
(e)	Length	Approximately 21 miles

ROUTING: Second circuit on Pinal West to Browning 500kV line

PURPOSE: This transmission line was identified as a component of the CATS-HV Pinal County system study. SRP anticipates using the circuit for the delivery of remote generation in the area to the load service territory.

DATE:

(a) Right of Way/Property Acquisition:	As part of the Pinal West to Browning Project
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
The authorization for this line is provided for in the CEC for Case No. 126 (Pinal West to Browning), which was awarded in 2005 (ACC Decision # 68093 and # 68291). SRP must make a compliance filing in accordance with Condition 23 of the CEC for Case No. 126 prior to constructing this line.

This information is included in this ten-year plan on behalf of the participants in the Pinal West to Browning Project as a part of one of the conditions for the CEC.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Pinnacle Peak - Brandow (with future tie into Rogers or Thunderstone)
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Pinnacle Peak Substation SEC 10, T4N, R4E
(d)	Point of Termination	Brandow Substation SEC 11, T1N, R4E
(e)	Length	To be determined

ROUTING: Use of available circuit position on existing SRP Pinnacle Peak – Papago Buttes 230kV structures from Pinnacle Peak to Brandow; easterly from a point on that line to a termination at either Rogers or Thunderstone.

PURPOSE: Provide adequate transmission capacity to accommodate SRP customer load.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
A CEC was awarded for this circuit as a part of Case No. 69, Pinnacle Peak – Brandow/Papago Buttes 230kV line, dated January 1985.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Rogers - Corbell
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Rogers Substation SEC 13, T1N, R5E
(d)	Point of Termination	Corbell Substation SEC 10, T1S, R5E
(e)	Length	Approximately 12 miles

ROUTING: Use of available circuit position on existing 230kV structures in the area.

PURPOSE: Provide adequate transmission capacity to accommodate future load growth.

DATE:

(a) Right of Way/Property Acquisition:	N/A
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	To be determined

NOTES:
SRP will be using an open position on existing double circuit structures for its entirety. The line and structures were constructed prior to the siting statutes.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Silver King - Knoll - New Hayden
SIZE:		
(a)	Voltage	230kV
(b)	Capacity	875MVA
(c)	Point of Origin	Silver King Substation Parts of SEC 15 & 16, T1S, R13E
(d)	Intermediate Termination	Knoll Substation SEC 23, T3S, R13E
(e)	Point of Termination	New Hayden Substation SEC 7, T5S, R15E
(f)	Length	Approximately 35 miles

ROUTING: South from Silver King, looped into Knoll, continuing to the Hayden area.

PURPOSE: To increase the transmission capacity to serve a new mining load.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	Contingent upon customer need

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.

January 2007

SALT RIVER PROJECT
TEN-YEAR PLAN
TRANSMISSION FACILITIES
TBD

LINE DESIGNATION:		Point on the Kearny - Hayden 115kV line to New Hayden; double circuit loop
SIZE:		
(a)	Voltage	115kV
(b)	Capacity	190MVA
(c)	Point of Origin	Point on Kearny - Hayden 115kV Line, SEC 7, T5S, R15E
(d)	Point of Termination	New Hayden Substation SEC 7, T5S, R15E
(e)	Length	Approximately 0.75 miles

ROUTING: Southwest from the existing Kearny - Hayden 115kV line to the New Hayden Transmission Station.

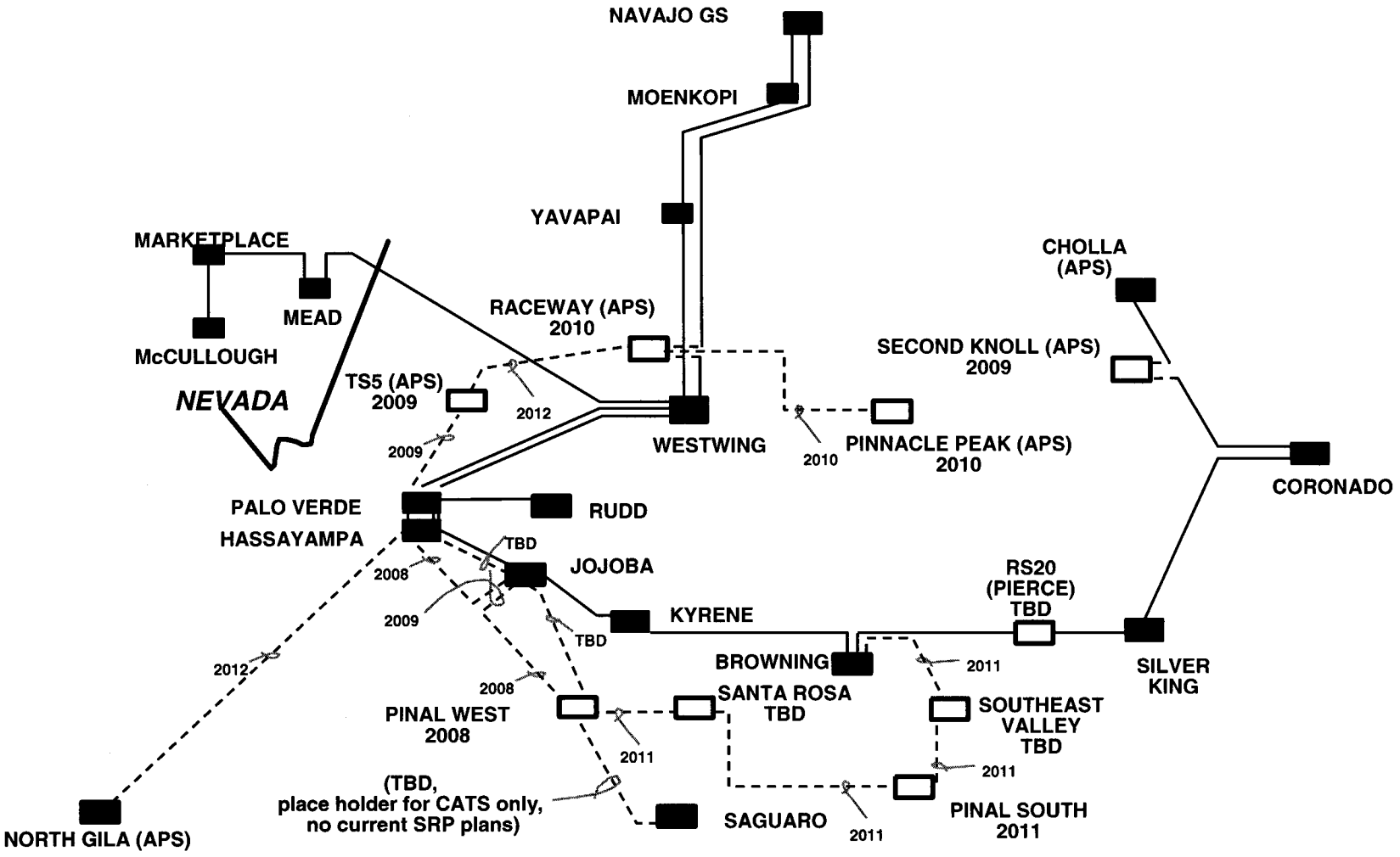
PURPOSE: To increase the transmission capacity to serve a new mining load.

DATE:

(a) Right of Way/Property Acquisition:	To be determined
(b) Construction to Start:	To be determined
(c) Estimated In-Service Date:	Contingent upon customer need

NOTES:
SRP does not hold a CEC for this project, but will be seeking a Certificate subsequent to an environmental and public process to site the line.

This information is included in this ten-year plan because the in-service date could advance into the ten-year reporting period.



JANUARY 25, 2007

SALT RIVER PROJECT
500kV SYSTEM

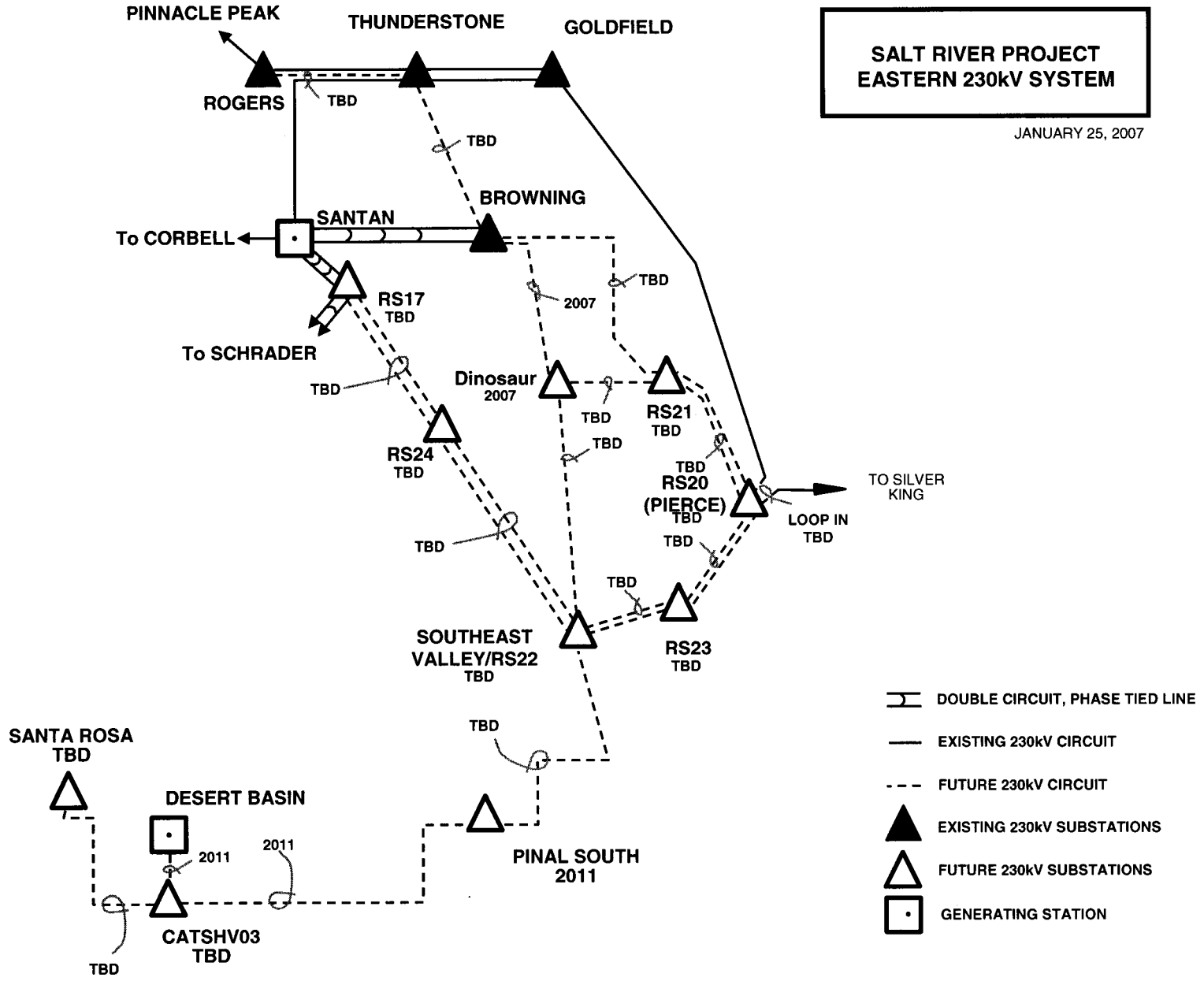
ATTACHMENT A

1/29/2007 000705-1

ATTACHMENT B

SALT RIVER PROJECT EASTERN 230kV SYSTEM

JANUARY 25, 2007

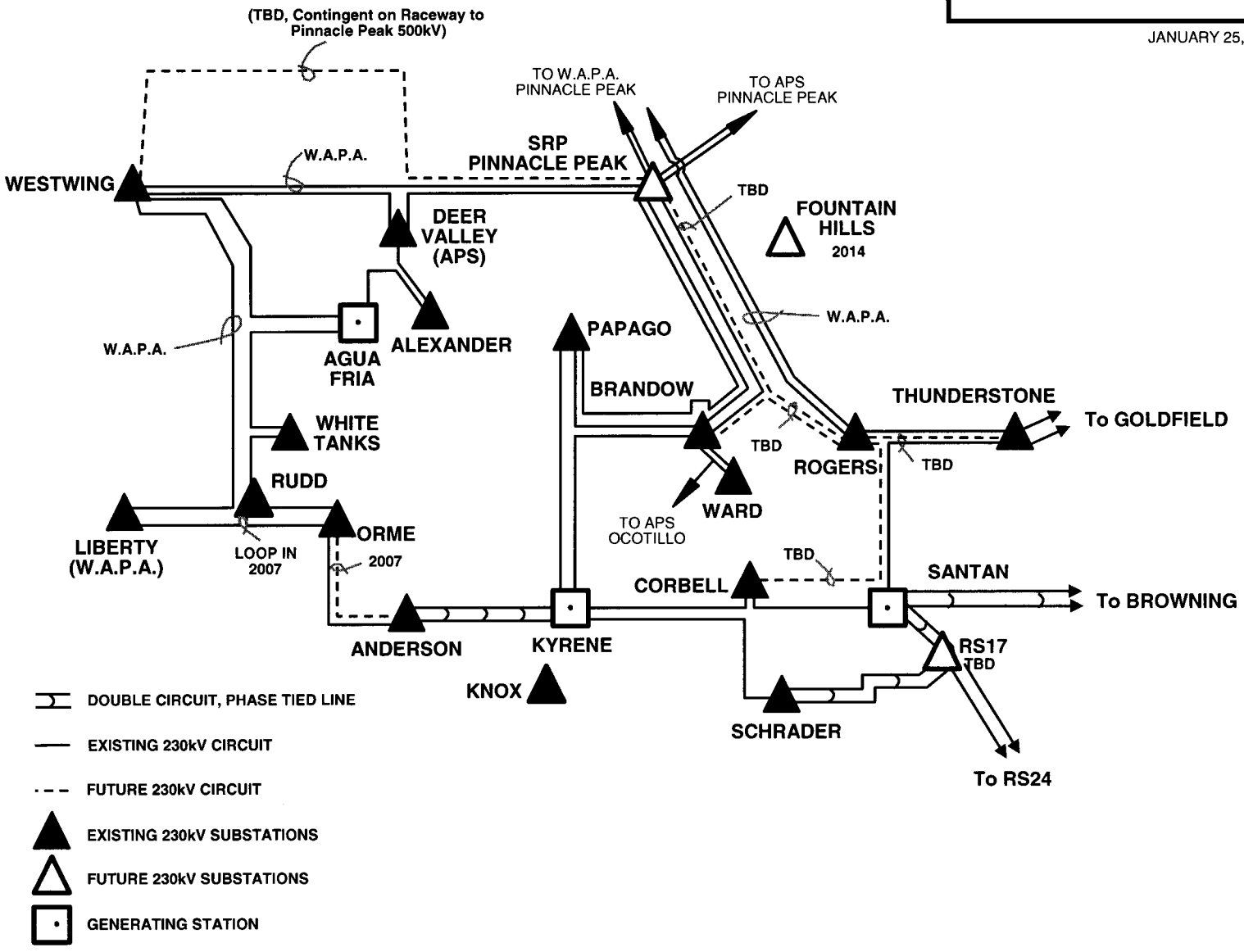


1/29/2007 000705-2

ATTACHMENT C

SALT RIVER PROJECT
WESTERN 230kV SYSTEM

JANUARY 25, 2007



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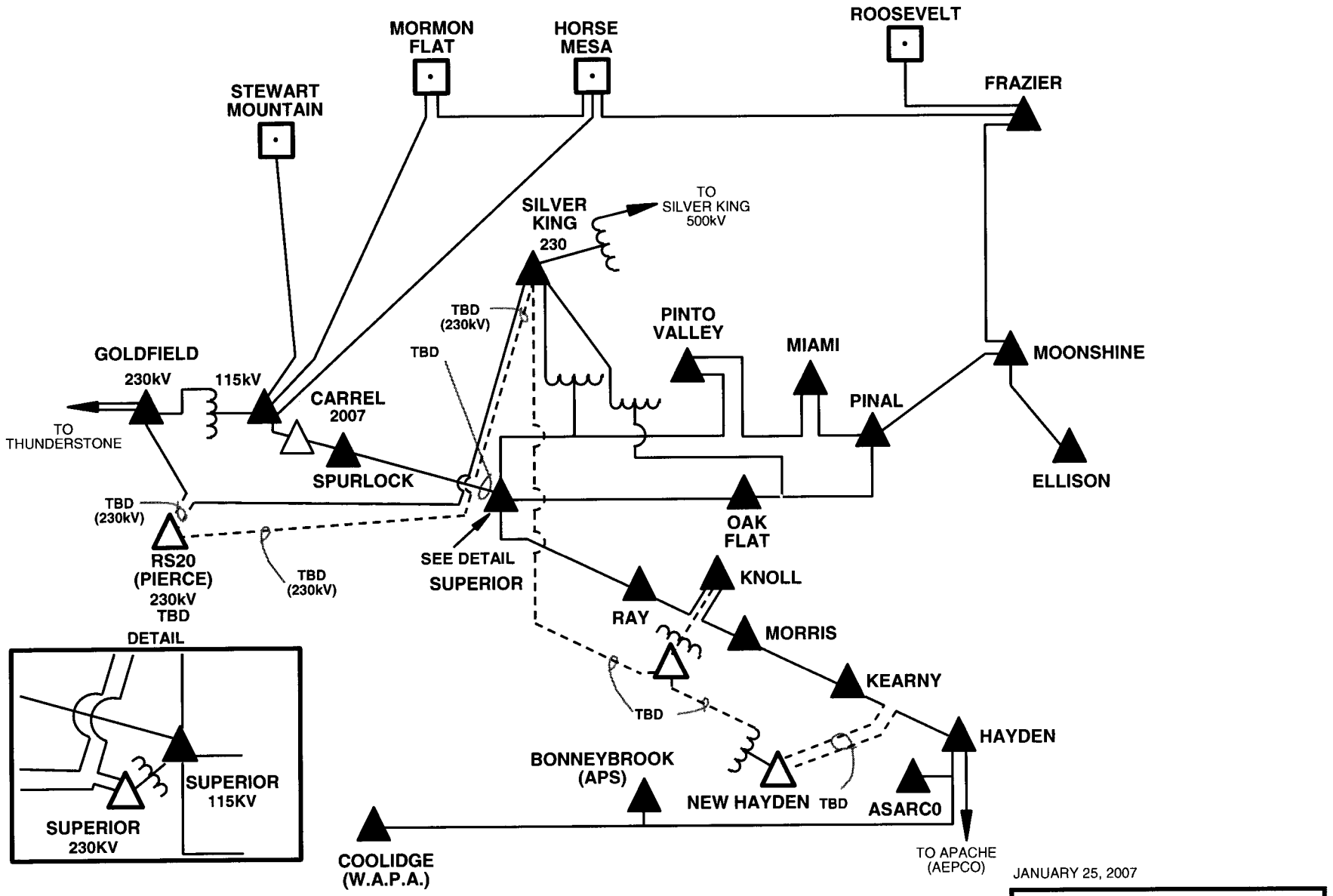

JANUARY 25, 2007

SALT RIVER PROJECT
EASTERN MINING AREA SYSTEM

ATTACHMENT D

1/29/2007 000705-4

SALT RIVER PROJECT

CATS-HV Study of Pinal County for the saturated load analysis, proposed number of EHV and HV stations, and potential transmission corridors.

APPENDIX 1

Delivering more than power.™

07-0162-01 01/07

Final Report

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

For
Central Arizona Transmission System – High Voltage
"CATS HV"
A sub-committee of SWAT

September 21, 2006

SWAT
Southwest Area Transmission

K. R. Saline & Associates, PLC

EXECUTIVE SUMMARY

With the tremendous growth experienced to date and with the growth anticipated in the next 15-20 years the basic infrastructure in the Pinal County area must be expanded. Typically, public utility (i.e. water, sewer), transportation, public services, and recreation infrastructure are addressed through the municipal or county planning processes. In contrast, most electric utility infrastructure is planned by electric utilities that are not associated with municipalities or counties.

In an attempt to coordinate and educate participants in the electric planning process, the SouthWest Area Transmission ("SWAT") steering committee tasked the Central Arizona Transmission Study – High Voltage ("CATS HV") subcommittee with developing a way to study the potential ultimate electric load in Pinal County and develop a transmission infrastructure system that could serve that ultimate load.

This study developed a transmission (infrastructure) system to support the unrealized saturated load and is an expansion and refinement of the 2003 "Pinal County Saturated Load Study" conducted as part of the Pinal West-South East Valley-Browning 500kV project. This process brought together city, town, county, and electric personnel to develop the projected electrical load. When a projected electrical load for a region is calculated based upon land use, it is commonly referred to as the "saturated load" for the region. Saturated load, as defined for this study, was a calculation of the total electric demand in the study area when the land therein is developed to its currently planned land use according to municipal and county zoning or General Plans.

When the land in the study area is fully developed, or saturated, on the order of 10,400MW load could be realized, a value that is approximately the 2005 peak Phoenix metropolitan load. For comparison, approximately 500MW is currently served in the study area. This study does not predict when the study area will be fully developed (saturated), but calculates the load associated with fully developed land use.

This study neither claims the transmission solution studied is the only solution, nor is it an optimization study that determines the minimum number of transmission stations and lines required to serve the load. This study assumes the existing and future transmission facilities are not utility specific. A transmission solution was developed to serve a calculated 10,400MW of saturated load. The study used generic parameters of construction, including but not limited to tower configuration, size, conductor, or the shared use of corridors that might impact reliability.

Serving the calculated 10,400MW of load required significant generation assumptions impacting study results. As of the date of this study no new generation is planned for the study region; therefore, assumptions regarding expansion of existing units and construction of new facilities was included with the study. Because of limited generation in the study region (existing, planned, or expansion of existing facilities), the study assumes the majority of generation was imported from remote locations (Palo Verde Hub, New Mexico, and Four Corners). Overloads on transmission elements outside the study area were noted but not mitigated.

The transmission solution studied to serve the expanded load in the Pinal County study area required the addition of 16 new 230kV substations, numerous 230kV lines, and a few 500kV lines. The 230kV lines added were a combination of 115kV transmission line upgrades to 230kV and new 230kV lines. The 500kV lines included the SouthEast Valley ("SEV") project and the Winchester-Pinal South 500kV line. The substations would be connected by approximately 180 miles of 115kV conductor upgraded to 230kV, 184 miles of new 230kV conductor and 267 miles of 500kV conductor for this studied transmission solution. Use of existing transmission or highway corridors was maximized to avoid construction of new corridors. Approximately 150 miles of new corridor (100 miles of 500kV and 50 miles of 230kV) would be required to complete this transmission plan. A "corridor" in the context of this study simply means a linear feature that was assumed available for the transmission line to follow. The linear feature could be an existing electric line (of any voltage), road, highway, canal, or other feature (railroad, natural gas line, etc.).

The transmission elements added to the study region supported the load and the generations imported to serve the load, but are not the only solution. Alternative generation opportunities and load growth assumptions may change the study results, including the transmission needs of the region. For this reason, the saturated load study should be re-visited every 5-10 years as General Plans change, major transmission improvements and/or generation resources are added, or as significant land use changes occur.

As a new study process and tool, the following refinements were suggested for the final report:

- Upgrade the external EHV (extra high voltage) transmission system to include planned additions associated with the generation expected in the Seams Steering Group-Western Interconnect ("SSG-WI") 2015 Reference Case and study.
- Gather and incorporate electric load data and load growth projections from the Native American Tribes in the study area.
- Gather more information regarding the sale and potential use of State Trust land.
- Publish and present results to jurisdictional entities.

In this final report, the following Interim report issues were addressed and findings included:

- The addition of the Pinnacle Peak – Four Corners line was added to match the SSG-WI 2015 Reference case and study. The addition of the facility reduced some and caused new overloads (external to the study region) as compared to the Interim report. The addition of the facility did reduce the reactive requirements in the study region.
- The tribes were contacted and a conference call was held in July 2006 to speak to the tribes in the Tribal Energy Association. Contact people were added to the CATS HV distribution list for all future meeting notices and meetings. The outcome of the July meeting was the ability to compare Gila River Indian load[1]. While the load was underestimated for this analysis, the increase of load was less than 1% of the total study area load.
- A meeting was held with members of the Arizona State Land Department regarding the study. Verbal comments indicated the State Land Department supported the study assumption that all state land was considered developable. It was suggested that future studies incorporate State Land personnel earlier in the process to provide comments and suggestions to the study plans. To achieve State Land Department insight earlier in the process several people from the State Land department have since been added to the Study Distribution list.
- In an effort to publish and present results to jurisdictional entities the study results and background were presented to the Pinal County Governmental Association at their March 17, 2006 meeting. The power point presentation is included in Appendix F.

[1] Gila River Indian Community Utility Authority, "GRICUA", voluntarily supplied confidential load data for the CATS HV study which does not obligate GRICUA to supply future data for studies. GRICUA is not subject to ACC jurisdiction.

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ACKNOWLEDGEMENTS

The study could not have been performed without the assistance and participation of the following organizations. Their help was instrumental in the development and completion of the study:

Arizona Corporation Commission
Arizona Power Authority
Arizona Public Service Company
Central Arizona Project
Central Arizona Water Conservation District
City of Casa Grande
City of Coolidge
Town of Florence
Pinal County
Salt River Project
San Carlos Irrigation Project
Santa Cruz Water and Power District Association (Electrical Districts 3, 4, and 5 of Pinal County)
Southwest Transmission Cooperative
Tucson Electric Power Company
Western Area Power Administration

INTRODUCTION

In recent years, Pinal County has experienced tremendous growth, and current projections are that this growth will continue over the next 15 to 20 years. This being the case, it is anticipated that Pinal County's basic electric transmission infrastructure will need to be expanded before it can meet all of this projected growth.

At the request of the SWAT steering committee, the CATS HV subcommittee has projected the potential ultimate electric load in Pinal County and developed a transmission infrastructure system that could serve that ultimate load. This study was an expansion and refinement of the 2003 "Pinal County Saturated Load Study" conducted as a part of the Pinal West-South East Valley-Browning 500kV project. This current study increased the size of the study area and gathered input from a number of sources, including city, town, county and electric personnel, to calculate the magnitude of this anticipated future load, usually referred to as the "saturated load". In this study, saturated load is calculated as the total electric demand in the study area when the land is fully developed in accordance with the assumptions of municipal and county zoning documents or General Plans.

The saturated load study process was an open process where utilities, town, city and county planners, and interested parties attended meetings and provided comments. As a transmission analysis, the study disregards the ownership of the sub-transmission or distribution system (which is at a lower voltage than the transmission system).

The process to complete the saturated load and transmission option study for Pinal County was:

- Define the study region (Phase 1 map)
- Gather published/public general plans for the study region
- Define/gather average electric usage demands by land use types
- Assign areas without a general plan some "reasonable" land use
- Calculate total demand or saturated load in study area ({area land use} x {electric demand per land use type})
- Determine approximate receiving station locations (230kV) (Phase 2 map) that would be necessary to support this saturated load. Show approximate receiving station boundaries (Phase 3 map)
- Connect proposed receiving stations to the existing network and to new transmission elements using the following guidelines: (Phase 4 map)
    - Utilize existing corridors
    - Upgrade lower voltage lines
    - Use section lines as guidelines for new transmission paths
    - Require a minimum of two transmission (230kV) lines from each transmission (230kV) station to ensure service of load even with an outage of one of the lines
- Model the existing and projected lines and substations in power flow program and test the system prior to an outage and without load
- Add new loads and corresponding generation to serve the load. Three cases were developed, a 50%, 75%, and 100% of the 10,400 calculated saturated load.
- Run power flow analysis (single contingency analysis) on the modified system to identify overloaded elements and voltage issues

Due to the large amount of load calculated for just a portion of the entire western interconnection, three cases representing the half (50%), seventy five (75%), and the entire saturated load (100%) were developed to slowly build the system to the 100% load level.

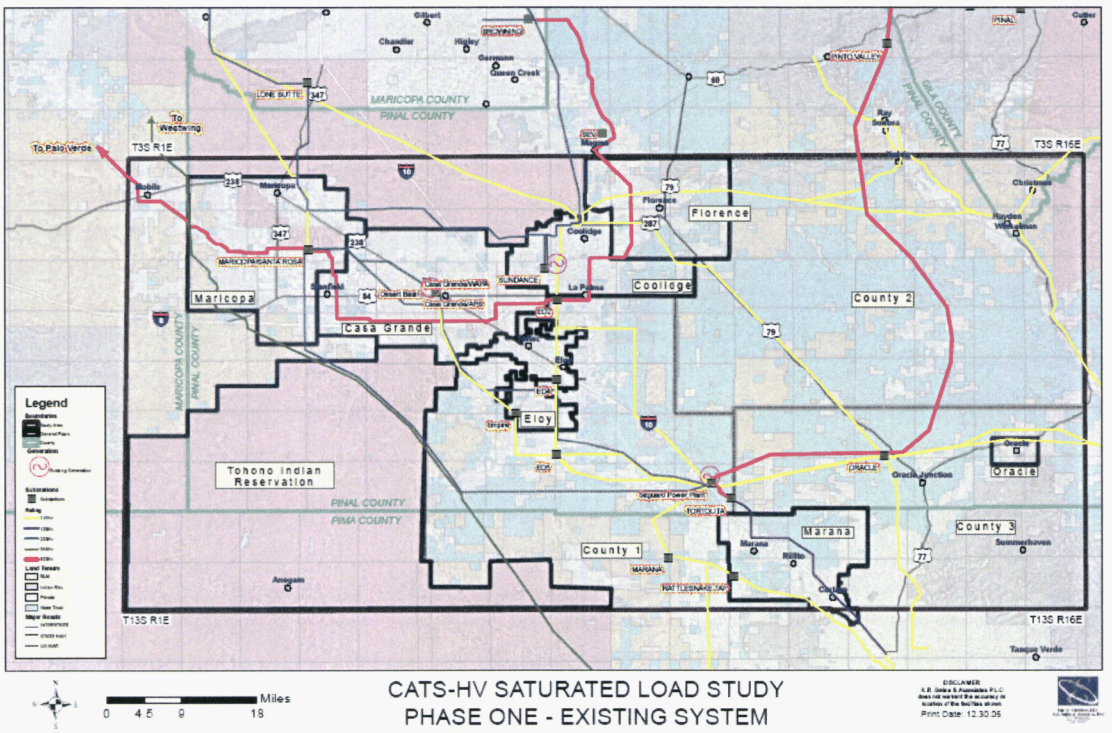
The development and discussion of the study process was captured during each meeting and is available as Appendix E

STUDY ASSUMPTIONS

The saturated load study was based on numerous significant assumptions for each component of the study, including land use, electric demand, substation location, conductor size, power factor for loads, and resources (generation sources). This section describes the assumptions according to two main categories: land use assumptions and electric use assumptions. Appendix B contains full size maps while Appendix C contains further details of the electric and land use assumptions.

LAND USE ASSUMPTIONS

The study area incorporated approximately 5,200 square miles between Phoenix and Tucson, and is mostly located within Pinal County, although portions are also located in Maricopa and Pima Counties. The Western boundary of the study area was approximately 6 miles west of the Pinal/Maricopa Boundary. The Eastern study boundary was approximately 8 miles east of the town of Oracle. The study boundary is shown in brown on the Phase 1 Map below (a full size map is available in Appendix B, Phase 1 map).



CATS-HV SATURATED LOAD STUDY
PHASE ONE - EXISTING SYSTEM

The General Plans or zoning maps (located in Appendix A) gathered for the study were:

- City of Casa Grande
- City of Coolidge
- City of Eloy
- Town of Florence
- Town of Marana
- City of Maricopa
- Pinal County

Other areas included in the study area that were assumed to have minimal to no load growth (based upon current experience) were:

- Tohono O'odham Indian Reservation
- Gila Indian Reservation
- Sonoran Desert National Monument
- Ak-Chin Indian Reservation
- San Carlos Indian Reservation

Rights of Way and Substation Land Use

For informational purposes only, the following are estimates of the area required for each substation and right-of-way (ROW) width. The substation size and distribution/transmission corridor width may vary by utility and terrain and should not be expected to reflect a particular project. The data in the table also assumed that a 115kV transmission substation would be upgraded to 230kV and would require the space to support future 230kV facilities.

Voltage	Substation minimum (acres)	Substation Preferred (add'l screening) (acres)	ROW Width (feet)
69kV	2.5	2.5	40
115kV	9	15	150
230kV	9	15	150
500kV	45	55	250

State Trust Land

The State of Arizona has land owned by the State Trust. The purpose of the State Trust land is to provide the best benefit for the trust beneficiaries (schools including K-12, colleges, military schools, hospitals, and the penitentiary, among others) through the sale or use of the land. The State Trust land in the study area was assumed to be available for development. State Trust land adjacent to existing communities and highways was given a higher level of development than land further away from existing cities and highways. The Phase One map on the previous page (and also reproduced in the appendix) shows the State Trust land in the study area shaded a light blue.

Transmission Corridors / Linear Features

In the development of this study use of existing linear features (such as existing electric transmission lines) was maximized. Due to the magnitude of the anticipated load growth some new transmission corridors were created. The total approximate new corridors included:

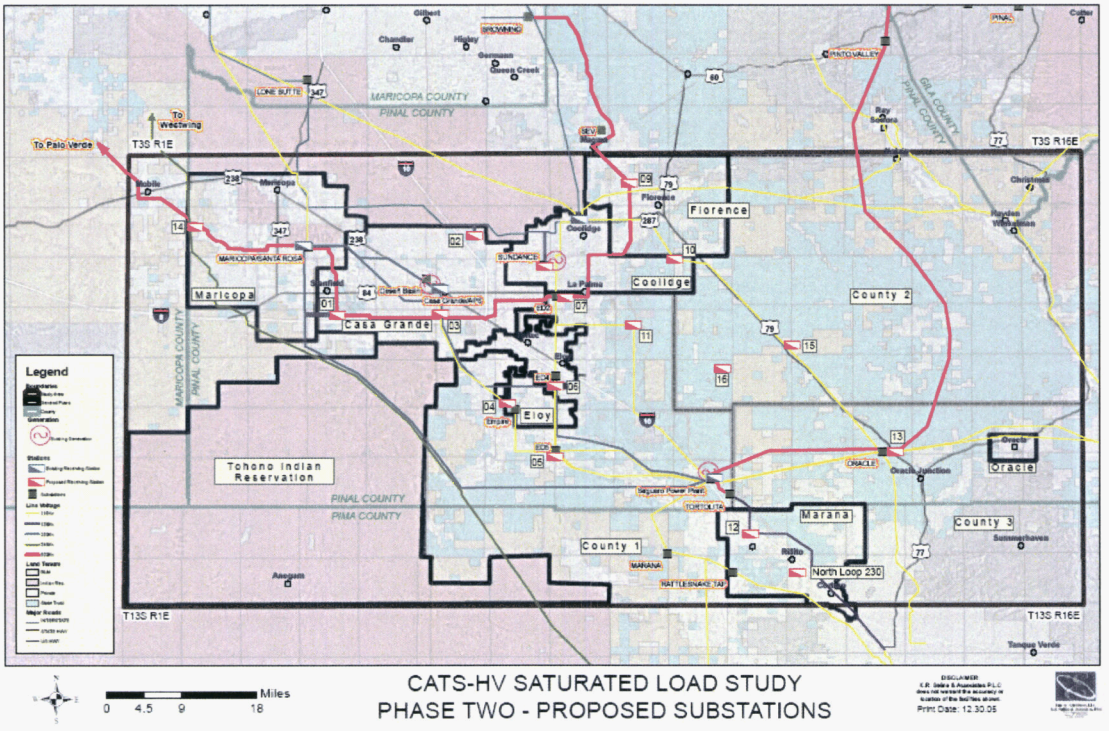
Voltage	Location	Approximate Miles of new corridors
230kV	Connecting CATS HV stations 11, 15, and 16 to the system	48
500kV	Winchester – Pinal South via CATSHV13 substation	100
	Total	148

This total does not include the South East Valley project that was modeled in the base case.

ELECTRIC ASSUMPTIONS

The following assumptions were used for the electric modeling in the power flow program. Please refer to the Phase 2 map below for substation locations (new substation symbol) and the Phase 4 map on the following page for the transmission lines modeled (dashed blue and red lines). Dashed lines overlaying existing lines indicated the lower voltage line was upgraded to a higher voltage. This analysis disregarded ownership of facilities by the various electric entities in the study region. The full size map is available as Appendix B – Phase 2 map.

The power flow case used as a base for this analysis was the coordinated 2015 Arizona bulk model (2015_az_basecase_bulk.sav) and studied in PSLF version 13. Because this was a 2015 case, the 500kV line Pinal West to Browning (also known as the SEV project) was represented in the case as in-service.

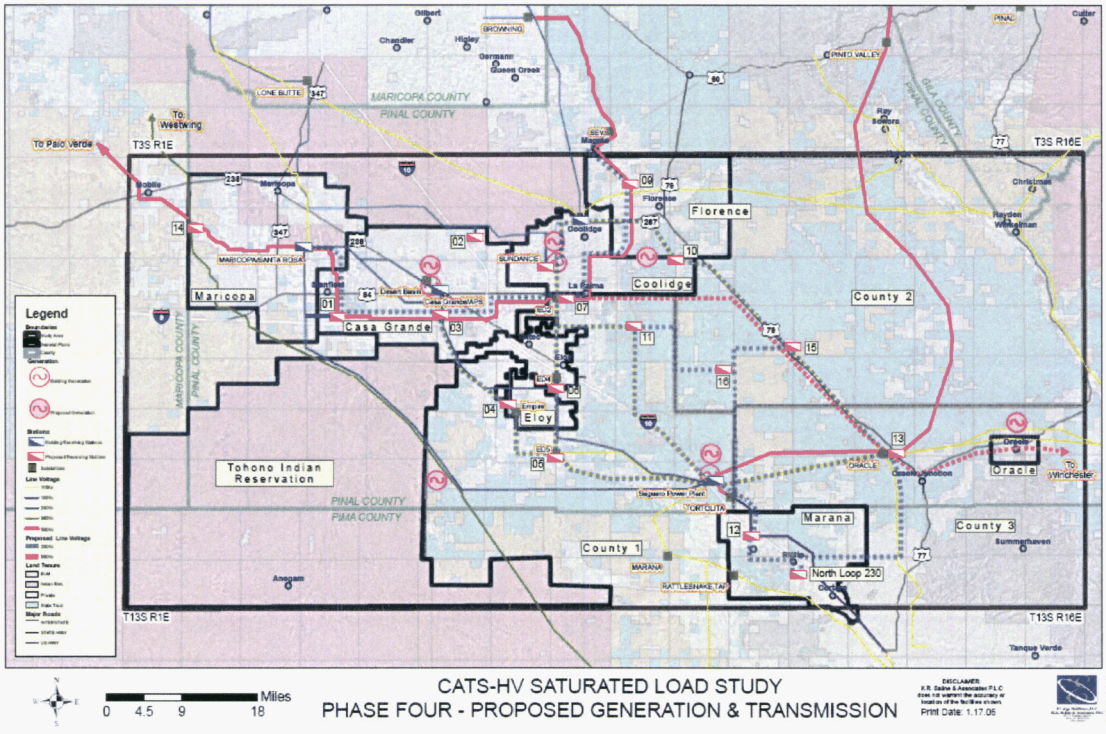


CATS-HV SATURATED LOAD STUDY
PHASE TWO - PROPOSED SUBSTATIONS

Conductor

The 230kV substations were connected using 1272 ACSS conductor with an 854MVA rating while 500kV substations were connected via 2156 ACSR bundled conductor with a 3124 MVA rating. Existing 115kV conductor, when replaced, was replaced with the 230kV 1272 ACSS conductor, using the same corridors (shown as dashed lines overlaid on the yellow 115kV lines).

The map below (and available full size in Appendix B – Phase 4 map) shows the existing and proposed lines in the study area.



Transmission Line Distances and Totals

The following tables highlight the transmission lines in the study, divided into existing 230kV, 115kV upgraded to 230kV, new 230kV, and new 500kV. Each table shows the approximate length (in miles) of the denoted type of transmission line.

Existing 230kV

From	To	Voltage	Approximate Length (mi)
Santa Rosa	Tatmomli	230	28
Tatmomli	Saguaro	230	40
Lone Butte	Sundance	230	47
Santa Rosa	Casa Grande	230	20
Santa Rosa	Saguaro	230	68
Total Existing			**203**

115kV upgraded to 230kV:

From	To	Voltage	Approximate Length (mi)
CATSHV07 (PS)	CATSHV06(ED4)	230	9.2
CATSHV05 (ED5)	CATSHV06(ED4)	230	8.5
CATSHV04 (EM)	CATSHV05(ED5)	230	12.1
CATSHV05 (ED5)	Saguaro	230	15.3
Coolidge	CATSHV10	230	11.2
Saguaro	CATSHV13(OJ)	230	17.3
CATSHV07	CATSHV11	230	11
CATSHV10	CATSHV15	230	15
CATSHV15	CATSHV13(OJ)	230	15.7
CASA GRANDE WAPA	CATSHV04(EM)	230	12.5
Casa Grande APS	CATSHV06(ED4)	230	18
CATSHV06	Saguaro	230	23.8
CATSHV07	Coolidge	230	11
Total 115kV upgrade			**180.6**

New 230kV:

From	To	Voltage	Approximate Length (mi)
Santa Rosa	CATSHV01	230	10.8
Desert Basin	CATSHV03 (CG)	230	5
CATSHV03 (CG)	CATSHV07(PS)	230	10.3
CATSHV03 (CG)	CATSHV06(ED4)	230	18.6
CATSHV07(PS)	Sundance	230	4.5
CATSHV09 (FL)	SEV	230	26.5
CATSHV07 (PS)	CATSHV09 (FL)	230	18.7
Saguaro	CATSHV12(MA)	230	8
CATSHV11	CATSHV16	230	12.7
CATSHV16	Saguaro	230	14.5
CATSHV15	CATSHV16	230	8.7
CATSHV01	CATSHV03 (CG)	230	14.5
CATSHV12(MA)	Nloop	230	8
CATSHV13(OJ)	Nloop	230	24
Total New 230kV			**184.8**

New 500kV

The table does not include 500kV to connect Four Corners Generation or Saguaro Area Generation

From	To	Voltage	Approximate Length (mi)
Winchester	CATSHV13(OJ)	500	75
CATSHV13	CATSHV07 (PS)	500	40.3
HASSYAMPA	PINAL WEST	500	51.8
PINAL WEST	SANTA ROSA	500	13.8
SANTA ROSA	CATSHV07 (PS)	500	36.9
CATSHV07 (PS)	SEV	500	31.3
SEV	Browning	500	18
Total new 500kV			**267.1**

Demand by land use type

The table below was developed during discussion at one of the first CATS-HV meetings and included insight from Arizona Public Service Co. ("APS"), Salt River Project, and Western Area Power Administration ("WAPA"). Each General Plan had different land use categories that were approximately matched with one of the land use types shown below. The complete residential listing can be found in the appendix.

Demand Types				Demand Value	Unit
Commercial					
Heavy	(45kW/acre *640acre/sq mile)			28800	kW/sq mile
Medium	(30kW/acre *640acre/sq mile)			19200	kW/sq mile
Light	(14kW/acre *640acre/sq mile)			8960	kW/sq mile
Government	(use light Commercial)			8960	kW/sq mile
Residential	**Assumes 4kW per dwelling unit**				
Avg d.u./acre	d.u. =	Dwelling unit			
0.05	0.2	kW/acre		128	kW/sq mile
0.25	1	kW/acre		640	kW/sq mile
1	4	kW/acre		2560	kW/sq mile
4	16	kW/acre		10240	kW/sq mile
Only a sampling of data is provided, see the appendix for dwelling sizes from 0.05 to 24 d.u. per acre.					
8	32	kW/acre		20480	kW/sq mile
8.5	34	kW/acre		21760	kW/sq mile
15.5	62	kW/acre		39680	kW/sq mile
21.5	86	kW/acre		55040	kW/sq mile
22	88	kW/acre		56320	kW/sq mile
Other Uses					
Parks				500	kW/sq mile
State Land				0	kW/sq mile
Reservation Land (with resorts/industrial parks)				500	kW/sq mile
Reservation Land				100	kW/sq mile
Existing ROW/Roads				0	kW/sq mile
Agriculture				1000	kW/sq mile
Schools	(Medium Commercial Value)			19200	kW/sq mile

Loads

The transmission system model represented a 2015 Arizona system, including forecasted 2015 loads in the study region. To avoid duplication of load in the study region (forecast and the calculated saturated loads), the forecasted loads were turned off. The saturated loads were modeled with a 1.0 per unit power factor, a common assumption for distribution loads modeled on the high voltage system. This assumption means the distribution system loads should provide their own reactive needs without relying on the transmission system. The saturated loads were modeled as connected to the new 230kV substations (not via a 230/69kV transformer). Each 230kV receiving station should handle approximately 500MW of load while each 115kV substation should handle approximately 200MW of load.

Substations entitled "CATSHV##" are substations added to the study region for this analysis. Those substations with names (such as Coolidge, Marana, Test Track, etc.) are substations already existing in the region and were allocated some of the saturated load. Some of the CATSHV substations have also been noted with the name of an existing substation or town to assist in determining their proposed location for this analysis.

The loads modeled for the three cases were:

Substation Load	**Voltage (kV)**	**Case**		
		50% Load	**75% Load**	**100% Load**
		MW	**MW**	**MW**
Coolidge	230	227	341	455
Test Track	230	227	341	455
Marana	115	110	165	220
Saguaro	230	260	390	520
Casa Grande APS	230	201	301	401
Rattlesnake	115	86	129	172
Tortolita	500	258	387	516
CATSHV01	230	257	386	514
CATSHV02	230	262	392	523
CATSHV03	230	248	372	495
CATSHV04 (Empire)	230	264	396	528
CATSHV05 (ED5)	230	231	347	463
CATSHV06 (ED4)	230	241	362	483
CATSHV07 (Pinal South)	230	256	384	512
Sundance (formerly CATSHV08)	230	249	373	498
CATSHV09 (Florence)	230	245	367	490
CATSHV10	230	249	374	498
CATSHV11	230	200	299	399
CATSHV12 (Marana)	230	264	396	528
CATSHV13 (Oracle Junction)	230	238	357	476
CATSHV14 (Pinal West)	230	189	283	377
CATSHV15	230	219	328	437
CATSHV16	230	219	328	437
Total Load (MW)		**5199**	**7799**	**10398**

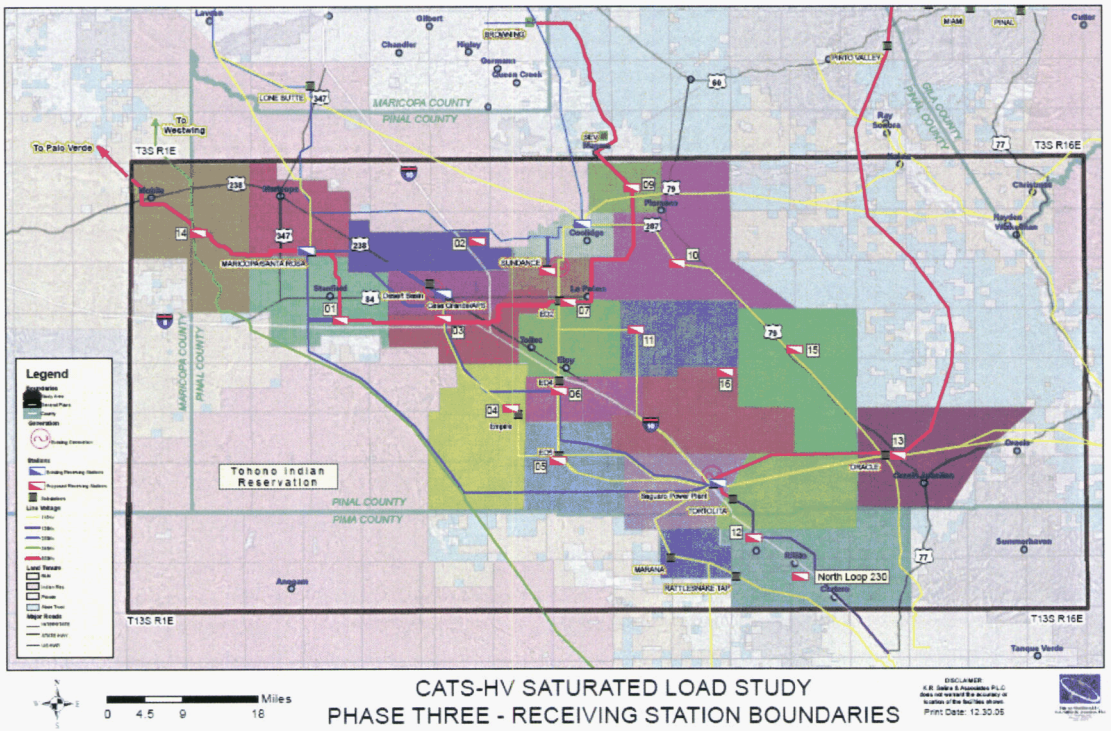
This study increased load only in the study region and did not increase load across Arizona or other Western states. The estimated 2005 peak load for the study area was 500MW. The 100% load case with nearly 10,400MW of calculated load is comparable to the 2005 Phoenix Metropolitan peak load.

Substation Boundaries

Another way to correlate the relationship between loads and substations is shown in the substation boundary map below. This map (also available full-size in Appendix B – Phase 3 Map) shows each 230kV receiving station and the estimated area containing approximately 500MW of load which could be served by the receiving station.

As each shaded area represents 500MW of load, this map shows that those colored areas with larger boundaries are projected to be less dense (in terms of electric demand) than those areas that are shown with smaller boundaries.

The proposed substations show a representative location and do not indicate that a substation would be located exactly as shown.



Generation

Most of the generation was imported from outside the study region per the 2015 SSG-WI Reference Case generation assumptions. The table below shows the generation resources used to serve the saturated load. According to the SSG-WI 2015 Reference Case the following generation is proposed for Arizona:

- 3400MW of Coal, which 3000MW was modeled at:
  - 1500MW from Desert Rock
  - 1500MW at Four Corners
- 2700MW Natural gas, which was modeled at the Palo Verde Hub as:
  - 1500MW of combustion turbines (CT's)
  - 1200MW of combined cycle (CC's) units
- 1500MW Renewables
  - 1500MW at Four Corners

New Mexico has studied 2-3,000MW (or more) of wind generation which was incorporated in this study by adding wind generation to the Winchester 500kV bus.

To incorporate the new generation, new transmission facilities were added. Transmission was added to accommodate the following facilities: Desert Rock, Palo Verde Hub, Saguaro Area Generation, Sundance, and Desert Basin. Additional EHV transmission enhancements, external to the study system, were not added to transport remote generation to the study region.

Incremental Generation Dispatch	Fuel	Case (MW)			Total (MW)
		50% Case	75% case	100% case	
Existing					
Sundance/Desert Basin/Saguaro	Natural Gas	288	-	-	288
New Resources					
Expansion: Sundance /Desert Basin/ Saguaro	Natural Gas	-	1600	-	1600
Winchester (simulating NM Wind)	Wind	950	-	200	1150
Saguaro Area	Natural Gas	-	1000	96	1096
Bowie	Natural Gas	1080	-	-	1080
Palo Verde Hub (CTs)	Natural Gas	950	-	500	1450
Palo Verde Hub (CCs)	Natural Gas	-	-	600	600
Four Corners	Wind	850	-	-	850
Four Corners (Desert Rock)	Coal	-	-	1300	1300
Four Corners (coal expansion projects)	Coal	900	-	300	1200
Study Area Load		**5199***	**7799**	**10398**	
Total Generation by case		**5018**	**2600**	**2996**	
Total Generation					**10614**

*Approximately 450MW of load modeled in the study region with the 2015 Bulk case was turned off with the addition of the CATS area loads reducing the need for generation.

The generation dispatch table above shows two important points:

1) Impact of generation location (import/local).
   The 50% case was essentially an "import" scenario to the study region. The 75% case was built from the 50% case, but used local generation to supply the added load. The 100% load case, built from the 75% load case, used external sources to support the total load.

   Due to this generation dispatch, some elements in the overload tables appear to have reduced loading in the 75% case as compared to the 50% case. This phenomenon shows the impact of local generation and that the generation assumptions correspondingly affects loading on the transmission system.

2) Generation added exceeded the expected saturated load.
   Due to the losses in the added lines, and adding a little extra "cushion" to the Arizona swing machine (which was nearly operating at its capacity in the starting case), the generation dispatched exceeded the calculated saturated load by approximately 200MW.

Reactive Support

The addition of primarily remote generation to serve the study region required the addition of significant amounts of reactive support (which keeps voltage at acceptable levels) in the study area. The 100% load case required the most reactive support due to extreme overloading of transmission elements outside the study region to transport the remote power to the study region.

As a result of the large amount of reactive (capacitive) support required in the study area, especially in the 100% load case, the study showed the need for more transmission capacity on the EHV transmission system to more reliably and efficiently transport the external generation to the study area. In addition to the large amount of reactive support added to the study area, the generation in the study region must be capable of providing reactive support to the system.

The following table summarizes the total reactive support (capacitance) required at study area busses to maintain the modeled load and transmission elements of the 230kV system at 0.95 per unit (95% of rated voltage). For this final report, due to the addition of the Pinnacle Peak-Four Corners 500kV and Coolidge-CATS07 230kV lines, the reactive support was reduced slightly, approximately 40MVARs for the 75% case and 140 for the 100% case.

Total Capacitance Required	**50% Case (MVAR)**	**75% Case (MVAR)**	**100% Case (MVAR)**
Shunts	750	750	750
Synchronous condensers	0	119	1063
Total	750	869	1813

POWER FLOW RESULTS

The following sections highlight the findings of the power flow modeling of the 10,400MW of saturated load and the system modeled to serve that load. The power flow analysis showed voltage and thermal issues in each of the cases pre and post contingency. The results discussed identify voltage issues greater than 5% voltage deviation and loading exceeding 100% of the element's continuous rating for normal operation and emergency rating (rating 2) for contingency simulations.

The purpose of the power flow analysis was to see if the proposed substations and lines were sufficient to serve the calculated saturated load. The lack of elements identified with a "CATSHV" name, the elements added to serve the calculated load, in the comparison tables show that the proposed transmission option was sufficient to serve the modeled load, with the exception of a few transformers modeled that would be needed to alleviate overloads due to outages. Appendix D contains the power flow data resulting from this study.

Due to the large amount of load calculated for just a portion of the entire western interconnection, three cases representing the half (50%), seventy five (75%), and the entire saturated load (100%) were developed to slowly build the system to the 100% load level.

50% LOAD CASE

The 50% load case modeled approximately 5200MW of load at the substations in the study area. The study found significant overloads on elements supplying the remote generation to the study area loads under normal operating conditions. Some of the significant overloads were:

- Cholla-Saguaro 500kV line – 129% (importing Four Corners generation)
- Rogers- Pinnacle Peak 230kV lines – 104% (only rated at 375MVA)
- Winchester-Vail 345kV line – 146% (addition of wind generation and Bowie project at Winchester)

Under contingency conditions, the following elements were heavily loaded (based on emergency rating):

- Pinal West – Santa Rosa 500kV line – 104% for loss of the Jojoba-Kyrene 500kV line (note high Palo Verde Hub generation)
- Rogers- Pinnacle Peak 230kV lines – 137% for loss of the parallel circuit
- Saguaro East – Marana 115kV line – 113% for loss of the Rattlesnake-Tucson 115kV line
- Santa Rosa – CATSHV01 CKT 2 230kV line – 121% for loss of the Circuit 1. This particular element is the loop-in of APS's 287MVA Santa Rosa-Tatmomli-Saguaro 230kV line into the CATSHV01 substation. One potential solution to eliminate the overload would be to avoid looping in the existing line to the CATSHV01 substation.

Voltage was monitored, similar to loading on the elements; however it was not as critical as overloading. There were busses that had low voltage prior to contingencies, but were outside the study area and on the 115kV system. Outages dropped voltage as much as 15% (well above the 5% allowed by Western Electricity Coordinating Council ("WECC")/North American Electric Reliability Council ("NERC") criteria, but again it was at 115kV busses outside the study area. Bus voltages did drop, due to outages, within the study system, but were close to the 5% voltage deviation threshold. This study also assumes that the 69kV and lower substation loads (modeled at the 230kV busses) would be compensated to have a unity power factor.

75% LOAD CASE

The 75% load case modeled approximately 7800MW of load at the substations in the study area, an increase of approximately 2600MW to the 50% case. The additional load continued to trigger significant overloads on elements supplying the remote generation to the study area loads under normal operating conditions. Some elements experienced a slight reduction in loading because of internal generation dispatched to serve the increased load from the 50% load case.

Some of the significant overloads, prior to an outage, were:

- Cholla-Saguaro 500kV line – 111% (importing Four Corners generation)
- Rogers- Pinnacle Peak 230kV lines – 106% (only rated at 375MVA)
- Winchester-Vail 345kV line – 143% (addition of wind generation and Bowie project at Winchester)

Under contingency conditions, the following elements were heavily loaded (based on emergency rating):

- Coolidge-Sundance 230kV line – 106% for loss of the parallel circuit (case includes the doubled Sundance and Desert Basin generation. The emergency line rating was only 415MVA.
- Pinal West – Santa Rosa 500kV line – 101% for loss of the Jojoba-Kyrene 500kV line (note high Palo Verde Hub generation)
- Rogers- Pinnacle Peak 230kV lines – 140% for loss of the parallel circuit
- Saguaro East – Marana 115kV line – 172% for loss of the Rattlesnake-Tucson 115kV line
- Santa Rosa – CATSHV01 CKT 2 230kV line – 132% for loss of the Circuit 1. This particular element is the loop-in of APS's 287MVA Santa Rosa-Tatmomli-Saguaro 230kV line into the CATSHV01 substation. Again, one option which would eliminate the overload would be to avoid looping in the existing line to the CATSHV01 substation.

Voltage was monitored, similar to loading on the elements; however it was not as critical as overloading. There were busses that had low voltage prior to contingencies, but were outside the study area and on the 115kV system. Outages dropped voltage as much as 15% (well above the 5% allowed by WECC/NERC criteria), but again it was at 115kV busses outside the study area. Bus voltages did drop, due to outages, within the study system, but were close to the 5% voltage deviation threshold. This study also assumes that the 69kV and lower substation loads (modeled at the 230kV busses) would be compensated to have a unity power factor.

100% LOAD CASE

The 100% load case modeled the full 10400MW of load at the substations in the study area and 10,600MW of resources. The additional 3000MW of generation added to the 75% case to create the full load, 100%, case was imported from outside the study area. The generation assumption showed all but a handful of Arizona 115kV and higher voltage elements reaching 100% or more of their emergency rating. This case shows the need for significant investment in the transmission system to meet the 100% load scenario.

Some of the significant overloads, prior to an outage, were:

- Cholla-Saguaro 500kV line – 145% (importing Four Corners generation)
- Rogers- Pinnacle Peak 230kV lines – 130% (only rated at 375MVA)
- Winchester-Vail 345kV line – 160% (addition of wind generation and Bowie project at Winchester)

Under contingency conditions, the following elements were heavily loaded (based on emergency rating):

- Coolidge-Sundance 230kV line – 114% for loss of the parallel circuit (case includes the doubled Sundance and Desert Basin generation. The emergency line rating was only 415MVA.
- Pinal West – Santa Rosa 500kV line – 133% for loss of the Jojoba-Kyrene 500kV line (note high Palo Verde Hub generation)
- Rogers- Pinnacle Peak 230kV lines – 171% for loss of the parallel circuit
- Saguaro East – Marana 115kV line – 215% for loss of the Rattlesnake-Tucson 115kV line
- Santa Rosa – CATSHV01 CKT 2 230kV line – 195% for loss of the Circuit 1. This particular element is the loop-in of APS's 287MVA Santa Rosa-Tatmomli-Saguaro 230kV line into the CATSHV01 substation. One potential alternative to eliminating the overload would avoid looping in the existing line to the CATSHV01 substation.

Voltage was monitored, similar to loading on the elements; however it was not as critical as overloading. There were busses that had low voltage prior to contingencies, but were outside the study area and on the 115kV system. Outages dropped voltage as much as 15% (well above the 5% allowed by WECC/NERC criteria), but again it was at 115kV busses outside the study area. Bus voltages did drop, due to outages, within the study system, but were close to the 5% voltage deviation threshold. This study also assumes that the 69kV and lower substation loads (modeled at the 230kV busses) would be compensated to have a unity power factor.

COMPARATIVE TABLES

The following tables compare the loading on elements for the cases studied for continuous and contingency conditions. A "-" indicates loading was less than 75% and not recorded by the power flow program. The outage description of "base" or "n-0" means the transmission system had no elements out of service. An outage or contingency occurs when a line or transformer is out of service. Please refer to the appendix for complete results. The tables below removed parallel circuits and results not significant to the study region.

CONTINUOUS (BASE) OVERLOADS

The following table compares the real flow on the monitored lines for the three cases in the analysis; the 50%, 75%, and 100% load cases prior to a system outage. The percentage loading was based on the element's normal ("continuous") rating.

The additional line elements (Pinnacle Peak – Four Corners 500kV and Coolidge- CATSHV07 230kV) resulted in a new overload of the Cactus Pinnacle Peak 230kV line and Shiprock 345/230kV transformer. The additional line elements generally reduced or maintained the loading seen in the Interim report.

	Rating 1	Case			Outage
Overloaded Element	**Mva**	**50%**	**75%**	**100%**	**description**
CACTUS -PNPKAPS 230 ck 1 line	371	128%	129%	135%	Base system (n-0)
CHOLLA -SAGUARO 500 ck 1 line	889	129%	111%	145%	Base system (n-0)
PNPKAPS 500/230 ck 1 tran	598	92%	91%	102%	Base system (n-0)
ROGERS -PINPK 230 ck 1 line	375	104%	106%	130%	Base system (n-0)
SAG.EAST-MARANA 115 ck 1 line	167	83%	132%	163%	Base system (n-0)
SHIPROCK 345/230 ck 1 tran	300	108%	111%	139%	Base system (n-0)
SNTAROSA-CATSHV01 230 ck 2 line	287	-	81%	120%	Base system (n-0)
WINCHSTR-VAIL 345 ck 1 line	925	146%	143%	160%	Base system (n-0)

OUTAGE OVERLOADS

The following table compares the real flow on the monitored lines for the three cases in the analysis, the 50%, 75%, and 100% load cases due to an outage on the system. The percentage loading was based on the element's emergency ("rating 2") rating. The addition of the Pinnacle Peak – Four Corners 500kV line and the Coolidge-CATSHV07 230kV line generally resulted in the same loadings as the Interim report, with the singular exception of a significant reduction in loading on the Coolidge-Sun Ariz 230kV line (approximately 50%).

	Rating 2	Case			
Overloaded Element	**Mva**	**50%**	**75%**	**100%**	**Outage description**
CASGRAPS-CASAGRND 230 ck 1 line	600	-	98%	116%	line TESTTRAK to SNTAROSA 230 ck 1
CHOLLA-SAGUARO 500 ck 1 line	1332	96%	78%	104%	line PINAL_W to SNTAROSA 500 ck 1
COOLIDGE-SUN ARIZ 230 ck 1 line	415	-	106%	114%	line COOLIDGE to SUN ARIZ 230 ck 2
DBG-CATSHV03 230 ck 1 line	939	-	95%	103%	line CASGRAPS to DBG 230 ck 1
JOJOBA -KYRENE 500 ck 1 line	3066	87%	84%	102%	line PINAL_W to SNTAROSA 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	104%	101%	133%	line JOJOBA to KYRENE 500 ck 1
ROGERS-PINPK 230 ck 1 line	412	137%	140%	171%	line ROGERS to PINPK 230 ck 2
SAG.EAST-MARANA 115 ck 1 line	184	113%	172%	215%	line RATTLSNK to TUCSON 115 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	121%	132%	195%	line SNTAROSA to CATSHV01 230 ck 1

VOLTAGE DEVIATION VIOLATIONS

WECC/NERC criteria allows only a 5% voltage deviation for bus voltage due to a single contingency. The following table highlights some of the voltage deviation violations in the study area. The "-" below indicates the voltage deviation was less than 5%. The additional Pinnacle Peak-Four Corners 500kV and Coolidge-CATSHV07 230kV lines did not significantly change the violations seen for outages. The Red Mesa East and Thunderstone 230kV busses saw an improvement, i.e. a reduction in voltage drop, but at least at Thunderstone, the voltage violation remained.

	Case			
Bus Name	**50%**	**75%**	**100%**	**Outage description**
ASARCOSR 115	-0.11	-0.11	-0.111	line KNOLL to MORRISAZ 115 ck 1
EMPIREsw 230	-0.08	-0.08	-0.078	line APACHE to BUTERFLD 230 ck 1
HAYDENAZ 115	-0.11	-0.11	-0.111	line KNOLL to MORRISAZ 115 ck 1
REDMSA_E 500	-	-	-	line NAVAJO to REDMSA_E 500 ck 1
THUNDRST 230	-	-	-0.067	line SANTAN to THUNDRST 230 ck 1

STUDY FINDINGS

The study findings were separated into three categories: "General, "Transmission", and "Generation". The "General" category includes findings regarding the saturated load and how to serve the load. The "Transmission" category includes findings regarding how to serve the saturated load via transmission lines and substations. The "Generation" category includes findings regarding how the generation assumptions in this study impact the results. This study limited its analysis to the high voltage 230kV system.

General

- The study found that based on the land use, based on general plans, and electric demand assumptions when full build-out occurs, the study area could require 10,400MW.
- The saturated load study should be updated every 5-10 years or more frequently if more rapid growth or significant changes occur to land use.
- The impacts noted for the 500kV lines will be studied by the CATS EHV (extra high voltage) committee or system owners as load and generation projections indicate a need.
- The study results should not be pulled out of context. The load may or may not be realized, growth may accelerate in areas not expected in this study, generation may or may not be available, and the transmission system (including substations) proposed for this analysis fits only the model and assumptions for this study.
- The study is a new process, subject to refinement, to educate and provide a way to start discussions for long-term transmission solutions.

Transmission

- The 10,400MW could be served by the proposed sixteen new, existing (115kV and 230kV), and upgraded (115 to 230kV) existing substations and transmission lines as modeled in the study.
- The existing transmission system (internal and external to the study area) will require upgrades to meet the proposed 10,400MW load and generation schedules.
- The 115kV system should be upgraded to 230kV between Phoenix and Tucson to accommodate load growth.
- Use of existing linear features (transmission and highway corridors) and upgrading 115kV transmission elements was sufficient to serve the increased load for most of the study area.
- New 230kV transmission was required to serve load in Pinal County between I-10 and State Highway 79 that is currently listed as State Trust land and does not currently have transmission lines or highways.

- Approximately 150 miles of new corridor (100 miles of 500kV and 50 miles of 230kV) would be required to complete this transmission plan.

Generation

- Generation internal to the study region would relieve overloads on transmission elements external to the study region by reducing import requirements.
- Generation internal to the study region must be capable of providing reactive support
- The generation dispatch changes between the three cases resulted in different overloads. The 75% case, with internal generation, showed some elements with lower loading than the 50% case despite the increased load.
- These results are specific to the modeled generation patterns. Results will change if different generation assumptions/patterns were used.
- Significant reactive support will be required to support the load (1800 MVAR in the 100% load case) under the import scenarios modeled.

COMPLETION OF INTERIM REPORT TASKS

In this final report, the following Interim report issues were addressed:

- Upgrade the external EHV (extra high voltage) transmission system to include planned additions associated with the generation expected in the SSG-WI 2015 Reference Case and study.
    - The addition of the Pinnacle Peak – Four Corners 500kV line was added and study results updated accordingly. The additional line assisted with reducing some overloads (and causing others), reducing voltage deviation issues and reducing the amount of reactive support. Updated results are reflected in Appendix D.
- Gather and incorporate electric load data and load growth projections from the Native American Tribes in the study area
    - The tribes in the study region were sent a letter, copy of the interim report, and an agenda to the April 2006 CATS HV/EHV meeting. Follow up correspondence resulted in the report being added to the Tribal Energy Association June 9, 2006 agenda for discussion. A conference call was held on July 21, 2006 with the Tribal Energy Association's members (Gila River, Ak-Chin, and Tohono O'odham). The outcome of the July meeting was the ability to compare Gila River Indian load[2]. While the load was underestimated for this analysis, the increase of load was less than 1% of the total study area load. Contact people were added to the CATS HV distribution list for all future meeting notices and meetings.
- Gather more information regarding the sale and potential use of State Trust land
    - A meeting was held on May 18, 2006 with members of the Arizona State Land Department regarding the study. Verbal comments indicated the State Land Department supported the study assumption that all state land was considered developable. It was suggested that future studies incorporate State Land personnel earlier in the process to provide comments and suggestions to the study plans. To achieve State Land Department insight earlier in the process several people from the State Land department have since been added to the Study Distribution list. The letter documenting the meeting with the State Land Department and contacts added to the CATS HV distribution list have been placed in Appendix F.
- Publish and present results to jurisdictional entities
    - The findings of the Interim study were presented to the Pinal County Governmental Association at their March 17, 2006 meeting. The power point presentation is included in Appendix F.

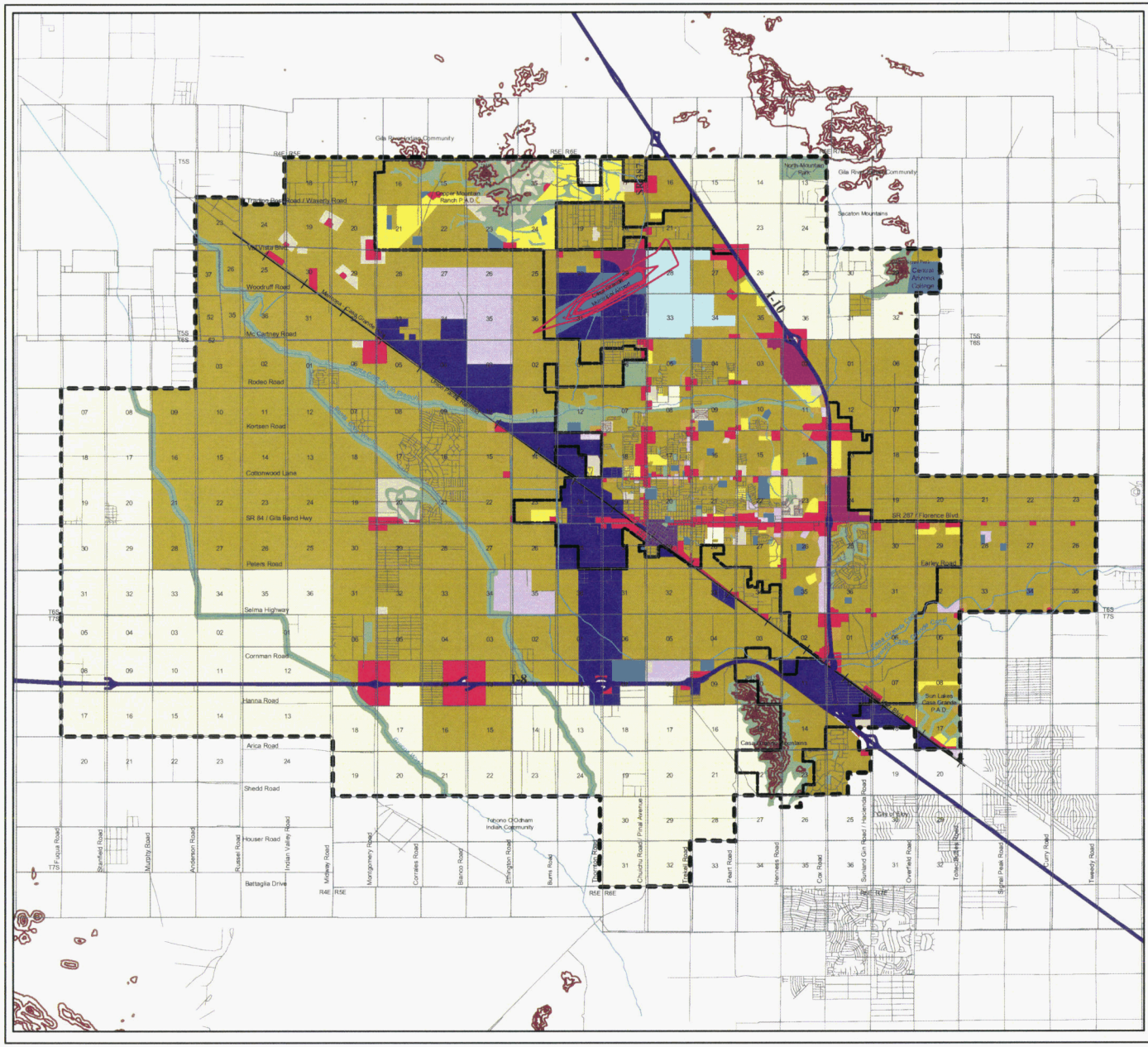
[2] GRICUA voluntarily supplied confidential load data for the CATS HV study which does not obligate GRICUA to supply future data for studies. GRICUA is not subject to ACC jurisdiction.

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX A
General Plans

SWAT
Southwest Area Transmission



City of Casa Grande General Plan 2010

Future Land Use

With Proposed 2005 City Initiated and Applicant Initiated Major Amendments

Legend **Figure 3.1**

Land Use Designation

- Rural Residential (0-1 DU/AC*) Target .5 DU/AC
- Low Density Residential (1-4 DU/AC) Target: 2.5 DU/AC
- Medium Density Residential #1 (4-8 DU/AC) Target: 5.0 DU/AC
- Medium Density Residential #2 (8-12 DU/AC) Target: 10.0 DU/AC
- High Density Residential (12-16 DU/AC) Target: 14.0 DU/AC
- Master Planned Community (MPC)
- Commercial
- Regional Commercial
- Office/Business Park
- Employment
- Natural Resource Extraction
- Public/Semi-Public
- Parks/Open Space
- Revitalization Area
- City Incorporated Boundary
- Planning Area Boundary
- Airport Noise Exposure Contours

* DU/AC = dwelling units per acre

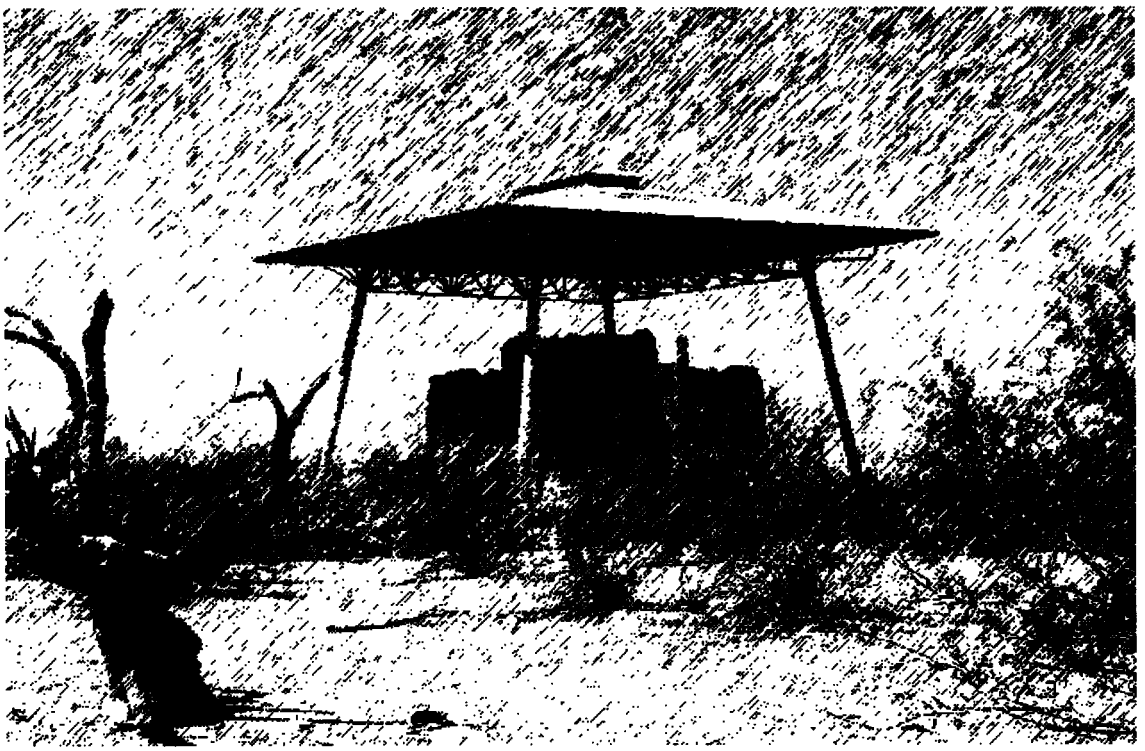
Note: A different target density for land designated Low Density Residential may be allowed depending on location. See Growth Areas and text in the General Plan document.

2 0 2 Miles

N W E S

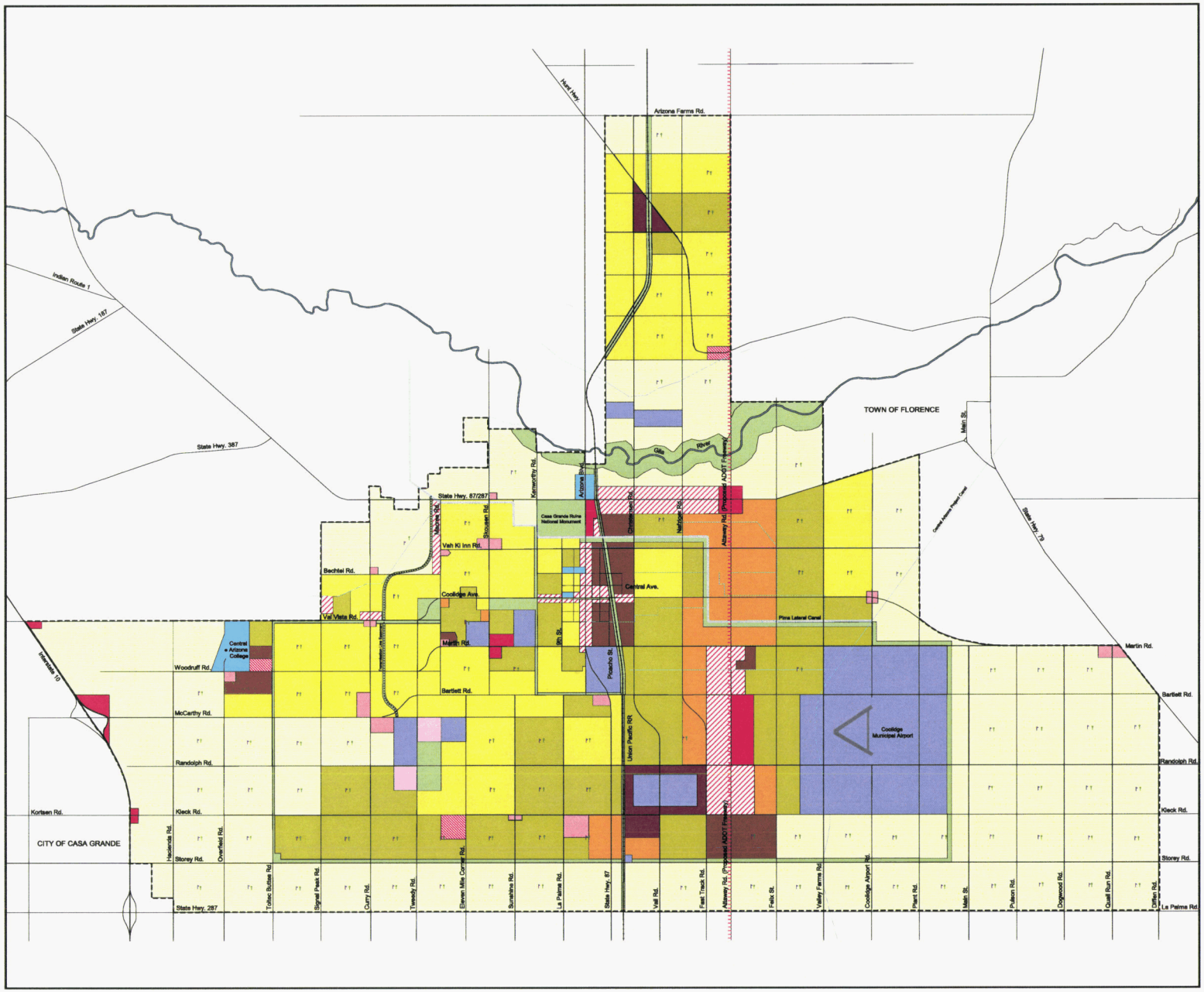
Partners For Strategic Action, Inc.
Lima & Associates
January 2005

CITY OF COOLIDGE
General Plan Update



ADOPTED

November 10, 2003



CITY OF COOLIDGE GENERAL PLAN

PROPOSED LAND USE PLAN

LEGEND

Land Use Designations

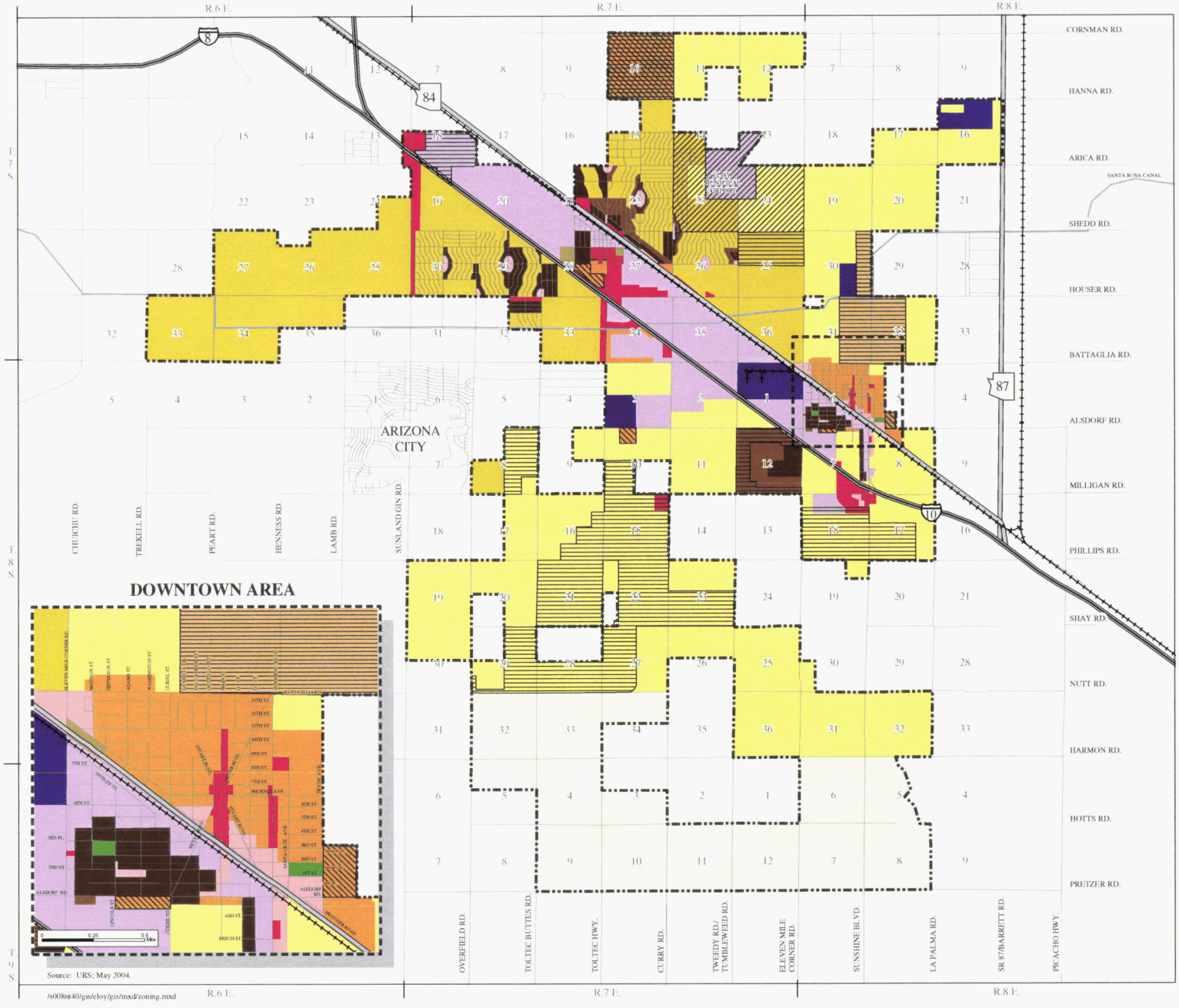
- VLSFR — Very Low Density Single-Family Residential (0-1 du/ac)
- LSFR — Low Density Single-Family Residential (1-4 du/ac)
- MSFR — Medium Density Single-Family Residential (4-8 du/ac)
- LMFR — Low Density Multi-Family Residential (8-15 du/ac)
- MMFR — Medium Density Multi-Family Residential (15-20 du/ac)
- MU — Mixed-Use
- NC — Neighborhood Commercial
- CC — Community Commercial
- RC — Regional Commercial
- CP — Commerce Park
- GO — General Office
- IND — Industrial
- PF — Public Facility
- P/OS — Park / Open Space
- Proposed School
- Proposed Park
- Coolidge Planning Boundary
- Proposed ADOT Freeway
- Existing Canals

Stantec

N

0 1 2 3 Miles

Updated:
November 17, 2003



City of Eloy
OFFICIAL ZONING MAP

ZONING DISTRICTS

- **RR-20** - Rural Residential (20 acres/du)
- **RR-5** - Rural Residential (5 acres/du)
- **R1-43** - Estate Density Residential (43,560 sq. ft.)
- **R1-12** - Low Density Residential (12,000 sq. ft.)
- **R1-8** - Medium Density Residential (8,000 sq. ft.)
- **R1-6** - Medium Density Residential (6,000 sq. ft.)
- **R-2** - Medium-High Density Residential (8 du/acre)
- **R-3** - High Density Residential (10 du/acre)
- **R-4** - High Density Residential (24 du/ac)
- **C-1** - Neighborhood Commercial
- **C-2** - Community Commercial
- **I-1** - Light Industrial
- **I-2** - General Industrial
- **OSC** - Open Space Conservation District
- **OSR** - Open Space Recreational District
- **MPD** - Master Planned Development
- **PAD** - Planned Area Development
- **MH** - Manufactured Home Overlay
- **CC** - Community Core Overlay
- **AP** - Airport Overlay

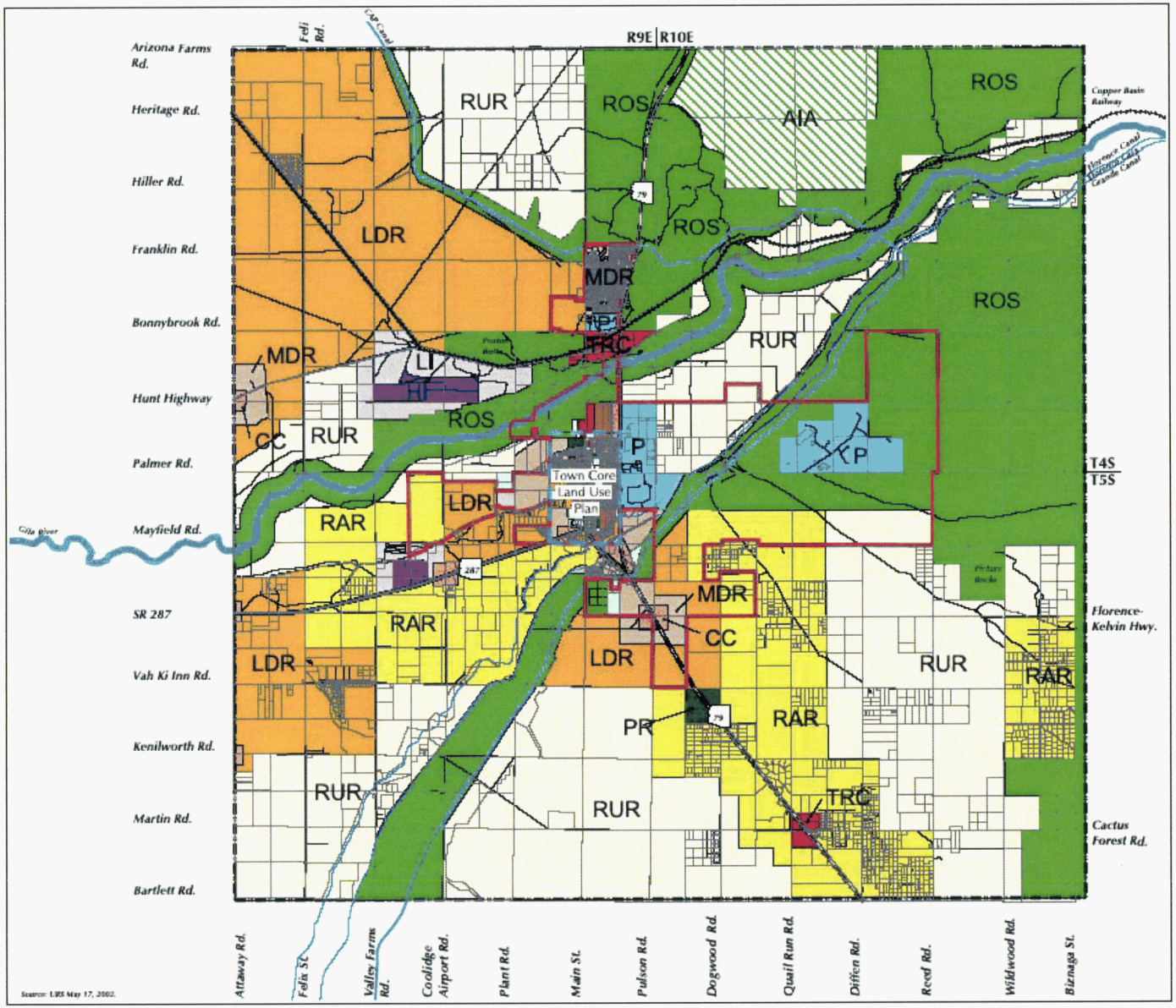
- Interstate
- State Highway
- Local Roads
- City Limit
- Downtown Area
- Railroad
- Canals

320 | 160 | 80 | 40
640 Acres

N

1 0 1 Miles

URS



FLORENCE AREA GENERAL PLAN UPDATE

PRESERVING OUR PAST - CHOOSING OUR FUTURE

LAND USE PLAN

- RUR — *Rural Residential (0.10-0.25 DU/AC)* (1 DU/10 AC to 1 DU/4 AC)
- RAR — *Ranchette Residential (0.25-1.0 DU/AC)* (1 DU/4 AC to 1 DU/1 AC)
- LDR — *Low Density Residential (1.0-4.0 DU/AC)*
- MDR — *Medium Density Residential (4.0-8.0 DU/AC)*
- HDR — *High Density Residential (8.0-18.0 DU/AC)*
- CC — *Community Commercial*
- TRC — *Tourist Commercial*
- PI — *Public/Institutional*
- P — *Prison*
- LI — *Light Industrial*
- HI — *Heavy Industrial*
- PR — *Parks and Recreation*
- ROS — *Recreational Open Space**
- AIA — *Artillery/Small Arms Impact Area*

- *Parcels*
- *Existing Streets*
- *State Highways*
- *Railroad*
- *Canals*
- *River*
- *Town Core Boundary*
- *Incorporated Boundary*
- *Study Area Boundary*

* LAND DESIGNATED AS RECREATIONAL OPEN SPACE OWNED BY THE ARIZONA STATE LAND DEPARTMENT SHALL HAVE A DENSITY OF 1 DU/AC.

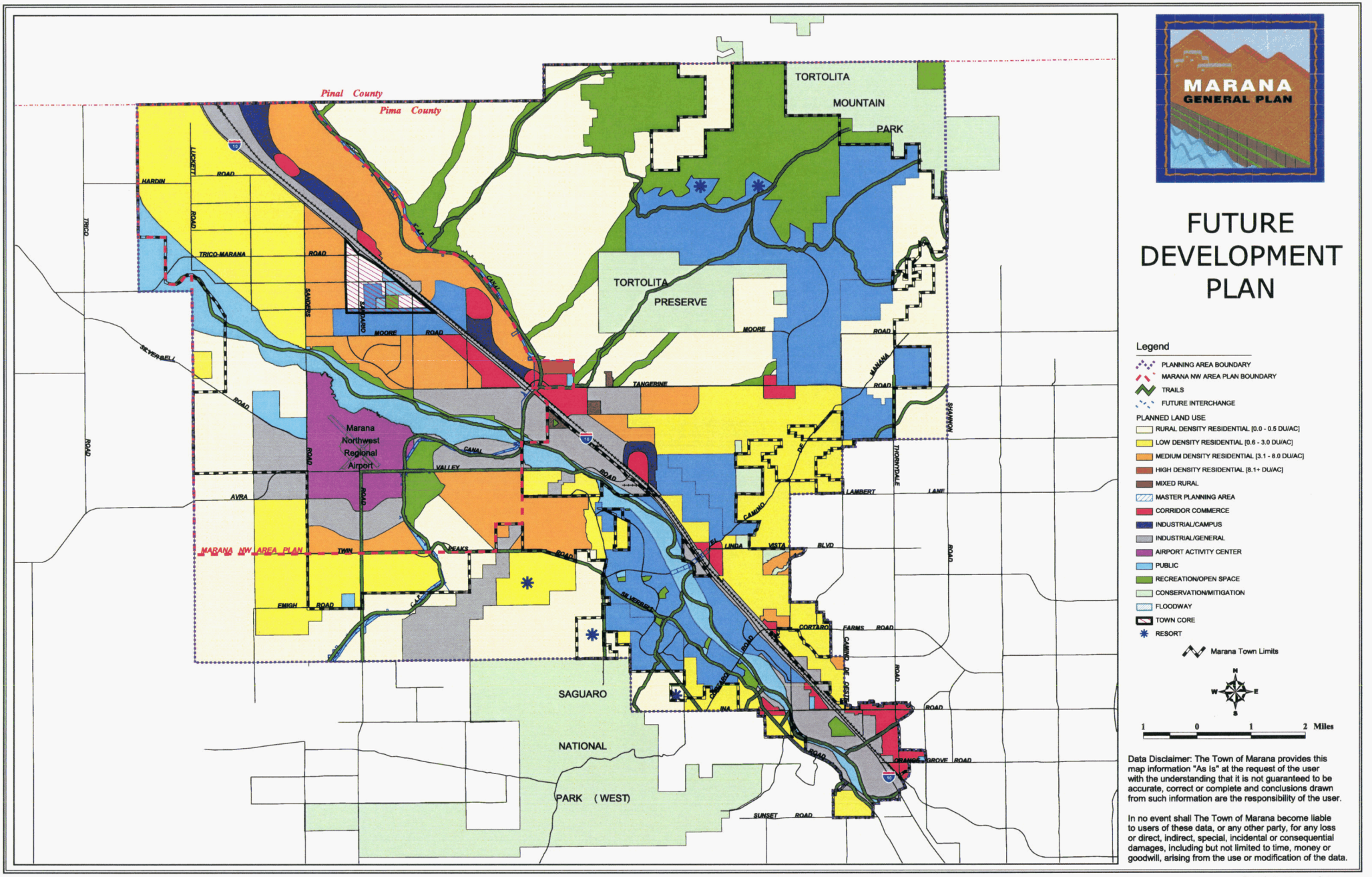
640 Acres

N

0 1 2 Miles

B-1

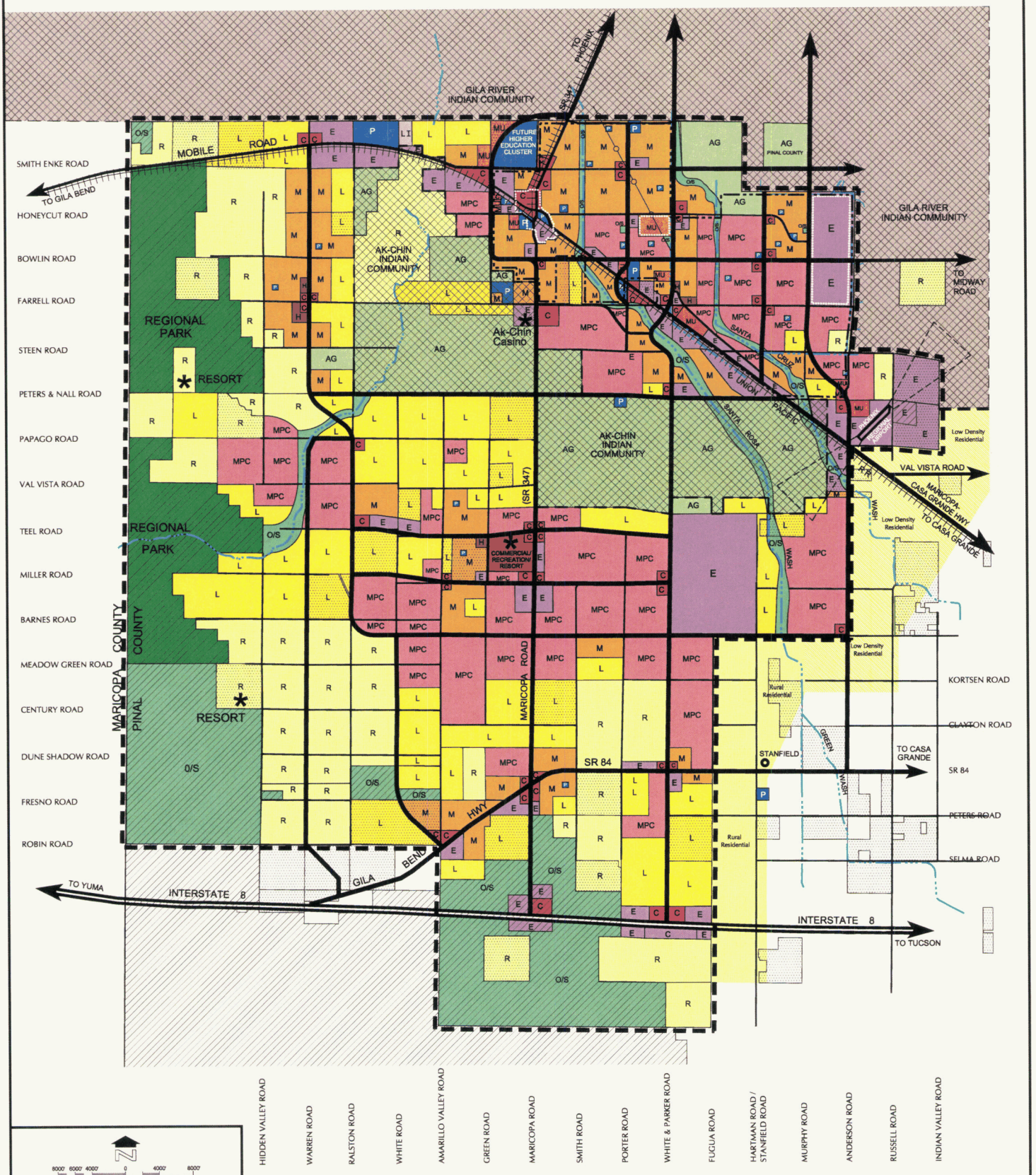
URS



Data Disclaimer: The Town of Marana provides this map information "As Is" at the request of the user with the understanding that it is not guaranteed to be accurate, correct or complete and conclusions drawn from such information are the responsibility of the user.

In no event shall The Town of Marana become liable to users of these data, or any other party, for any loss or direct, indirect, special, incidental or consequential damages, including but not limited to time, money or goodwill, arising from the use or modification of the data.

DRAFT FUTURE LAND USE



RURAL (<1 du/ac)
LOW DENSITY RESIDENTIAL (1-2 du/ac)
MEDIUM DENSITY RESIDENTIAL (2-6 du/ac)
MIXED USE
HIGH DENSITY RESIDENTIAL (>6 du/ac)
MASTER PLANNED COMMUNITY

COMMERCIAL
PARK / OPEN SPACE
AGRICULTURE
PUBLIC / QUASI-PUBLIC
EMPLOYMENT/ INDUSTRIAL
LIGHT INDUSTRIAL

STATE LAND
FEDERAL LAND
INDIAN COMMUNITY
FREEWAYS / INTERSTATES
MAJOR ARTERIALS / HIGHWAYS

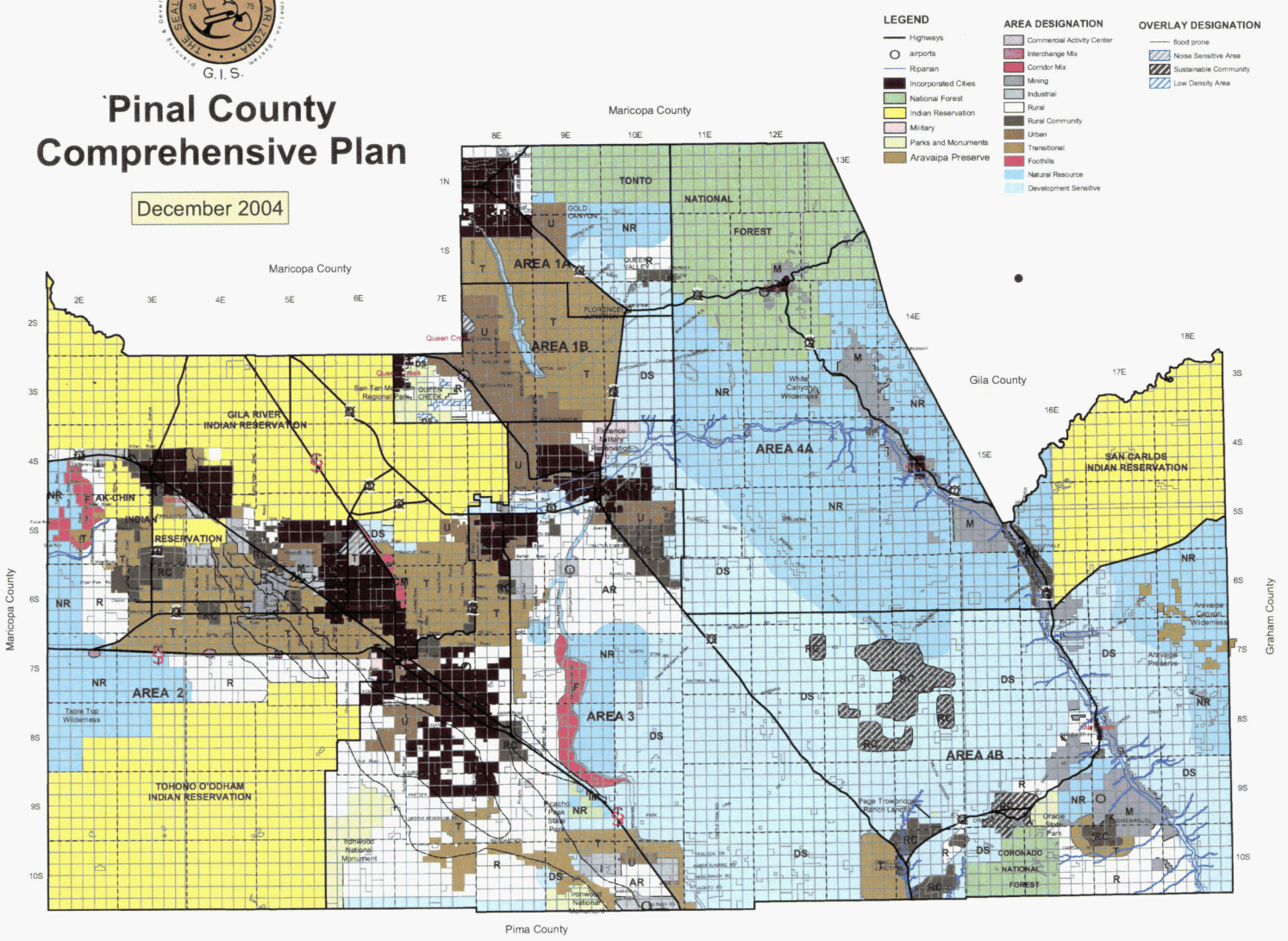
SPECIAL PLANNING AREA BOUNDARY
ROADWAY
CITY PLANNING AREA
MAJOR WASH
RAILROAD

CITY OF MARICOPA
GENERAL PLAN 2025

DATE: 9-12-2005

Pinal County Comprehensive Plan

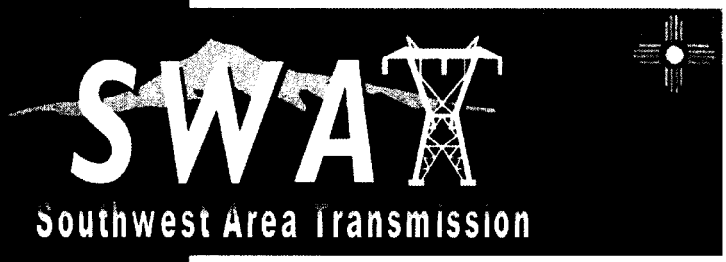
December 2004

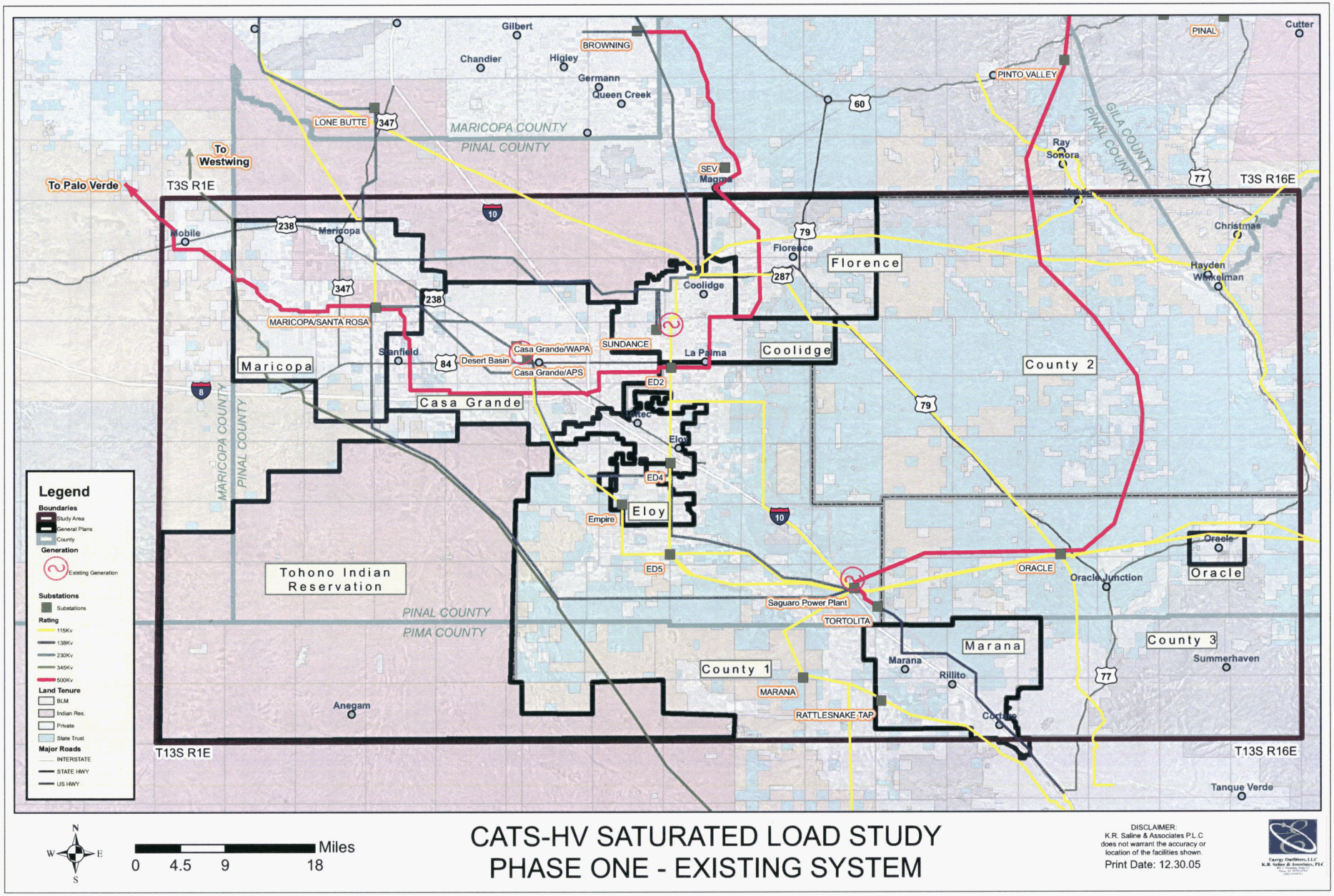


CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX B
Study Maps



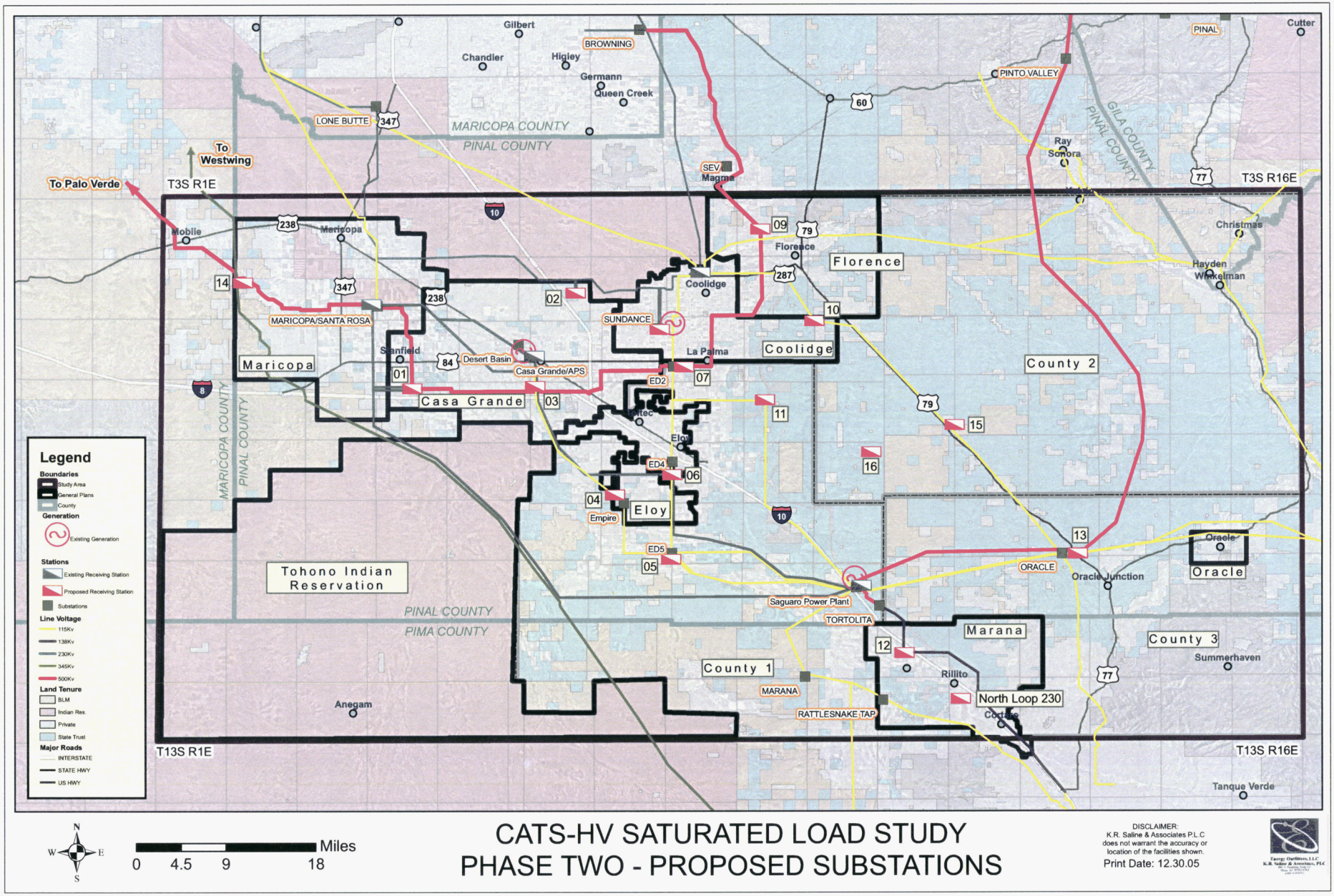


CATS-HV SATURATED LOAD STUDY
PHASE ONE - EXISTING SYSTEM

DISCLAIMER:
K.R. Saline & Associates P.L.C does not warrant the accuracy or location of the facilities shown.

Print Date: 12.30.05

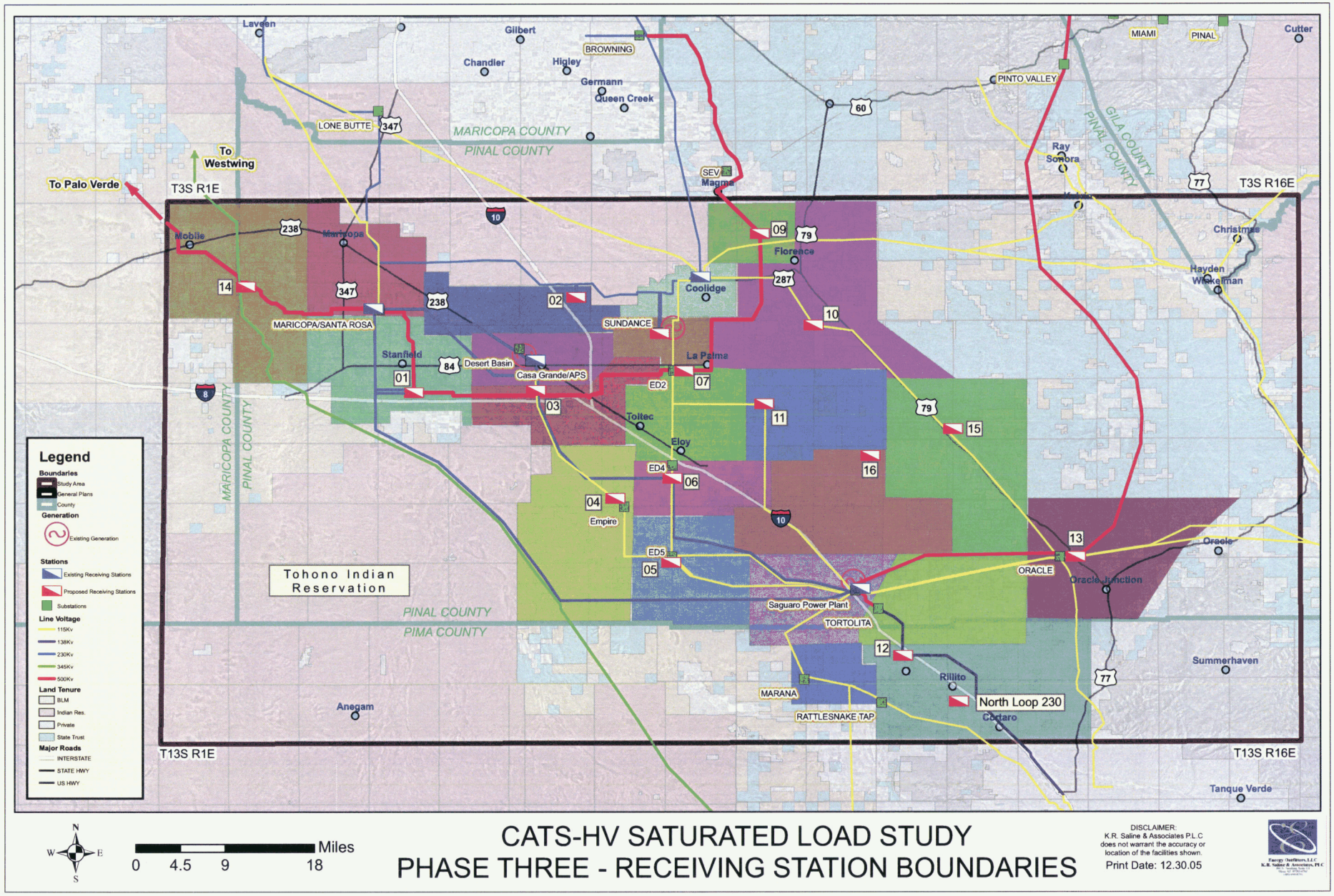
Energy Outfitters, LLC
K.R. Saline & Associates, PLC



CATS-HV SATURATED LOAD STUDY
PHASE TWO - PROPOSED SUBSTATIONS

DISCLAIMER:
K.R. Saline & Associates P.L.C. does not warrant the accuracy or location of the facilities shown.

Print Date: 12.30.05



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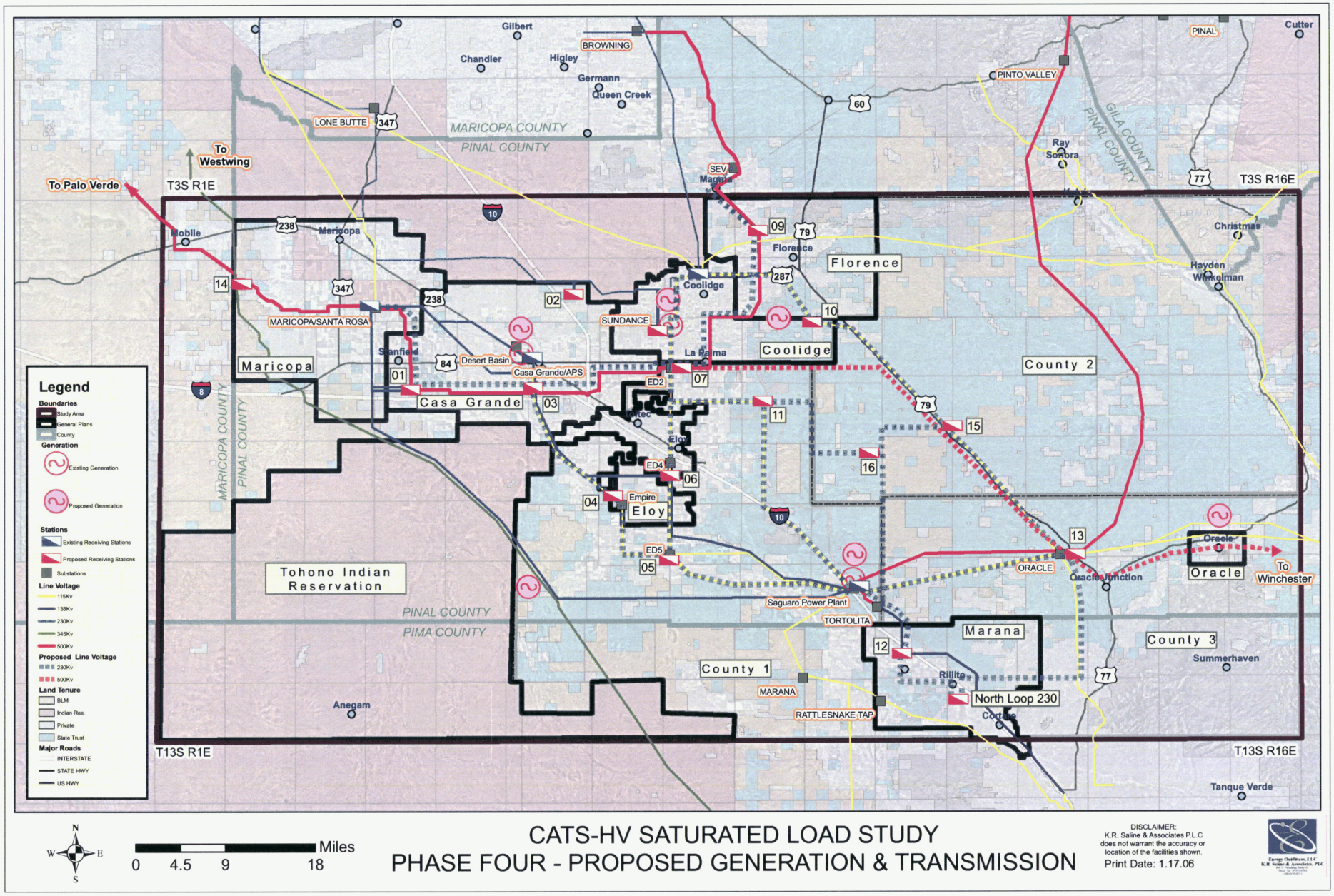
0 4.5 9 18 Miles

CATS-HV SATURATED LOAD STUDY
PHASE THREE - RECEIVING STATION BOUNDARIES

DISCLAIMER:
K.R. Saline & Associates P.L.C does not warrant the accuracy or location of the facilities shown

Print Date: 12.30.05

Energy Consultants, L.L.C
K.R. Saline & Associates, PLC



N
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0 4.5 9 18 Miles

CATS-HV SATURATED LOAD STUDY
PHASE FOUR - PROPOSED GENERATION & TRANSMISSION

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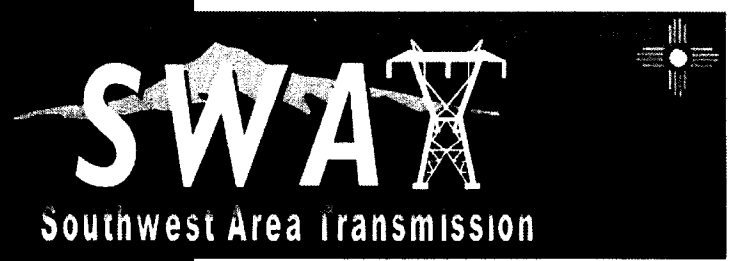
Print Date: 1.17.06

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX C
Land Use & Electric Assumptions



CATS HV SATURATED LOAD 2005

Blue Text = Formulas
Black Text = entered data

Demand Assignment Categories

Demand Types			Demand Value	Unit
Commercial				
Heavy	(45kW/acre *640acre/sq mile)		28800	kW/sq mile
Medium	(30kW/acre *640acre/sq mile)		19200	kW/sq mile
Light	(14kW/acre *640acre/sq mile)		8960	kW/sq mile
Government	(use light Commercial)		8960	kW/sq mile
Residential	Assumes 4kW per dwelling unit			
Avg d.u./acre				
0.05	0.2	kW/acre	128	kW/sq mile
0.2	0.8	kW/acre	512	kW/sq mile
0.25	1	kW/acre	640	kW/sq mile
0.50	2	kW/acre	1280	kW/sq mile
1	4	kW/acre	2560	kW/sq mile
1.5	6	kW/acre	3840	kW/sq mile
2	8	kW/acre	5120	kW/sq mile
2.5	10	kW/acre	6400	kW/sq mile
3	12	kW/acre	7680	kW/sq mile
3.5	14	kW/acre	8960	kW/sq mile
4	16	kW/acre	10240	kW/sq mile
4.5	18	kW/acre	11520	kW/sq mile
5	20	kW/acre	12800	kW/sq mile
5.5	22	kW/acre	14080	kW/sq mile
6	24	kW/acre	15360	kW/sq mile
6.5	26	kW/acre	16640	kW/sq mile
7	28	kW/acre	17920	kW/sq mile
7.5	30	kW/acre	19200	kW/sq mile
8	32	kW/acre	20480	kW/sq mile
8.5	34	kW/acre	21760	kW/sq mile
9	36	kW/acre	23040	kW/sq mile
9.5	38	kW/acre	24320	kW/sq mile
10	40	kW/acre	25600	kW/sq mile
10.5	42	kW/acre	26880	kW/sq mile
11	44	kW/acre	28160	kW/sq mile
11.5	46	kW/acre	29440	kW/sq mile
12	48	kW/acre	30720	kW/sq mile
12.5	50	kW/acre	32000	kW/sq mile
13	52	kW/acre	33280	kW/sq mile
13.5	54	kW/acre	34560	kW/sq mile
14	56	kW/acre	35840	kW/sq mile
14.5	58	kW/acre	37120	kW/sq mile
15	60	kW/acre	38400	kW/sq mile
15.5	62	kW/acre	39680	kW/sq mile
16	64	kW/acre	40960	kW/sq mile
16.5	66	kW/acre	42240	kW/sq mile
17	68	kW/acre	43520	kW/sq mile
17.5	70	kW/acre	44800	kW/sq mile
18	72	kW/acre	46080	kW/sq mile
18.5	74	kW/acre	47360	kW/sq mile
19	76	kW/acre	48640	kW/sq mile
19.5	78	kW/acre	49920	kW/sq mile
20	80	kW/acre	51200	kW/sq mile
20.5	82	kW/acre	52480	kW/sq mile
21	84	kW/acre	53760	kW/sq mile
21.5	86	kW/acre	55040	kW/sq mile
22	88	kW/acre	56320	kW/sq mile
22.5	90	kW/acre	57600	kW/sq mile
23	92	kW/acre	58880	kW/sq mile
23.5	94	kW/acre	60160	kW/sq mile
24	96	kW/acre	61440	kW/sq mile
Other Uses				
Parks			500	kW/sq mile
State Land			0	kW/sq mile
Reservation Land (with resorts/industrial parks)			500	kW/sq mile
Reservation Land			100	kW/sq mile
Existing ROW/Roads			0	kW/sq mile
Agriculture			1000	kW/sq mile
Schools	(use Medium Commercial Value)		19200	kW/sq mile

CATS Area Loads

Bus #	Substation Load	Full Load MW	75%	Half load MW
19045	Coolidge 230	455	341	227
19068	Test Track 230kV (formerly SR230)	455	341	227
19057	Oracle	0	0	0
17012	Marana 115kV	220	165	110
14225	Saguaro 230kV	520	390	260
14203	Casa Grande APS 230kV	401	301	201
19210	Rattlesnake 115kV	172	129	86
16000	Tortolita 500kV	516	387	258
			0	
90001	CATSHV01	514	386	257
90002	CATSHV02	523	392	262
90003	CATSHV03	495	372	248
90004	CATSHV04 (Empire)	528	396	264
90005	CATSHV05 (ED5)	463	347	231
90006	CATSHV06 (ED4)	483	362	241
90007	CATSHV07 (Pinal South)	512	384	256
19410	Sundance (Formerly CATSHV08)	498	373	249
90009	CATSHV09 (Florence)	490	367	245
90010	CATSHV10	498	374	249
90011	CATSHV11	399	299	200
90012	CATSHV12 (Marana)	528	396	264
90013	CATSHV13 (Oracle Junction)	476	357	238
90014	CATSHV14 (Pinal West)	377	283	189
90015	CATSHV15	437	328	219
90016	CATSHV16	437	328	219
		10398	7799	5199

CATS HV SATURATED LOAD STUDY
GENERATION DISPATCH

		2015 Base			CATS_SAT Load Cases			
					50%	75%	100%	TOTAL
Existing GENERATION								
#	**Name**	**MW**	**MWmax**	**Avail**	**288**	**0**	**0**	**288**
19411-20	Sundance	450	600	150	150	-	-	
14987-89	DBG	519	597	78	78	-	-	
14941-45	SaguaroCTs 1-2-3	399	399	0	-	-	-	
16518	Springerville3	420	450	30	30	-	-	
16519	Springerville4	420	450	30	30	-	-	
14800-11	Gila CT&ST	2220	2220	0	-	-	-	
15157-162	HGC CT&ST	1128	1128	0	-	-	-	
15164-169	MES CT&ST	1382	1382	0	-	-	-	
14931-33	Palo Verde	4332	4332	0	-	-	-	
14974-77	RED CT&ST	984	984	0	-	-	-	
15145-7	ARL-CT&ST	699	699	0	-	-	-	
Expansion of Existing Generation								
#	**Name**	**MW**						**1600**
19410	Sundance2	0	600	600	-	600	-	
14237	DBG2	0	600	600	-	600	-	
14225	Saguaro2	0	400	400	-	400	-	
Proposed Generation								
#	**Name**	**MW**						**8726**
90100	Winchester 500(NM WIND)	0	1500	1500	950	0	200	1150
80345	Toltec	0	1096	1096	-	1000	96	1096
16530-35	Bowie	0	1080	1080	1080	-	-	1080
14001 (FC BUS)	Desert Rock (coal)	0	1500	1500	-	-	1300	1300
SWAT 14001	Four Corners (coal)	0	1500	1500	900	-	300	1200
SWAT+15021	PV HUB (CTs)	0	1500	1500	950	-	500	1450
SWAT+15021	PV HUB (CCs)	0	1200	1200	-	-	600	600
SWAT 14001	Four Corners (wind)	0	1500	1500	850	-	-	850
Generation Dispatched					**5018**	**2600**	**2996**	**10614**
CATSHV LOAD								
CATSHV LOAD					5199.5	7799	10399	
Existing LOAD (turned off)					457			
Total New LOAD (CATS-Existing)					**4742.5**	**7799**	**10399**	

Resource Summary	**MW**
Existing Generation	
Existing (natural gas)	288
Proposed Generation	
Wind (NM at Winchester & Four Corners)	2000
Coal (Four Corners)	2500
Natural Gas (CT&CC)	4226
Expansion of Existing (natural gas)	1600
Total	**10614**

Resources-Internal vs External	**MW**
Internal (existing, expansion, Toltec)	2984
External (PV, FC, Bowie, Winchester)	7630
Total	**10614**

CATS HV Saturated Load Study

As modeled:

Input the Size of Conductor: 1272 or 954

Size	Conductor	voltage	Bundled	# Wires in Bundle	Length	R	X	B	RTG (AMPS)	MVA
1272	ACSS- Bittern	230	NO	1	1 mile	0.000161	0.001429	0.003027	2144	854
2156	ACSR (from IVGS study)	500	Yes	2	1 mile	0.000010907	0.000244	0.0176	1804	3124

PSLF Line Parameters

Modeled lines: *(calculated from 1-mile line segments)*

From #	From Name	To #	To Name	voltage	Ckt ID		Length	R	X	B		MVA	Comment
14226	Santa Rosa	90001	CATSHV01	230	1		10.8	0.001739	0.015432	0.032686		854	new 230kV following 500kV line
14226	Santa Rosa	90001	CATSHV01	230	2		10.8	0.002205	0.016120	0.031074		287	Loop-in exising SR-TATmomli-Saguaro 230kV line
90001	CATSHV01	14229	Tatmomli	230	1		17.7	0.003615	0.026420	0.050926		287	Loop-in exising SR-TATmomli-Saguaro 230kV line
14237	Desert Basin	90003	CATSHV03 (CG)	230	1		5	0.000805	0.007145	0.015133		854	
19055	Lone Butte	90002	CATSHV02	230	1		32	0.005153	0.045725	0.096848		854	Loop-in existing LB-Coolidge 230kV line
90002	CATSHV02	19410	Sundance	230	1		15.8	0.002544	0.022577	0.047819		854	formerly to CATs02-Coolidge, changed end to Sundance
90003	CATSHV03 (CG)	90007	CATSHV07(PS)	230	1		10.3	0.001659	0.014718	0.031173		854	
90004	CATSHV04 (EM)	90005	CATSHV05(ED5)	230	1		12.1	0.001948	0.017290	0.036621		854	
90003	CATSHV03 (CG)	90006	CATSHV06(ED4)	230	1		18.6	0.002995	0.026578	0.056293		854	Status zero
90007	CATSHV07 (PS)	90006	CATSHV06(ED4)	230	1		9.2	0.001481	0.013146	0.027844		854	
90005	CATSHV05 (ED5)	90006	CATSHV06(ED4)	230	1		8.5	0.001369	0.012146	0.025725		854	
90005	CATSHV05 (ED5)	14225	Saguaro	230	1		15.3	0.002464	0.021862	0.046305		854	
90007	CATSHV07(PS)	19410	Sundance	230	1		4.5	0.000725	0.006430	0.013619		854	formerly to CATS 08. Removed CATS 08 bus = Sundance
90009	CATSHV09 (FL)	15210	SEV	230	1		26.5	0.004267	0.037866	0.080202		854	formerly CATS09 to Browning
15222	Browning	15210	SEV	230	1						in case	854	
90007	CATSHV07 (PS)	90009	CATSHV09 (FL)	230	1		18.7	0.003011	0.026720	0.056596		854	
19045	Coolidge	90010	CATSHV10	230	1		11.2	0.001803	0.016004	0.033897		854	
14225	Saguaro	90012	CATSHV12(MA)	230	1		8	0.001288	0.011431	0.024212		854	
14225	Saguaro	90013	CATSHV13(OJ)	230	1		17.3	0.002786	0.024720	0.052358		854	
90007	CATSHV07	90011	CATSHV11	230	1		11	0.001771	0.015718	0.033292		854	
90011	CATSHV11	90016	CATSHV16	230	1		12.7	0.002045	0.018147	0.038437		854	
90016	CATSHV16	14225	Saguaro	230	1		14.5	0.002335	0.020719	0.043884		854	
90015	CATSHV15	90016	CATSHV16	230	1		8.7	0.001401	0.012431	0.026331		854	
90001	CATSHV01	90003	CATSHV03 (CG)	230	1		14.5	0.002335	0.020719	0.043884		854	
90010	CATSHV10	90015	CATSHV15	230	1		15	0.002415	0.021434	0.045398		854	
90015	CATSHV15	90013	CATSHV13(OJ)	230	1		15.7	0.002528	0.022434	0.047516		854	
90100	Winchester	90013	CATSHV13(OJ)	500	1		75	0.000818	0.018278	1.320000		3124	
90100	Winchester	90013	CATSHV13(OJ)	500	1		series cap	0.000000	-0.009832	0.000000		3124	
90013	CATSHV13	90007	CATSHV07 (PS)	500	1		40.3	0.000440	0.009822	0.709280		3124	
15090	HASSYAMPA	79264	PINAL WEST	500	1*		51.8	0.00048	0.01105	1.0374	in case	4290	1780KCM ACSR Chukar tri-bundle
79264	PINAL WEST	14015	SANTA ROSA	500	1*		13.8	0.00013	0.00295	0.27612	in case	4290	1780 ACSR
14015	SANTA ROSA	90007	CATSHV07 (PS)	500	1*		36.9	0.000340	0.007880	0.738640		4290	1780 ACSR
90007	CATSHV07 (PS)	15992	SEV	500	1*		31.3	0.000290	0.006680	0.626460		4290	1780 ACSR
15992	SEV	15051	Browning	500	1*		18	0.000170	0.003850	0.360180	in case	4290	1780 ACSR
14203	Casagrande APS	19218	CASA GRANDE WAPA	230	1		jmpr	0.000000	0.000290	0.000000		600	jumper
19218	CASA GRANDE WAPA	90004	CATSHV04(EM)	230	1		12.5	0.002013	0.017861	0.037831		854	
14203	Casagrande APS	90006	CATSHV06(ED4)	230	1		18	0.002898	0.025720	0.054477		854	
90006	CATSHV06	14225	Saguaro	230	1		23.8	0.003832	0.034008	0.072031		854	
90012	CATSHV12(MA)	90207	Nloop	230	1		8	0.001288	0.011431	0.024212		854	
90013	CATSHV13(OJ)	90207	Nloop	230	1		24	0.003864	0.034294	0.072636		854	
80000	REDMSA_E	81000	Four Corners	500	1		183	0.001996	0.044599	3.220800		3124	
80000	REDMSA_E	81000	Four Corners	500	1		series cap	0.000000	-0.015610	0.000000		3124	
14003	Navajo	80000	Red Mesa E	500	1	sec1	13	0.000141	0.003162	0.245665		2147	split existing line
14002	Moenkopi	80000	Red Mesa E	500	1		61	0.000659	0.014838	1.152735		2147	
Lines to add Toltec Project													
26114	PINAL WEST	16103	South	345kV	1		calc 104	0.004730	0.049470	0.927800		925	in case
16114	Pinal West	80345	Toltec	345	1		25	0.001137	0.011892	0.223029			
80345	Toltec	16103	South	345kV	1		79	0.003593	0.037578	0.704771			
							sumcheck	0.004730	0.049470	0.927800			
80500	Toltec	14004	Saguaro	500	1		17	0.000185	0.004143	0.299200			

*RXB - Data for these elements provided by SRP

Lines added 4-4-06												
14016	Pinnacle Peak APS	14001	Four Corners	500	1	sec1	series cap	0	-0.012120	0.000000	1567.5/2182	calc as % of FC-Moenkopi line 179 miles, data from APS3/23/(
14016	Pinnacle Peak APS	14001	Four Corners	500	1	sec2	289	0.002906	0.069260	5.399000	1732.12182.4	
14016	Pinnacle Peak APS	14001	Four Corners	500	1	sec3	series cap	0	-0.012120	0.000000	1567.5/2182.4	
90007	CATSHV07 (PS)	19045	Coolidge	230	1		11.25	0.001811	0.016075	0.034048	854	

CATS HV Saturated Load Study

As modeled:

Input the Size of Conductor: 1272 or 954	Size	Conductor	voltage	Bundled	# Wires in Bundle	Length
→	1272		230	NO	1	1 mile
	2156		500	Yes	2	1 mile

Distance Calculations (new, upgraded, 230kV/500kV)

Modeled lines: *(calculated from 1-mile line segments)*

From #	From Name	To #	To Name	voltage	Ckt ID	Length	Upgrade	New	Existing	
14226	Santa Rosa	90001	CATSHV01	230	2	10.8			E	
90001	CATSHV01	14229	Tatmomli	230	1	17.7			E	
19055	Lone Butte	90002	CATSHV02	230	1	32			E	Total Existing
90002	CATSHV02	19410	Sundance	230	1	15.8			E	116.3
	TATmomli		Saguaro	230	-	40			E	
90100	Winchester	90013	CATSHV13(OJ)	500	1	75		N		
90100	Winchester	90013	CATSHV13(OJ)	500	1	series cap		N		
90013	CATSHV13	90007	CATSHV07 (PS)	500	1	40.3		N		
15090	HASSYAMPA	79264	PINAL WEST	500	1*	51.8		N		
79264	PINAL WEST	14015	SANTA ROSA	500	1*	13.8		N		
14015	SANTA ROSA	90007	CATSHV07 (PS)	500	1*	36.9		N		
90007	CATSHV07 (PS)	15992	SEV	500	1*	31.3		N		Total 500 New
15992	SEV	15051	Browning	500	1*	18		N		267.1
14226	Santa Rosa	90001	CATSHV01	230	1	10.8		N		
14237	Desert Basin	90003	CATSHV03 (CG)	230	1	5		N		
90003	CATSHV03 (CG)	90007	CATSHV07(PS)	230	1	10.3		N		
90003	CATSHV03 (CG)	90006	CATSHV06(ED4)	230	1	18.6		N		
90007	CATSHV07(PS)	19410	Sundance	230	1	4.5		N		
90009	CATSHV09 (FL)	15210	SEV	230	1	26.5		N		
15222	Browning	15210	SEV	230	1			N		
90007	CATSHV07 (PS)	90009	CATSHV09 (FL)	230	1	18.7		N		
14225	Saguaro	90012	CATSHV12(MA)	230	1	8		N		
90011	CATSHV11	90016	CATSHV16	230	1	12.7		N		
90016	CATSHV16	14225	Saguaro	230	1	14.5		N		
90015	CATSHV15	90016	CATSHV16	230	1	8.7		N		
90001	CATSHV01	90003	CATSHV03 (CG)	230	1	14.5		N		
14203	Casagrande APS	19218	CASA GRANDE WAPA	230	1	jmpr		N		
90012	CATSHV12(MA)	90207	Nloop	230	1	8		N		Total 230kV New
90013	CATSHV13(OJ)	90207	Nloop	230	1	24		N		184.8
90007	CATSHV07 (PS)	19045	Coolidge	230	1	11	Upgrade			
90007	CATSHV07 (PS)	90006	CATSHV06(ED4)	230	1	9.2	Upgrade			
90005	CATSHV05 (ED5)	90006	CATSHV06(ED4)	230	1	8.5	Upgrade			
90004	CATSHV04 (EM)	90005	CATSHV05(ED5)	230	1	12.1	Upgrade			
90005	CATSHV05 (ED5)	14225	Saguaro	230	1	15.3	Upgrade			
19045	Coolidge	90010	CATSHV10	230	1	11.2	Upgrade			
14225	Saguaro	90013	CATSHV13(OJ)	230	1	17.3	Upgrade			
90007	CATSHV07	90011	CATSHV11	230	1	11	Upgrade			
90010	CATSHV10	90015	CATSHV15	230	1	15	Upgrade			
90015	CATSHV15	90013	CATSHV13(OJ)	230	1	15.7	Upgrade			
19218	CASA GRANDE WAPA	90004	CATSHV04(EM)	230	1	12.5	Upgrade			
14203	Casagrande APS	90006	CATSHV06(ED4)	230	1	18	Upgrade			Total 115kV upgrade
90006	CATSHV06	14225	Saguaro	230	1	23.8	Upgrade			180.6

Synchronous Condensers added to 75% and 100% cases

#	Name	kV	ID	Status	pgen	pmax	75% Load qgen (MVARs)	100% Load qgen (MVARs)	qmax	qmin	
90015	CATSHV15	230	sc	1	0	0	109	113	200	-100	
90010	CATSHV10	230	sc	1	0	0	30	96	100	-100	
90207	NLOOP230	230	sc	1	0	0	13	83	100	-100	
17666	BOPP	115	sc	1	0	0	0	38.9	100	-100	**Original**
19214	SNYDHILL	115	sc	1	0	0	0	46	100	-100	**Interim Report**
90009	CATSHV09	230	sc	1	0	0	0	106	200	-100	
90002	CATSHV02	230	sc	1	0	0	0	84	200	-100	
90005	CATSHV05	230	sc	1	0	0	0	149	200	-100	
90011	CATSHV11	230	sc	1	0	0	0	131	200	-100	
90001	CATSHV01	230	sc	1	0	0	0	229	300	-100	
90013	CATSHV13	230	sc	1	0	0	0	128	200	-100	
	TOTAL						152	1203.9			

Synchronous Condensers added to 75% and 100% cases

#	Name	kV	ID	Status	pgen	pmax	75% Load qgen (MVARs)	100% Load qgen (MVARs)	qmax	qmin	
90015	CATSHV15	230	sc	1	0	0	93.7	104.9	200	-100	**Final Report**
90010	CATSHV10	230	sc	1	0	0	25	85.6	100	-100	
90207	NLOOP230	230	sc	1	0	0	0	57.3	100	-100	
17666	BOPP	115	sc	1	0	0	0	36.3	100	-100	
19214	SNYDHILL	115	sc	1	0	0	0	44.1	100	-100	
90009	CATSHV09	230	sc	1	0	0	0	90.6	200	-100	
90002	CATSHV02	230	sc	1	0	0	0	69.2	200	-100	
90005	CATSHV05	230	sc	1	0	0	0	131.4	200	-100	
90011	CATSHV11	230	sc	1	0	0	0	114.5	200	-100	
90001	CATSHV01	230	sc	1	0	0	0	213.3	300	-100	
90013	CATSHV13	230	sc	1	0	0	0	116.1	200	-100	
	TOTAL						118.7	1063.3			
					for report		118.7	1063.3			

Shunts Added to CATS HV 50% load case

BUS NAME	KV	ID	STATUS	MVARs	VSCHED	-V-ACT-
CATSHV02	230	CT	1	50	1	1.0028
CATSHV09	230	CT	1	50	1	1.0017
CATSHV12	230	CT	1	50	1	1.004
CATSHV05	230	CT	1	50	1	1.0057
CATSHV04	230	CT	1	50	1	1.0058
CATSHV11	230	CT	1	50	1	1.0015
CATSHV06	230	CT	1	50	1	1.0042
CATSHV10	230	CT	1	50	1	0.999
ORME	230	CT	1	100	1	0.9812
THUNDRST	230	CT	1	100	1	0.9789
GOLDFELD	230	CT	1	50	1	0.9875
ROGERS	230	CT	1	50	1	0.9832
SUNYSLOP	230	CT	1	50	1	0.97
TOTAL				**750**		

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX D
Power Flow

Selected outages for report . . .

BASE

Overloaded Element	Rating 1 Mva		50%	75%	100%	Outage description	
CHOLLA -SAGUARO 500 ck 1 line	889	base	136%	119%	157%	Base system (n-0)	
COOLIDGE-SUN ARIZ 230 ck 1 line	377	base	-	99%	115%	Base system (n-0)	
ROGERS -PINPK 230 ck 1 line	375	base	100%	102%	126%	Base system (n-0)	
SAG.EAST-MARANA 115 ck 1 line	167	base	83%	132%	163%	Base system (n-0)	Interim Report
SNTAROSA-CATSHV01 230 ck 2 line	287	base	-	79%	118%	Base system (n-0)	
SPRINGR -VAIL2 345 ck 1 line	717	base	90%	90%	106%	Base system (n-0)	
WINCHSTR-VAIL 345 ck 1 line	925	base	147%	145%	162%	Base system (n-0)	
WINCHSTR-WILLOW 345 ck 1 line	896	base	93%	94%	101%	Base system (n-0)	
Base - Rev 4 cases							
CACTUS -PNPKAPS 230 ck 1 line	371	base	128%	129%	135%	Base system (n-0)	New
CHOLLA -SAGUARO 500 ck 1 line	889	base	129%	111%	145%	Base system (n-0)	8% lower
PNPKAPS 500/230 ck 1 tran	598	base	92%	91%	102%	Base system (n-0)	New
ROGERS -PINPK 230 ck 1 line	375	base	104%	106%	130%	Base system (n-0)	4% higher
SAG.EAST-MARANA 115 ck 1 line	167	base	83%	132%	163%	Base system (n-0)	no change
SHIPROCK 345/230 ck 1 tran	300	base	108%	111%	139%	Base system (n-0)	New
SNTAROSA-CATSHV01 230 ck 2 line	287	base	-	81%	120%	Base system (n-0)	2% higher
WINCHSTR-VAIL 345 ck 1 line	925	base	146%	143%	160%	Base system (n-0)	2% lower

N-1 LOADING

Overloaded Element	Rated Mva	Contingency	50%	75%	100%	Outage description	
CASGRAPS-CASAGRND 230 ck 1 line	600	line_305	-	99%	117%	line TESTTRAK to SNTAROSA 230 ck 1	
CHOLLA -SAGUARO 500 ck 1 line	1332	line_106	101%	83%	111%	line PINAL_W to SNTAROSA 500 ck 1	
COOLIDGE-SUN ARIZ 230 ck 1 line	415	line_280	116%	155%	180%	line COOLIDGE to SUN ARIZ 230 ck 2	
DBG -CATSHV03 230 ck 1 line	939	line_24	-	94%	102%	line CASGRAPS to DBG 230 ck 1	
JOJOBA -KYRENE 500 ck 1 line	3066	line_106	87%	84%	103%	line PINAL_W to SNTAROSA 500 ck 1	
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_11	103%	100%	132%	line JOJOBA to KYRENE 500 ck 1	
ROGERS -PINPK 230 ck 1 line	412	line_173	133%	135%	166%	line ROGERS to PINPK 230 ck 2	
SAG.EAST-MARANA 115 ck 1 line	184	line_315	114%	173%	215%	line RATTLSNK to TUCSON 115 ck 1	Interim Report
SNTAROSA-CATSHV01 230 ck 2 line	287	line_481	118%	129%	191%	line SNTAROSA to CATSHV01 230 ck 1	
CASGRAPS-CASAGRND 230 ck 1 line	600	line_305	-	98%	116%	line TESTTRAK to SNTAROSA 230 ck 1	1% lower
CHOLLA -SAGUARO 500 ck 1 line	1332	line_106	96%	78%	104%	line PINAL_W to SNTAROSA 500 ck 1	5% lower
COOLIDGE-SUN ARIZ 230 ck 1 line	415	line_280	-	106%	114%	line COOLIDGE to SUN ARIZ 230 ck 2	50+% lower
DBG -CATSHV03 230 ck 1 line	939	line_24	-	95%	103%	line CASGRAPS to DBG 230 ck 1	1% higher
JOJOBA -KYRENE 500 ck 1 line	3066	line_106	87%	84%	102%	line PINAL_W to SNTAROSA 500 ck 1	no change
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_11	104%	101%	133%	line JOJOBA to KYRENE 500 ck 1	1% higher
ROGERS -PINPK 230 ck 1 line	412	line_173	137%	140%	171%	line ROGERS to PINPK 230 ck 2	4-5% higher
SAG.EAST-MARANA 115 ck 1 line	184	line_315	113%	172%	215%	line RATTLSNK to TUCSON 115 ck 1	no change
SNTAROSA-CATSHV01 230 ck 2 line	287	line_481	121%	132%	195%	line SNTAROSA to CATSHV01 230 ck 1	3% higher

Voltage Deviation

Bus Name	Outage	50%	75%	100%	Outage description	
ASARCOSR 115	line_132	-0.12	-0.11	-0.113	line KNOLL to MORRISAZ 115 ck 1	Interim Report
EMPIREsw 230	line_252	-0.08	-0.08	-0.083	line APACHE to BUTERFLD 230 ck 1	
HAYDENAZ 115	line_132	-0.12	-0.11	-0.113	line KNOLL to MORRISAZ 115 ck 1	
REDMSA_E 500	line_4	-	-	-0.083	line NAVAJO to REDMSA_E 500 ck 1	
THUNDRST 230	line_176	-0.06	-0.06	-0.081	line SANTAN to THUNDRST 230 ck 1	
ASARCOSR 115	line_132	-0.11	-0.11	-0.111	line KNOLL to MORRISAZ 115 ck 1	
EMPIREsw 230	line_252	-0.08	-0.08	-0.078	line APACHE to BUTERFLD 230 ck 1	
HAYDENAZ 115	line_132	-0.11	-0.11	-0.111	line KNOLL to MORRISAZ 115 ck 1	
REDMSA_E 500	line_4	-	-	-	line NAVAJO to REDMSA_E 500 ck 1	
THUNDRST 230	line_176	-	-	-0.067	line SANTAN to THUNDRST 230 ck 1	

Overloaded Element	Rated Mva	Contingency	CATS_50%_LOAD_r4	CATS_75%_LOAD_r4	CATS_100%_LOAD_r	Outage description
CHOLLA -SAGUARO 500 ck 1 line	889	base	129%	111%	145%	Base system (n-0)
CHOLLA -SAGUARO 500 ck 1 line	1332	line_1	88%	77%	101%	line FOURCORN to MOENKOPI 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_103	89%	78%	102%	line SILVERKG to BROWNING 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_105	0%	76%	100%	line HASSYAMP to PINAL_W 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_106	96%	78%	104%	line PINAL_W to SNTAROSA 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_13	88%	77%	102%	line JOJOBA to PINAL_W 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_16	91%	80%	104%	line CHOLLA to PNPKAPS 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_17	91%	81%	104%	line CHOLLA to PRECHCYN 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_198	89%	78%	102%	line SPRINGR to PYOUNG 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_199	94%	82%	107%	line SPRINGR to VAIL2 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_20	90%	80%	103%	line PRECHCYN to PNPKAPS 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_200	0%	78%	101%	line VAIL to SOUTH 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_202	94%	84%	108%	line WINCHSTR to VAIL 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_448	90%	79%	102%	line WINCHSTR to WILLOW 345 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_516	89%	77%	102%	line REDMSA_E to FOURCORN 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_800	Div	0%	102%	Pinal West - Toltec 345kV ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_802	Div	94%	123%	Toltec-Saguaro 500kV ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_901	90%	79%	104%	line FC-PINNACLE PEAK 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	line_96	100%	90%	116%	line CORONADO to SILVERKG 500 ck 1
CHOLLA -SAGUARO 500 ck 1 line	1332	tran_569	93%	82%	106%	tran VAIL2 345 to VAIL 138 ck 1
SAGUARO 500/230 ck 1 tran	598	line_106	0%	102%	108%	line PINAL_W to SNTAROSA 500 ck 1
SAGUARO 500/230 ck 1 tran	598	tran_810	Div	Div	108%	tran Saguaro 500/230 ck 3
SAGUARO 500/230 ck 2 tran	598	line_106	0%	102%	108%	line PINAL_W to SNTAROSA 500 ck 1
SAGUARO 500/230 ck 2 tran	598	tran_810	Div	Div	108%	tran Saguaro 500/230 ck 3
SAGUARO 500/230 ck 3 tran	598	line_106	0%	0%	108%	line PINAL_W to SNTAROSA 500 ck 1
WESTWING 500/230 ck 2 tran	1494	tran_525	94%	94%	100%	tran WESTWING 500 to WESTWNGW 230 ck 3
YAVAPAI 500/230 ck 1 tran	336	tran_528	108%	106%	112%	tran YAVAPAI 500 to YAVAPAI 230 ck 2
YAVAPAI 500/230 ck 2 tran	336	tran_527	108%	106%	112%	tran YAVAPAI 500 to YAVAPAI 230 ck 1
JOJOBA -KYRENE 500 ck 1 line	3066	line_106	87%	84%	102%	line PINAL_W to SNTAROSA 500 ck 1
SNTAROSA 500/230 ck 1 tran	598	line_11	81%	79%	102%	line JOJOBA to KYRENE 500 ck 1
SNTAROSA 500/230 ck 1 tran	598	line_508	83%	80%	109%	line SNTAROSA to CAT07500 500 ck 1
SNTAROSA 500/230 ck 1 tran	598	line_802	Div	76%	101%	Toltec-Saguaro 500kV ck 1
SNTAROSA 500/230 ck 1 tran	598	tran_585	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 2
SNTAROSA 500/230 ck 1 tran	598	tran_586	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 3
SNTAROSA 500/230 ck 2 tran	598	line_11	81%	79%	102%	line JOJOBA to KYRENE 500 ck 1
SNTAROSA 500/230 ck 2 tran	598	line_508	83%	80%	109%	line SNTAROSA to CAT07500 500 ck 1
SNTAROSA 500/230 ck 2 tran	598	line_802	Div	76%	101%	Toltec-Saguaro 500kV ck 1
SNTAROSA 500/230 ck 2 tran	598	tran_584	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 1
SNTAROSA 500/230 ck 2 tran	598	tran_586	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 3
SNTAROSA 500/230 ck 3 tran	598	line_11	81%	79%	102%	line JOJOBA to KYRENE 500 ck 1
SNTAROSA 500/230 ck 3 tran	598	line_508	83%	80%	109%	line SNTAROSA to CAT07500 500 ck 1
SNTAROSA 500/230 ck 3 tran	598	line_802	Div	76%	101%	Toltec-Saguaro 500kV ck 1
SNTAROSA 500/230 ck 3 tran	598	tran_584	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 1
SNTAROSA 500/230 ck 3 tran	598	tran_585	85%	83%	109%	tran SNTAROSA 500 to SNTAROSA 230 ck 2
PNPKAPS 500/230 ck 1 tran	598	base	92%	91%	102%	Base system (n-0)
PNPKAPS 500/230 ck 1 tran	598	line_100	97%	97%	107%	line PALOVRDE to RUDD 500 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_105	0%	0%	105%	line HASSYAMP to PINAL_W 500 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_106	101%	100%	113%	line PINAL_W to SNTAROSA 500 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_11	106%	106%	117%	line JOJOBA to KYRENE 500 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_15	95%	95%	107%	line RACEWAY to WESTWING 500 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_16	95%	95%	106%	line CHOLLA to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_17	96%	96%	107%	line CHOLLA to PRECHCYN 345 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_18	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_19	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 2
PNPKAPS 500/230 ck 1 tran	598	line_20	95%	95%	106%	line PRECHCYN to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_28	99%	99%	110%	line DEERVALY to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_343	95%	95%	106%	line GLEN PS to NAVAJO 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_344	96%	96%	108%	line KAYENTA to SHIPROCK 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_345	95%	95%	107%	line KAYENTA to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_348	95%	95%	106%	line NAVAJO to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_418	95%	95%	106%	line CTRYCLUB to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_419	95%	95%	106%	line GLENDALE to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_55	96%	96%	107%	line WESTWNGW to PINPK 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_72	96%	96%	106%	line GLENDALW to GLENDALE 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_73	96%	96%	106%	line GLENDALW to AGUAFRIA 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	line_802	Div	0%	105%	Toltec-Saguaro 500kV ck 1
PNPKAPS 500/230 ck 1 tran	598	tran_523	95%	94%	105%	tran WESTWING 500 to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	tran_524	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 2
PNPKAPS 500/230 ck 1 tran	598	tran_525	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 3
PNPKAPS 500/230 ck 1 tran	598	tran_533	95%	95%	106%	tran RACEWAY 500 to RACEWAY 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	tran_592	95%	95%	106%	tran GLEN PS 230 to GLENCANY 230 ck 1
PNPKAPS 500/230 ck 1 tran	598	tran_607	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
PNPKAPS 500/230 ck 1 tran	598	tran_608	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
PNPKAPS 500/230 ck 2 tran	598	base	92%	91%	102%	Base system (n-0)
PNPKAPS 500/230 ck 2 tran	598	line_100	97%	97%	107%	line PALOVRDE to RUDD 500 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_105	0%	0%	105%	line HASSYAMP to PINAL_W 500 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_106	101%	100%	113%	line PINAL_W to SNTAROSA 500 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_11	106%	106%	117%	line JOJOBA to KYRENE 500 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_15	95%	95%	107%	line RACEWAY to WESTWING 500 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_16	95%	95%	106%	line CHOLLA to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_17	96%	96%	107%	line CHOLLA to PRECHCYN 345 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_18	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_19	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 2
PNPKAPS 500/230 ck 2 tran	598	line_20	95%	95%	106%	line PRECHCYN to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_28	99%	99%	110%	line DEERVALY to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_343	95%	95%	106%	line GLEN PS to NAVAJO 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_344	96%	96%	108%	line KAYENTA to SHIPROCK 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_345	95%	95%	107%	line KAYENTA to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_348	95%	95%	106%	line NAVAJO to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_418	95%	95%	106%	line CTRYCLUB to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_419	95%	95%	106%	line GLENDALE to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_55	96%	96%	107%	line WESTWNGW to PINPK 230 ck 1

PNPKAPS 500/230 ck 2 tran	598	line_72	96%	96%	106%	line GLENDALW to GLENDALE 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_73	96%	96%	106%	line GLENDALW to AGUAFRIA 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	line_802	Div	0%	105%	Toltec-Saguaro 500kV ck 1
PNPKAPS 500/230 ck 2 tran	598	tran_523	95%	94%	105%	tran WESTWING 500 to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	tran_524	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 2
PNPKAPS 500/230 ck 2 tran	598	tran_525	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 3
PNPKAPS 500/230 ck 2 tran	598	tran_533	95%	95%	106%	tran RACEWAY 500 to RACEWAY 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	tran_592	95%	95%	106%	tran GLEN PS 230 to GLENCANY 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	tran_606	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
PNPKAPS 500/230 ck 2 tran	598	tran_608	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
PNPKAPS 500/230 ck 3 tran	598	base	92%	91%	102%	Base system (n-0)
PNPKAPS 500/230 ck 3 tran	598	line_100	97%	97%	107%	line PALOVRDE to RUDD 500 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_105	0%	0%	105%	line HASSYAMP to PINAL_W 500 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_106	101%	100%	113%	line PINAL_W to SNTAROSA 500 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_11	106%	106%	117%	line JOJOBA to KYRENE 500 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_15	95%	95%	107%	line RACEWAY to WESTWING 500 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_16	95%	95%	106%	line CHOLLA to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_17	96%	96%	107%	line CHOLLA to PRECHCYN 345 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_18	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_19	95%	0%	106%	line FOURCORN to CHOLLA 345 ck 2
PNPKAPS 500/230 ck 3 tran	598	line_20	95%	95%	106%	line PRECHCYN to PNPKAPS 345 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_28	99%	99%	110%	line DEERVALY to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_343	95%	95%	106%	line GLEN PS to NAVAJO 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_344	96%	96%	108%	line KAYENTA to SHIPROCK 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_345	95%	95%	107%	line KAYENTA to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_348	95%	95%	106%	line NAVAJO to LNGHOUSE 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_418	95%	95%	106%	line CTRYCLUB to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_419	95%	95%	106%	line GLENDALE to GRNDTRML 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_55	96%	96%	107%	line WESTWNGW to PINPK 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_72	96%	96%	106%	line GLENDALW to GLENDALE 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_73	96%	96%	106%	line GLENDALW to AGUAFRIA 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	line_802	Div	0%	105%	Toltec-Saguaro 500kV ck 1
PNPKAPS 500/230 ck 3 tran	598	tran_523	95%	94%	105%	tran WESTWING 500 to WESTWNGE 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	tran_524	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 2
PNPKAPS 500/230 ck 3 tran	598	tran_525	95%	95%	106%	tran WESTWING 500 to WESTWNGW 230 ck 3
PNPKAPS 500/230 ck 3 tran	598	tran_533	95%	95%	106%	tran RACEWAY 500 to RACEWAY 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	tran_592	95%	95%	106%	tran GLEN PS 230 to GLENCANY 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	tran_606	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
PNPKAPS 500/230 ck 3 tran	598	tran_607	116%	115%	129%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
CACTUS -OCOTILLO 230 ck 1 line	461	line_23	115%	116%	119%	line CACTUS to PNPKAPS 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	371	base	128%	129%	135%	Base system (n-0)
CACTUS -PNPKAPS 230 ck 1 line	461	line_100	107%	108%	114%	line PALOVRDE to RUDD 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_106	107%	107%	115%	line PINAL_W to SNTAROSA 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_11	110%	111%	118%	line JOJOBA to KYRENE 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_150	0%	0%	111%	line AGUAFRIA to WESTWNGW 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_167	106%	106%	113%	line PAPAGOBT to PINPKSRP 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_169	0%	0%	111%	line PINPKSRP to BRANDOW 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_170	0%	0%	111%	line PINPKSRP to BRANDOW 230 ck 2
CACTUS -PNPKAPS 230 ck 1 line	461	line_171	0%	0%	112%	line ROGERS to THUNDRST 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_22	111%	111%	114%	line CACTUS to OCOTILLO 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_27	93%	94%	101%	line CTRYCLUB to LINCSTRT 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_33	106%	107%	115%	line LINCSTRT to OCOTILLO 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_34	109%	110%	116%	line LINCSTRT to WPHXAPSN 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_35	106%	107%	112%	line LONEPEAK to PNPKAPS 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_36	113%	114%	120%	line LONEPEAK to SUNYSLOP 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_38	99%	100%	105%	line MEADOWBK to SUNYSLOP 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_39	106%	107%	112%	line REACH to LONEPEAK 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_40	109%	109%	115%	line REACH to PNPKAPS 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_41	117%	118%	125%	line PNPKAPS to OCOTILLO 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_417	Div	107%	115%	line CHOLLA to SAGUARO 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_418	111%	112%	118%	line CTRYCLUB to GRNDTRML 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_419	111%	112%	118%	line GLENDALE to GRNDTRML 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_424	99%	100%	106%	line RACEWAY to PNPKAPS 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_64	0%	0%	104%	line KYR-NEW to OCOTILLO 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_72	112%	113%	119%	line GLENDALW to GLENDALE 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_73	112%	113%	119%	line GLENDALW to AGUAFRIA 230 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	line_96	106%	107%	113%	line CORONADO to SILVERKG 500 ck 1
CACTUS -PNPKAPS 230 ck 1 line	461	tran_548	112%	113%	118%	tran KYRENE 500 to KYR-NEW 230 ck 5
CASGRAPS-DBG 230 ck 1 line	900	line_202	0%	87%	100%	line WINCHSTR to VAIL 345 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_305	0%	105%	128%	line TESTTRAK to SNTAROSA 230 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_417	Div	88%	103%	line CHOLLA to SAGUARO 500 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_430	0%	90%	112%	line TESTTRAK to CASAGRND 230 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_484	0%	113%	126%	line DBG to CATSHV03 230 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_490	0%	91%	108%	line CATSHV07 to CATSHV06 230 ck 1
CASGRAPS-DBG 230 ck 1 line	900	line_802	Div	90%	107%	Toltec-Saguaro 500kV ck 1
CASGRAPS-CASAGRND 230 ck 1 line	600	line_305	0%	98%	116%	line TESTTRAK to SNTAROSA 230 ck 1
CASGRAPS-CASAGRND 230 ck 1 line	600	line_484	0%	99%	101%	line DBG to CATSHV03 230 ck 1
COCONINO-VERDE S 230 ck 1 line	211	line_25	100%	100%	102%	line CHOLLA to LEUPP 230 ck 1
COCONINO-VERDE S 230 ck 1 line	211	line_32	99%	100%	102%	line LEUPP to COCONINO 230 ck 1
DEERVALY-WESTWNGE 230 ck 1 line	837	line_100	95%	95%	101%	line PALOVRDE to RUDD 500 ck 1
DEERVALY-WESTWNGE 230 ck 1 line	837	line_11	96%	95%	103%	line JOJOBA to KYRENE 500 ck 1
DEERVALY-WESTWNGE 230 ck 1 line	837	line_152	98%	98%	104%	line AGUAFRIA to ALEXANDR 230 ck 1
EL SOL -AGUAFRIA 230 ck 1 line	539	line_188	101%	100%	103%	line RUDD to WHITETNK 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	457	base	103%	103%	111%	Base system (n-0)
GLENDALE-GRNDTRML 230 ck 1 line	571	line_106	96%	93%	106%	line PINAL_W to SNTAROSA 500 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_11	105%	104%	115%	line JOJOBA to KYRENE 500 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_152	94%	94%	101%	line AGUAFRIA to ALEXANDR 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_23	95%	94%	102%	line CACTUS to PNPKAPS 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_27	104%	103%	109%	line CTRYCLUB to LINCSTRT 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_34	121%	121%	129%	line LINCSTRT to WPHXAPSN 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_36	112%	112%	119%	line LONEPEAK to SUNYSLOP 230 ck 1
GLENDALE-GRNDTRML 230 ck 1 line	571	line_40	99%	99%	106%	line REACH to PNPKAPS 230 ck 1
LONEPEAK-SUNYSLOP 230 ck 1 line	539	line_37	129%	130%	134%	line MEADOWBK to CTRYCLUB 230 ck 1

LONEPEAK-SUNYSLOP 230 ck 1 line	539	line_418	108%	108%	113%	line CTRYCLUB to GRNDTRML 230 ck 1
LONEPEAK-SUNYSLOP 230 ck 1 line	539	line_419	107%	108%	113%	line GLENDALE to GRNDTRML 230 ck 1
LONEPEAK-SUNYSLOP 230 ck 1 line	539	line_72	113%	114%	119%	line GLENDALW to GLENDALE 230 ck 1
LONEPEAK-SUNYSLOP 230 ck 1 line	539	line_73	113%	114%	119%	line GLENDALW to AGUAFRIA 230 ck 1
MEADOWBK-CTRYCLUB 230 ck 1 line	598	line_36	116%	116%	118%	line LONEPEAK to SUNYSLOP 230 ck 1
MEADOWBK-SUNYSLOP 230 ck 1 line	490	line_36	101%	101%	103%	line LONEPEAK to SUNYSLOP 230 ck 1
SAGUARO 230/115 ck 1 tran	200	line_106	80%	104%	99%	line PINAL_W to SNTAROSA 500 ck 1
SAGUARO 230/115 ck 1 tran	200	line_506	84%	104%	98%	line WINCHSTR to CAT13500 500 ck 1
SAGUARO 230/115 ck 1 tran	200	line_507	85%	104%	99%	line CAT13500 to CAT07500 500 ck 1
SAGUARO 230/115 ck 1 tran	200	tran_545	101%	126%	116%	tran SAGUARO 230 to SAG.WEST 115 ck 1
SAGUARO 230/115 ck 1 tran	200	tran_810	Div	Div	102%	tran Saguaro 500/230 ck 3
SAGUARO 230/115 ck 1 tran	200	line_106	79%	102%	98%	line PINAL_W to SNTAROSA 500 ck 1
SAGUARO 230/115 ck 1 tran	200	line_506	83%	102%	97%	line WINCHSTR to CAT13500 500 ck 1
SAGUARO 230/115 ck 1 tran	200	line_507	83%	102%	97%	line CAT13500 to CAT07500 500 ck 1
SAGUARO 230/115 ck 1 tran	200	line_88	81%	110%	112%	line SAG.EAST to SAG.WEST 115 ck 1
SAGUARO 230/115 ck 1 tran	200	tran_544	100%	124%	115%	tran SAGUARO 230 to SAG.EAST 115 ck 1
SAGUARO 230/115 ck 1 tran	200	tran_810	Div	Div	100%	tran Saguaro 500/230 ck 3
SNTAROSA-CATSHV01 230 ck 2 line	287	base	0%	81%	120%	Base system (n-0)
SNTAROSA-CATSHV01 230 ck 2 line	287	line_11	82%	87%	131%	line JOJOBA to KYRENE 500 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_199	0%	0%	124%	line SPRINGR to VAIL2 345 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_202	80%	89%	131%	line WINCHSTR to VAIL 345 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_24	0%	0%	102%	line CASGRAPS to DBG 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_305	87%	95%	140%	line TESTTRAK to SNTAROSA 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_417	Div	94%	141%	line CHOLLA to SAGUARO 500 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_430	82%	85%	129%	line TESTTRAK to CASAGRND 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_48	0%	0%	111%	line SAGUARO to TATMOMLI 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_481	121%	132%	195%	line SNTAROSA to CATSHV01 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_483	0%	0%	111%	line CATSHV01 to TATMOMLI 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_484	93%	116%	157%	line DBG to CATSHV03 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_485	79%	86%	128%	line LONE BUT to CATSHV02 230 ck 2
SNTAROSA-CATSHV01 230 ck 2 line	287	line_486	0%	77%	116%	line CATSHV02 to SUN ARIZ 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_487	0%	0%	115%	line CATSHV03 to CATSHV07 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_496	0%	0%	124%	line COOLIDGE to CATSHV10 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_499	0%	0%	123%	line CATSHV07 to CATSHV11 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_50	82%	0%	129%	line SNTAROSA to DBG 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_503	0%	76%	108%	line CATSHV01 to CATSHV03 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_508	90%	95%	142%	line SNTAROSA to CAT07500 500 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_510	0%	0%	123%	line CASAGRND to CATSHV04 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_513	0%	0%	123%	line CATSHV09 to SEV 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_800	Div	0%	126%	Pinal West - Toltec 345kV ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	line_802	Div	99%	148%	Toltec-Saguaro 500kV ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_548	0%	77%	117%	tran KYRENE 500 to KYR-NEW 230 ck 5
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_569	0%	0%	124%	tran VAIL2 345 to VAIL 138 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_584	0%	0%	111%	tran SNTAROSA 500 to SNTAROSA 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_585	0%	0%	111%	tran SNTAROSA 500 to SNTAROSA 230 ck 2
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_586	0%	0%	111%	tran SNTAROSA 500 to SNTAROSA 230 ck 3
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_623	79%	86%	125%	tran CAT07500 500 to CATSHV07 230 ck 1
SNTAROSA-CATSHV01 230 ck 2 line	287	tran_810	Div	Div	123%	tran Saguaro 500/230 ck 3
YAVAPAI -VERDE N 230 ck 1 line	211	line_25	151%	151%	155%	line CHOLLA to LEUPP 230 ck 1
YAVAPAI -VERDE N 230 ck 1 line	211	line_32	151%	151%	155%	line LEUPP to COCONINO 230 ck 1
YAVAPAI -VERDE N 230 ck 1 line	211	tran_535	133%	133%	135%	tran CHOLLA 345 to CHOLLA 230 ck 1
DBG -CATSHV03 230 ck 1 line	939	line_24	0%	95%	103%	line CASGRAPS to DBG 230 ck 1
RACEWAY -WESTWNGE 230 ck 1 line	374	tran_523	96%	97%	103%	tran WESTWING 500 to WESTWNGE 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	457	base	117%	117%	125%	Base system (n-0)
GLENDALW-GLENDALE 230 ck 1 line	569	line_105	97%	97%	105%	line HASSYAMP to PINAL_W 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_106	108%	105%	118%	line PINAL_W to SNTAROSA 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_11	117%	116%	127%	line JOJOBA to KYRENE 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_13	0%	0%	104%	line JOJOBA to PINAL_W 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_152	106%	105%	112%	line AGUAFRIA to ALEXANDR 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_16	98%	98%	105%	line CHOLLA to PNPKAPS 345 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_164	97%	97%	104%	line ORME to RUDD 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_165	97%	97%	104%	line ORME to RUDD 230 ck 2
GLENDALW-GLENDALE 230 ck 1 line	569	line_17	98%	98%	104%	line CHOLLA to PRECHCYN 345 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_176	0%	0%	103%	line SANTAN to THUNDRST 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_20	97%	97%	104%	line PRECHCYN to PNPKAPS 345 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_23	106%	106%	114%	line CACTUS to PNPKAPS 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_27	115%	115%	120%	line CTRYCLUB to LINCSTRT 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_34	133%	133%	141%	line LINCSTRT to WPHXAPSN 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_341	0%	0%	103%	line FLAGSTAF to PINPKBRB 345 ck 2
GLENDALW-GLENDALE 230 ck 1 line	569	line_344	0%	0%	103%	line KAYENTA to SHIPROCK 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_35	104%	104%	111%	line LONEPEAK to PNPKAPS 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_36	124%	124%	131%	line LONEPEAK to SUNYSLOP 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_39	104%	104%	110%	line REACH to LONEPEAK 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_40	111%	111%	118%	line REACH to PNPKAPS 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_41	100%	100%	107%	line PNPKAPS to OCOTILLO 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_420	0%	0%	103%	line AVERY to TS6 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_421	0%	0%	103%	line TS6 to PNPKAPS 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_424	105%	104%	111%	line RACEWAY to PNPKAPS 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_508	97%	97%	105%	line SNTAROSA to CAT07500 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_55	102%	102%	109%	line WESTWNGW to PINPK 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_76	0%	0%	103%	line AVERY to RACEWAY 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_802	Div	97%	105%	Toltec-Saguaro 500kV ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_901	99%	98%	106%	line FC-PINNACLE PEAK 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	line_96	0%	96%	104%	line CORONADO to SILVERKG 500 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	tran_548	102%	101%	108%	tran KYRENE 500 to KYR-NEW 230 ck 5
GLENDALW-GLENDALE 230 ck 1 line	569	tran_606	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
GLENDALW-GLENDALE 230 ck 1 line	569	tran_607	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
GLENDALW-GLENDALE 230 ck 1 line	569	tran_608	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
GLENDALW-AGUAFRIA 230 ck 1 line	457	base	117%	117%	125%	Base system (n-0)
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_105	97%	97%	105%	line HASSYAMP to PINAL_W 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_106	108%	105%	118%	line PINAL_W to SNTAROSA 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_11	117%	116%	127%	line JOJOBA to KYRENE 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_13	0%	0%	104%	line JOJOBA to PINAL_W 500 ck 1

GLENDALW-AGUAFRIA 230 ck 1 line	569	line_152	106%	105%	112%	line AGUAFRIA to ALEXANDR 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_16	98%	98%	105%	line CHOLLA to PNPKAPS 345 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_164	97%	97%	104%	line ORME to RUDD 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_165	97%	97%	104%	line ORME to RUDD 230 ck 2
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_17	98%	98%	104%	line CHOLLA to PRECHCYN 345 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_176	0%	0%	103%	line SANTAN to THUNDRST 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_20	97%	97%	104%	line PRECHCYN to PNPKAPS 345 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_23	106%	106%	114%	line CACTUS to PNPKAPS 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_27	115%	115%	120%	line CTRYCLUB to LINCSTRT 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_34	133%	133%	141%	line LINCSTRT to WPHXAPSN 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_341	0%	0%	103%	line FLAGSTAF to PINPKBRB 345 ck 2
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_344	0%	0%	103%	line KAYENTA to SHIPROCK 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_35	104%	104%	111%	line LONEPEAK to PNPKAPS 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_36	124%	124%	131%	line LONEPEAK to SUNYSLOP 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_39	104%	104%	110%	line REACH to LONEPEAK 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_40	111%	111%	118%	line REACH to PNPKAPS 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_41	100%	100%	107%	line PNPKAPS to OCOTILLO 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_420	0%	0%	103%	line AVERY to TS6 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_421	0%	0%	103%	line TS6 to PNPKAPS 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_424	105%	104%	111%	line RACEWAY to PNPKAPS 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_508	97%	97%	105%	line SNTAROSA to CAT07500 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_55	102%	102%	109%	line WESTWNGW to PINPK 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_76	0%	0%	103%	line AVERY to RACEWAY 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_802	Div	97%	105%	Toltec-Saguaro 500kV ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_901	99%	98%	106%	line FC-PINNACLE PEAK 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	line_96	0%	96%	104%	line CORONADO to SILVERKG 500 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	tran_548	102%	101%	108%	tran KYRENE 500 to KYR-NEW 230 ck 5
GLENDALW-AGUAFRIA 230 ck 1 line	569	tran_606	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
GLENDALW-AGUAFRIA 230 ck 1 line	569	tran_607	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
GLENDALW-AGUAFRIA 230 ck 1 line	569	tran_608	99%	98%	106%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
WILOWLKW-PRESCOTT 230 ck 1 line	268	line_360	100%	101%	110%	line ROUNDVLY to PEACOCK 230 ck 1
WILOWLKW-PRESCOTT 230 ck 1 line	268	line_45	91%	92%	101%	line PRESCOTT to ROUNDVLY 230 ck 1
WILOWLKW-PRESCOTT 230 ck 1 line	268	line_8	101%	103%	119%	line YAVAPAI to WESTWING 500 ck 1
ADAMS -APACHE 115 ck 1 line	159	line_202	91%	92%	103%	line WINCHSTR to VAIL 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	167	base	83%	132%	163%	Base system (n-0)
SAG.EAST-MARANA 115 ck 1 line	184	line_197	0%	0%	145%	line SPRINGR to CORONADO 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_198	0%	0%	151%	line SPRINGR to PYOUNG 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_199	79%	123%	152%	line SPRINGR to VAIL2 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_200	0%	0%	145%	line VAIL to SOUTH 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_202	93%	135%	165%	line WINCHSTR to VAIL 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_248	79%	124%	154%	line KANTOR to CANEZ 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_249	79%	124%	155%	line CANEZ to SONOITA 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_250	83%	129%	159%	line SONOITA to VALENCIA 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_252	80%	125%	153%	line APACHE to BUTERFLD 230 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_255	81%	128%	167%	line AVRA to MARANA 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_256	89%	136%	176%	line AVRA to SNDARIO 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_257	84%	130%	159%	line BICKNELL to VAIL 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_258	119%	169%	205%	line BICKNELL to THREEPNT 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_265	92%	139%	180%	line THREEPNT to SNDARIO 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_282	91%	138%	171%	line DEL BAC to NOGALES 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_300	91%	138%	171%	line TUCSON to DEL BAC 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_301	79%	130%	161%	line TUCSON to ORACLE 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_312	0%	113%	145%	line BRAWLEY to SANXAVER 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_315	113%	172%	215%	line RATTLSNK to TUCSON 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_316	0%	110%	141%	line RATTLSNK to TWINPEAK 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_318	0%	111%	143%	line SANDARIO to BRAWLEY 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_319	0%	114%	0%	line SANXAVER to SNYDHILL 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_320	0%	117%	145%	line SNYDHILL to BLACKMTN 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_322	0%	111%	142%	line TWINPEAK to SANDARIO 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_323	0%	123%	153%	line NOGALES to KANTOR 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_417	Div	114%	139%	line CHOLLA to SAGUARO 500 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_448	78%	123%	151%	line WINCHSTR to WILLOW 345 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_471	78%	123%	151%	line BUTERFLD to EMPIREsw 230 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_472	0%	86%	107%	line MARANA to RATTLSNK 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_474	0%	112%	144%	line THREEPNT to VALEN-SW 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_475	0%	116%	0%	line VALEN-SW to BOPP 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_506	0%	108%	133%	line WINCHSTR to CAT13500 500 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_507	0%	107%	132%	line CAT13500 to CAT07500 500 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_802	Div	108%	131%	Toltec-Saguaro 500kV ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_84	93%	140%	170%	line ADAMS to APACHE 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_85	83%	128%	159%	line ADAMS to NOGALES 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_88	0%	0%	145%	line SAG.EAST to SAG.WEST 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	line_89	79%	126%	155%	line SAG.EAST to ORACLE 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	tran_568	0%	115%	143%	tran VAIL 345 to VAIL 138 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	tran_569	79%	123%	152%	tran VAIL2 345 to VAIL 138 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	tran_578	78%	123%	152%	tran BICKNELL 230 to BICKNELL 115 ck 1
SAG.EAST-MARANA 115 ck 1 line	184	tran_618	78%	123%	152%	tran BICKNELL 230 to BICKNELL 115 ck 2
BRANDOW -WARD 230 ck 1 line	429	line_159	103%	104%	106%	line BRANDOW to WARD 230 ck 2
BRANDOW -WARD 230 ck 2 line	429	line_158	103%	104%	106%	line BRANDOW to WARD 230 ck 1
PINPKSRP-BRANDOW 230 ck 1 line	429	line_11	96%	97%	116%	line JOJOBA to KYRENE 500 ck 1
PINPKSRP-BRANDOW 230 ck 2 line	429	line_11	96%	96%	116%	line JOJOBA to KYRENE 500 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	line_11	121%	121%	137%	line JOJOBA to KYRENE 500 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	line_160	101%	102%	111%	line CORBELL to KYRENE 230 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	line_176	145%	145%	156%	line SANTAN to THUNDRST 230 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	line_178	94%	95%	103%	line SILVERKG to GOLDFELD 230 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	line_96	102%	104%	114%	line CORONADO to SILVERKG 500 ck 1
ROGERS -THUNDRST 230 ck 1 line	460	tran_553	116%	117%	124%	tran SILVERKG 500 to SILVERKG 230 ck 1
ROGERS -PINPK 230 ck 1 line	375	base	104%	106%	130%	Base system (n-0)
ROGERS -PINPK 230 ck 1 line	412	line_100	90%	92%	113%	line PALOVRDE to RUDD 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_103	88%	90%	110%	line SILVERKG to BROWNING 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_104	0%	0%	121%	line BROWNING to KYRENE 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_105	98%	100%	124%	line HASSYAMP to PINAL_W 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_106	115%	114%	144%	line PINAL_W to SNTAROSA 500 ck 1

ROGERS -PINPK 230 ck 1 line	412	line_11	118%	119%	145%	line JOJOBA to KYRENE 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_13	98%	100%	124%	line JOJOBA to PINAL_W 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_156	88%	90%	114%	line BRANDOW to KYRENE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_16	90%	92%	114%	line CHOLLA to PNPKAPS 345 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_160	107%	109%	131%	line CORBELL to KYRENE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_162	98%	100%	122%	line KYRENE to SCHRADER 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_167	99%	101%	123%	line PAPAGOBT to PINPKSRP 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_169	98%	100%	123%	line PINPKSRP to BRANDOW 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_17	90%	92%	113%	line CHOLLA to PRECHCYN 345 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_170	98%	100%	123%	line PINPKSRP to BRANDOW 230 ck 2
ROGERS -PINPK 230 ck 1 line	412	line_173	137%	140%	171%	line ROGERS to PINPK 230 ck 2
ROGERS -PINPK 230 ck 1 line	412	line_174	0%	0%	109%	line ROGERS to SPOOKHIL 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_176	126%	128%	150%	line SANTAN to THUNDRST 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_178	103%	105%	126%	line SILVERKG to GOLDFELD 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_185	98%	100%	121%	line BROWNING to SANTAN 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_199	0%	0%	121%	line SPRINGR to VAIL2 345 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_20	91%	92%	114%	line PRECHCYN to PNPKAPS 345 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_23	97%	99%	121%	line CACTUS to PNPKAPS 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_28	92%	93%	115%	line DEERVALY to WESTWNGE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_321	0%	0%	109%	line SPOOKHIL to COOLIDGE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_344	0%	0%	115%	line KAYENTA to SHIPROCK 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_345	0%	0%	115%	line KAYENTA to LNGHOUSE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_417	Div	105%	130%	line CHOLLA to SAGUARO 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_422	91%	93%	115%	line SECNOL to CHOLLA 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_424	89%	91%	113%	line RACEWAY to PNPKAPS 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_485	0%	0%	122%	line LONE BUT to CATSHV02 230 ck 2
ROGERS -PINPK 230 ck 1 line	412	line_496	0%	93%	113%	line COOLIDGE to CATSHV10 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_506	99%	101%	124%	line WINCHSTR to CAT13500 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_507	99%	101%	124%	line CAT13500 to CAT07500 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_508	100%	102%	126%	line SNTAROSA to CAT07500 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_55	91%	93%	115%	line WESTWNGW to PINPK 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_802	Div	100%	125%	Toltec-Saguaro 500kV ck 1
ROGERS -PINPK 230 ck 1 line	412	line_901	89%	91%	111%	line FC-PINNACLE PEAK 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	line_96	108%	110%	133%	line CORONADO to SILVERKG 500 ck 1
ROGERS -PINPK 230 ck 1 line	412	tran_523	0%	94%	115%	tran WESTWING 500 to WESTWNGE 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	tran_548	87%	89%	111%	tran KYRENE 500 to KYR-NEW 230 ck 5
ROGERS -PINPK 230 ck 1 line	412	tran_553	113%	115%	136%	tran SILVERKG 500 to SILVERKG 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	tran_606	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
ROGERS -PINPK 230 ck 1 line	412	tran_607	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
ROGERS -PINPK 230 ck 1 line	412	tran_608	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
ROGERS -PINPK 230 ck 2 line	375	base	104%	106%	130%	Base system (n-0)
ROGERS -PINPK 230 ck 2 line	412	line_100	90%	92%	113%	line PALOVRDE to RUDD 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_103	88%	90%	110%	line SILVERKG to BROWNING 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_104	0%	0%	121%	line BROWNING to KYRENE 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_105	98%	100%	124%	line HASSYAMP to PINAL_W 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_106	115%	114%	144%	line PINAL_W to SNTAROSA 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_11	118%	119%	145%	line JOJOBA to KYRENE 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_13	98%	100%	124%	line JOJOBA to PINAL_W 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_156	88%	90%	114%	line BRANDOW to KYRENE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_16	90%	92%	114%	line CHOLLA to PNPKAPS 345 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_160	107%	109%	131%	line CORBELL to KYRENE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_162	98%	100%	122%	line KYRENE to SCHRADER 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_167	99%	101%	123%	line PAPAGOBT to PINPKSRP 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_169	98%	100%	123%	line PINPKSRP to BRANDOW 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_17	90%	92%	113%	line CHOLLA to PRECHCYN 345 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_170	98%	100%	123%	line PINPKSRP to BRANDOW 230 ck 2
ROGERS -PINPK 230 ck 2 line	412	line_172	137%	140%	171%	line ROGERS to PINPK 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_174	0%	0%	109%	line ROGERS to SPOOKHIL 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_176	126%	128%	150%	line SANTAN to THUNDRST 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_178	103%	105%	126%	line SILVERKG to GOLDFELD 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_185	98%	100%	121%	line BROWNING to SANTAN 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_199	0%	0%	121%	line SPRINGR to VAIL2 345 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_20	91%	92%	114%	line PRECHCYN to PNPKAPS 345 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_23	97%	99%	121%	line CACTUS to PNPKAPS 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_28	92%	93%	115%	line DEERVALY to WESTWNGE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_321	0%	0%	109%	line SPOOKHIL to COOLIDGE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_344	0%	0%	115%	line KAYENTA to SHIPROCK 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_345	0%	0%	115%	line KAYENTA to LNGHOUSE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_417	Div	105%	130%	line CHOLLA to SAGUARO 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_422	91%	93%	115%	line SECNOL to CHOLLA 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_424	89%	91%	113%	line RACEWAY to PNPKAPS 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_485	0%	0%	122%	line LONE BUT to CATSHV02 230 ck 2
ROGERS -PINPK 230 ck 2 line	412	line_496	0%	93%	113%	line COOLIDGE to CATSHV10 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_506	99%	101%	124%	line WINCHSTR to CAT13500 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_507	99%	101%	124%	line CAT13500 to CAT07500 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_508	100%	102%	126%	line SNTAROSA to CAT07500 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_55	91%	93%	115%	line WESTWNGW to PINPK 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_802	Div	100%	125%	Toltec-Saguaro 500kV ck 1
ROGERS -PINPK 230 ck 2 line	412	line_901	89%	91%	111%	line FC-PINNACLE PEAK 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	line_96	108%	110%	133%	line CORONADO to SILVERKG 500 ck 1
ROGERS -PINPK 230 ck 2 line	412	tran_523	0%	94%	115%	tran WESTWING 500 to WESTWNGE 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	tran_548	87%	89%	111%	tran KYRENE 500 to KYR-NEW 230 ck 5
ROGERS -PINPK 230 ck 2 line	412	tran_553	113%	115%	136%	tran SILVERKG 500 to SILVERKG 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	tran_606	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 1
ROGERS -PINPK 230 ck 2 line	412	tran_607	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 2
ROGERS -PINPK 230 ck 2 line	412	tran_608	0%	94%	115%	tran PNPKAPS 500 to PNPKAPS 230 ck 3
SANTAN -CORBELL 230 ck 1 line	587	line_160	114%	114%	116%	line CORBELL to KYRENE 230 ck 1
SPRINGR -VAIL2 345 ck 1 line	860	line_202	96%	95%	109%	line WINCHSTR to VAIL 345 ck 1
VAIL -SOUTH 345 ck 1 line	1110	line_506	84%	88%	102%	line WINCHSTR to CAT13500 500 ck 1
VAIL -SOUTH 345 ck 1 line	1110	line_507	83%	88%	101%	line CAT13500 to CAT07500 500 ck 1
VAIL 345/138 ck 1 tran	806	line_199	118%	113%	122%	line SPRINGR to VAIL2 345 ck 1
VAIL 345/138 ck 1 tran	806	line_200	116%	112%	121%	line VAIL to SOUTH 345 ck 1
VAIL 345/138 ck 1 tran	806	line_506	111%	105%	114%	line WINCHSTR to CAT13500 500 ck 1

VAIL 345/138 ck 1 tran	806	line_507	112%	106%	115%	line CAT13500 to CAT07500 500 ck 1
VAIL 345/138 ck 1 tran	806	line_802	Div	90%	100%	Toltec-Saguaro 500kV ck 1
VAIL 345/138 ck 1 tran	806	tran_569	118%	113%	123%	tran VAIL2 345 to VAIL 138 ck 1
VAIL2 345/138 ck 1 tran	806	line_202	98%	97%	110%	line WINCHSTR to VAIL 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	925	base	146%	143%	160%	Base system (n-0)
WINCHSTR-VAIL 345 ck 1 line	1110	line_106	102%	104%	115%	line PINAL_W to SNTAROSA 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_11	114%	113%	126%	line JOJOBA to KYRENE 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_192	111%	109%	122%	line PYOUNG to WINCHSTR 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_197	121%	120%	134%	line SPRINGR to CORONADO 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_198	106%	104%	114%	line SPRINGR to PYOUNG 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_199	146%	144%	162%	line SPRINGR to VAIL2 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_200	93%	91%	101%	line VAIL to SOUTH 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_205	115%	0%	127%	line DMP to SN.CRUZ 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_213	113%	112%	125%	line IRVNGTN to TUCSON 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_226	114%	113%	126%	line SN.CRUZ to IRVNGTN 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_252	131%	129%	143%	line APACHE to BUTERFLD 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_254	112%	110%	124%	line APACHE to WINCHSTR 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_257	112%	110%	122%	line BICKNELL to VAIL 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_258	115%	113%	126%	line BICKNELL to THREEPNT 115 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_263	121%	119%	133%	line PANTANO to SAHUARIT 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_393	113%	112%	124%	line SPRINGR to LUNA 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_417	Div	131%	150%	line CHOLLA to SAGUARO 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_422	120%	119%	132%	line SECNOL to CHOLLA 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_423	120%	119%	132%	line CORONADO to SECNOL 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_445	122%	121%	133%	line PYOUNG to WILLOW 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_448	101%	99%	112%	line WINCHSTR to WILLOW 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_451	121%	0%	0%	line PINALWES to SOUTH 345 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_456	120%	119%	132%	line TORTOLIT to RANVISTO 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_471	126%	125%	139%	line BUTERFLD to EMPIREsw 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_476	125%	123%	137%	line EMPIREsw to PANTANO 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_490	120%	119%	134%	line CATSHV07 to CATSHV06 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_496	0%	119%	134%	line COOLIDGE to CATSHV10 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_497	121%	120%	135%	line SAGUARO to CATSHV12 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_499	120%	119%	134%	line CATSHV07 to CATSHV11 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_501	0%	0%	127%	line CATSHV16 to SAGUARO 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_506	174%	175%	200%	line WINCHSTR to CAT13500 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_507	173%	174%	198%	line CAT13500 to CAT07500 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_508	110%	109%	121%	line SNTAROSA to CAT07500 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_510	0%	0%	132%	line CASAGRND to CATSHV04 230 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_6	120%	119%	134%	line SAGUARO to TORTOLIT 500 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_800	Div	0%	137%	Pinal West - Toltec 345kV ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_802	Div	106%	116%	Toltec-Saguaro 500kV ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	line_84	121%	120%	134%	line ADAMS to APACHE 115 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	tran_568	94%	95%	107%	tran VAIL 345 to VAIL 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	tran_569	146%	144%	162%	tran VAIL2 345 to VAIL 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	tran_587	0%	113%	125%	tran NLOOP230 230 to N. LOOP 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	tran_614	121%	119%	133%	tran IRVMID3 138 to IRVNGTN 138 ck 1
WINCHSTR-VAIL 345 ck 1 line	1110	tran_615	121%	120%	133%	tran IRVMID4 138 to IRVNGTN 138 ck 1
E. LOOP -NE.LOOP 138 ck 1 line	287	line_227	112%	100%	119%	line SNYDER to E. LOOP 138 ck 1
E. LOOP -NE.LOOP 138 ck 1 line	287	line_506	93%	85%	103%	line WINCHSTR to CAT13500 500 ck 1
E. LOOP -NE.LOOP 138 ck 1 line	287	line_507	93%	85%	102%	line CAT13500 to CAT07500 500 ck 1
E. LOOP -NE.LOOP 138 ck 1 line	287	line_802	Div	83%	104%	Toltec-Saguaro 500kV ck 1
IRVNGTN -TUCSON 138 ck 1 line	302	line_226	94%	87%	101%	line SN.CRUZ to IRVNGTN 138 ck 1
IRVNGTN -TUCSON 138 ck 1 line	302	line_506	99%	94%	110%	line WINCHSTR to CAT13500 500 ck 1
IRVNGTN -TUCSON 138 ck 1 line	302	line_507	99%	94%	109%	line CAT13500 to CAT07500 500 ck 1
IRVNGTN -TUCSON 138 ck 1 line	302	line_802	Div	92%	110%	Toltec-Saguaro 500kV ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_213	104%	95%	112%	line IRVNGTN to TUCSON 138 ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_236	104%	96%	111%	line TWNTYSEC to E. LOOP 138 ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_417	Div	86%	103%	line CHOLLA to SAGUARO 500 ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_506	105%	97%	116%	line WINCHSTR to CAT13500 500 ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_507	104%	97%	115%	line CAT13500 to CAT07500 500 ck 1
SN.CRUZ -IRVNGTN 138 ck 1 line	287	line_802	Div	95%	117%	Toltec-Saguaro 500kV ck 1
SNYDER -E. LOOP 138 ck 1 line	287	line_208	105%	95%	112%	line E. LOOP to NE.LOOP 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_205	103%	96%	106%	line DMP to SN.CRUZ 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_213	102%	95%	105%	line IRVNGTN to TUCSON 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_225	103%	97%	106%	line S.TRAIL to ROBERTS 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_226	107%	100%	110%	line SN.CRUZ to IRVNGTN 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_238	109%	103%	112%	line VAIL to S.TRAIL 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_241	125%	118%	129%	line LOSREALS to VAIL 138 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_506	99%	94%	104%	line WINCHSTR to CAT13500 500 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_507	99%	94%	103%	line CAT13500 to CAT07500 500 ck 1
TWNTYSEC-E. LOOP 138 ck 1 line	370	line_802	Div	95%	107%	Toltec-Saguaro 500kV ck 1
LOSREALS-VAIL 138 ck 1 line	370	line_236	108%	103%	113%	line TWNTYSEC to E. LOOP 138 ck 1
SONOITA -VALENCIA 115 ck 1 line	56	base	84%	88%	107%	Base system (n-0)
SONOITA -VALENCIA 115 ck 1 line	67	line_258	80%	84%	101%	line BICKNELL to THREEPNT 115 ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_472	85%	101%	122%	line MARANA to RATTLSNK 115 ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_506	88%	89%	109%	line WINCHSTR to CAT13500 500 ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_507	88%	90%	109%	line CAT13500 to CAT07500 500 ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_802	Div	95%	120%	Toltec-Saguaro 500kV ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_84	130%	135%	157%	line ADAMS to APACHE 115 ck 1
SONOITA -VALENCIA 115 ck 1 line	67	line_85	99%	103%	126%	line ADAMS to NOGALES 115 ck 1
GATEWAY -VALENCIA 115 ck 1 line	132	line_84	101%	103%	115%	line ADAMS to APACHE 115 ck 1
COPPERVR 345/230 ck 1 tran	224	line_261	112%	112%	119%	line MORENCI to GREEN-SW 230 ck 1
COPPERVR 345/230 ck 1 tran	224	line_262	100%	100%	100%	line MORENCI to PD-MORNC 230 ck 1
COPPERVR 345/230 ck 1 tran	224	tran_580	112%	113%	119%	tran GREEN-SW 345 to GREEN-SW 230 ck 1
APACHE -BUTERFLD 230 ck 1 line	368	line_202	110%	108%	117%	line WINCHSTR to VAIL 345 ck 1
AVRA -MARANA 115 ck 1 line	79	line_258	107%	113%	120%	line BICKNELL to THREEPNT 115 ck 1
AVRA -MARANA 115 ck 1 line	79	line_507	0%	0%	100%	line CAT13500 to CAT07500 500 ck 1
AVRA -SNDARIO 115 ck 1 line	79	line_258	83%	87%	107%	line BICKNELL to THREEPNT 115 ck 1
AVRA -SNDARIO 115 ck 1 line	79	line_315	0%	0%	106%	line RATTLSNK to TUCSON 115 ck 1
AVRA -SNDARIO 115 ck 1 line	79	line_506	81%	85%	118%	line WINCHSTR to CAT13500 500 ck 1
AVRA -SNDARIO 115 ck 1 line	79	line_507	82%	86%	119%	line CAT13500 to CAT07500 500 ck 1
AVRA -SNDARIO 115 ck 1 line	79	line_802	Div	76%	112%	Toltec-Saguaro 500kV ck 1

BICKNELL 230/115 ck 1 tran	112	tran_618	92%	95%	120%	tran BICKNELL 230 to BICKNELL 115 ck 2
BICKNELL 230/115 ck 2 tran	112	tran_578	92%	95%	120%	tran BICKNELL 230 to BICKNELL 115 ck 1
BICKNELL-THREEPNT 115 ck 1 line	124	base	79%	82%	106%	Base system (n-0)
BICKNELL-THREEPNT 115 ck 1 line	136	line_197	76%	79%	101%	line SPRINGR to CORONADO 345 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_200	80%	85%	109%	line VAIL to SOUTH 345 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_282	77%	81%	104%	line DEL BAC to NOGALES 115 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_300	77%	81%	104%	line TUCSON to DEL BAC 115 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_315	80%	87%	113%	line RATTLSNK to TUCSON 115 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_417	Div	83%	108%	line CHOLLA to SAGUARO 500 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_506	92%	95%	123%	line WINCHSTR to CAT13500 500 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_507	92%	95%	122%	line CAT13500 to CAT07500 500 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_802	Div	89%	118%	Toltec-Saguaro 500kV ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	line_84	78%	81%	104%	line ADAMS to APACHE 115 ck 1
BICKNELL-THREEPNT 115 ck 1 line	136	tran_568	81%	82%	104%	tran VAIL 345 to VAIL 138 ck 1
BUTERFLD-EMPIREsw 230 ck 1 line	368	line_202	93%	91%	101%	line WINCHSTR to VAIL 345 ck 1
GREEN-SW 345/230 ck 1 tran	193	line_446	128%	129%	136%	line PYOUNG to COPPERVR 345 ck 1
GREEN-SW 345/230 ck 1 tran	193	line_463	128%	129%	137%	line COPPERVR to FRISCO 230 ck 1
GREEN-SW 345/230 ck 1 tran	193	line_464	106%	107%	115%	line PD-MORNC to FRISCO 230 ck 1
GREEN-SW 345/230 ck 1 tran	193	tran_616	128%	129%	136%	tran COPPERVR 345 to COPPERVR 230 ck 1
MARANA -RATTLSNK 115 ck 1 line	184	line_315	0%	94%	122%	line RATTLSNK to TUCSON 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	72	base	0%	78%	106%	Base system (n-0)
THREEPNT-SNDARIO 115 ck 1 line	79	line_197	76%	78%	103%	line SPRINGR to CORONADO 345 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_200	82%	88%	116%	line VAIL to SOUTH 345 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_213	0%	0%	100%	line IRVNGTN to TUCSON 138 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_250	0%	75%	102%	line SONOITA to VALENCIA 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_282	76%	80%	109%	line DEL BAC to NOGALES 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_300	76%	80%	109%	line TUCSON to DEL BAC 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_301	0%	0%	100%	line TUCSON to ORACLE 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_315	81%	89%	122%	line RATTLSNK to TUCSON 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_417	Div	85%	113%	line CHOLLA to SAGUARO 500 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_468	0%	0%	101%	line APACHE to SNMANUEL 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_474	83%	87%	116%	line THREEPNT to VALEN-SW 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_475	0%	79%	107%	line VALEN-SW to BOPP 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_490	0%	0%	101%	line CATSHV07 to CATSHV06 230 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_499	0%	0%	101%	line CATSHV07 to CATSHV11 230 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_506	101%	105%	135%	line WINCHSTR to CAT13500 500 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_507	101%	105%	136%	line CAT13500 to CAT07500 500 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_802	Div	95%	129%	Toltec-Saguaro 500kV ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_84	76%	80%	108%	line ADAMS to APACHE 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_85	0%	76%	103%	line ADAMS to NOGALES 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	line_88	0%	0%	101%	line SAG.EAST to SAG.WEST 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	tran_521	0%	0%	100%	tran SAGUARO 500 to SAG.EAST 115 ck 1
THREEPNT-SNDARIO 115 ck 1 line	79	tran_568	82%	83%	109%	tran VAIL 345 to VAIL 138 ck 1
BLYTHE -NILAND 161 ck 1 line	165	line_268	101%	101%	101%	line BLYTHE to GLT TAP 161 ck 1
BLYTHE -NILAND 161 ck 1 line	165	line_309	101%	101%	101%	line GLT TAP to KNOB 161 ck 1
BLYTHE -NILAND 161 ck 1 line	165	line_405	113%	113%	113%	line BLYTHE to BLYTHESC 161 ck 1
COOLIDGE-SUN ARIZ 230 ck 1 line	415	line_280	0%	106%	114%	line COOLIDGE to SUN ARIZ 230 ck 2
COOLIDGE-SUN ARIZ 230 ck 1 line	415	line_900	0%	89%	103%	line COOLIDGE to CATSHV07 230 ck 1
COOLIDGE-SUN ARIZ 230 ck 2 line	415	line_279	0%	106%	114%	line COOLIDGE to SUN ARIZ 230 ck 1
COOLIDGE-SUN ARIZ 230 ck 2 line	415	line_900	0%	89%	103%	line COOLIDGE to CATSHV07 230 ck 1
KNOB -PILOTKNB 161 ck 1 line	165	line_396	103%	103%	103%	line BLYTHE to NILAND 161 ck 1
LONE BUT-LIBERTY 230 ck 1 line	415	line_106	0%	0%	104%	line PINAL_W to SNTAROSA 500 ck 1
TUCSON -ORACLE 115 ck 1 line	98	line_472	0%	90%	104%	line MARANA to RATTLSNK 115 ck 1
TESTTRAK-CASAGRND 230 ck 1 line	485	line_24	94%	110%	148%	line CASGRAPS to DBG 230 ck 1
RATTLSNK-TUCSON 115 ck 1 line	184	line_472	0%	104%	128%	line MARANA to RATTLSNK 115 ck 1
GLEN PS 230/230 ck 1 tran	350	line_1	81%	83%	109%	line FOURCORN to MOENKOPI 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_16	76%	78%	100%	line CHOLLA to PNPKAPS 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_17	76%	79%	101%	line CHOLLA to PRECHCYN 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_18	78%	80%	105%	line FOURCORN to CHOLLA 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_19	78%	80%	105%	line FOURCORN to CHOLLA 345 ck 2
GLEN PS 230/230 ck 1 tran	350	line_197	77%	79%	102%	line SPRINGR to CORONADO 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_199	76%	78%	101%	line SPRINGR to VAIL2 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_2	77%	79%	102%	line MOENKOPI to YAVAPAI 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_20	75%	78%	100%	line PRECHCYN to PNPKAPS 345 ck 1
GLEN PS 230/230 ck 1 tran	350	line_372	75%	77%	100%	line NAVAJO to CRYSTAL 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_417	Div	80%	105%	line CHOLLA to SAGUARO 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_425	77%	79%	102%	line NAVAJO to VV1 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_426	77%	79%	102%	line VV1 to RACEWAY 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_506	76%	79%	102%	line WINCHSTR to CAT13500 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_507	76%	79%	102%	line CAT13500 to CAT07500 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_516	82%	84%	113%	line REDMSA_E to FOURCORN 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_901	92%	94%	122%	line FC-PINNACLE PEAK 500 ck 1
GLEN PS 230/230 ck 1 tran	350	line_96	80%	83%	106%	line CORONADO to SILVERKG 500 ck 1
GLEN PS 230/230 ck 1 tran	350	tran_569	75%	77%	100%	tran VAIL2 345 to VAIL 138 ck 1
GLENCANY 345/230 ck 1 tran	330	tran_594	91%	93%	114%	tran GLENCANY 345 to GLENCANY 230 ck 2
GLENCANY 345/230 ck 2 tran	330	tran_593	91%	93%	114%	tran GLENCANY 345 to GLENCANY 230 ck 1
KAYENTA -SHIPROCK 230 ck 1 line	398	base	87%	89%	109%	Base system (n-0)
KAYENTA -SHIPROCK 230 ck 1 line	538	line_1	79%	81%	101%	line FOURCORN to MOENKOPI 500 ck 1
KAYENTA -SHIPROCK 230 ck 1 line	538	line_516	80%	81%	104%	line REDMSA_E to FOURCORN 500 ck 1
KAYENTA -SHIPROCK 230 ck 1 line	538	line_901	87%	89%	111%	line FC-PINNACLE PEAK 500 ck 1
SHIPROCK 345/230 ck 1 tran	300	base	108%	111%	139%	Base system (n-0)
SHIPROCK 345/230 ck 1 tran	360	line_1	101%	104%	131%	line FOURCORN to MOENKOPI 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_16	95%	98%	121%	line CHOLLA to PNPKAPS 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_17	96%	98%	121%	line CHOLLA to PRECHCYN 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_18	97%	99%	125%	line FOURCORN to CHOLLA 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_19	97%	99%	125%	line FOURCORN to CHOLLA 345 ck 2
SHIPROCK 345/230 ck 1 tran	360	line_193	0%	0%	118%	line MCKINLEY to SPRINGR 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_194	0%	0%	118%	line MCKINLEY to SPRINGR 345 ck 2
SHIPROCK 345/230 ck 1 tran	360	line_197	96%	98%	122%	line SPRINGR to CORONADO 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_198	0%	0%	119%	line SPRINGR to PYOUNG 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_199	95%	97%	121%	line SPRINGR to VAIL2 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_2	95%	98%	122%	line MOENKOPI to YAVAPAI 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_20	95%	97%	120%	line PRECHCYN to PNPKAPS 345 ck 1

SHIPROCK 345/230 ck 1 tran	360	line_339	76%	78%	100%	line FLAGSTAF to GLENCANY 345 ck 2
SHIPROCK 345/230 ck 1 tran	360	line_340	77%	79%	100%	line FLAGSTAF to PINPKBRB 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_341	79%	81%	104%	line FLAGSTAF to PINPKBRB 345 ck 2
SHIPROCK 345/230 ck 1 tran	360	line_342	95%	97%	121%	line GALLEGOS to BERGIN 115 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_351	94%	97%	121%	line BERGIN to FOOTHILS 115 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_353	94%	97%	121%	line FOOTHILS to HOODMESA 115 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_372	96%	99%	123%	line NAVAJO to CRYSTAL 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_376	96%	99%	123%	line FOURCORN to PILLAR 230 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_388	86%	88%	111%	line PINTO PS to FOURCORN 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_389	84%	86%	109%	line SIGURDPS to GLENCANY 230 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_390	85%	87%	112%	line SHIPROCK to SAN_JUAN 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_4	0%	0%	119%	line NAVAJO to REDMSA_E 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_400	93%	96%	119%	line MOENKOPI to ELDORDO 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_417	Div	100%	126%	line CHOLLA to SAGUARO 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_425	95%	98%	122%	line NAVAJO to VV1 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_426	95%	98%	122%	line VV1 to RACEWAY 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_448	94%	96%	119%	line WINCHSTR to WILLOW 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_506	95%	98%	122%	line WINCHSTR to CAT13500 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_507	95%	98%	122%	line CAT13500 to CAT07500 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_516	102%	104%	135%	line REDMSA_E to FOURCORN 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_8	0%	0%	118%	line YAVAPAI to WESTWING 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_901	111%	113%	143%	line FC-PINNACLE PEAK 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	line_96	100%	102%	127%	line CORONADO to SILVERKG 500 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_519	0%	0%	112%	tran FOURCORN 500 to FOURCORN 345 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_520	0%	0%	112%	tran FOURCORN 500 to FOURCORN 345 ck 2
SHIPROCK 345/230 ck 1 tran	360	tran_569	95%	97%	121%	tran VAIL2 345 to VAIL 138 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_593	85%	88%	109%	tran GLENCANY 345 to GLENCANY 230 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_594	85%	88%	109%	tran GLENCANY 345 to GLENCANY 230 ck 2
SHIPROCK 345/230 ck 1 tran	360	tran_595	84%	86%	110%	tran SHIPROCK 230 to SHIPROCK 115 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_599	95%	97%	121%	tran GALLEGOS 230 to GALLEGOS 115 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_601	87%	89%	112%	tran PINPKBRB 345 to PINPK 230 ck 1
SHIPROCK 345/230 ck 1 tran	360	tran_602	87%	89%	112%	tran PINPKBRB 345 to PINPK 230 ck 2
SHIPROCK 345/230 ck 1 tran	360	tran_603	87%	90%	112%	tran PINPKBRB 345 to PINPK 230 ck 3
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_100	77%	76%	103%	line PALOVRDE to RUDD 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_104	0%	0%	100%	line BROWNING to KYRENE 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_11	104%	101%	133%	line JOJOBA to KYRENE 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_190	0%	0%	101%	line SEV to BROWNING 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_417	Div	0%	103%	line CHOLLA to SAGUARO 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_506	82%	80%	109%	line WINCHSTR to CAT13500 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_507	82%	80%	109%	line CAT13500 to CAT07500 500 ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_800	Div	0%	103%	Pinal West - Toltec 345kV ck 1
PINAL_W -SNTAROSA 500 ck 1 line	2598	line_802	Div	83%	116%	Toltec-Saguaro 500kV ck 1
CAT07500 500/230 ck 1 tran	598	line_202	88%	92%	107%	line WINCHSTR to VAIL 345 ck 1
CAT07500 500/230 ck 1 tran	598	line_417	Div	85%	102%	line CHOLLA to SAGUARO 500 ck 1
CAT07500 500/230 ck 1 tran	598	line_802	Div	89%	108%	Toltec-Saguaro 500kV ck 1
CAT07500 500/230 ck 2 tran	598	line_202	88%	92%	107%	line WINCHSTR to VAIL 345 ck 1
CAT07500 500/230 ck 2 tran	598	line_417	Div	85%	102%	line CHOLLA to SAGUARO 500 ck 1
CAT07500 500/230 ck 2 tran	598	line_802	Div	89%	108%	Toltec-Saguaro 500kV ck 1
CAT07500 500/230 ck 2 tran	598	tran_623	94%	96%	111%	tran CAT07500 500 to CATSHV07 230 ck 1
CAT07500 500/230 ck 3 tran	598	line_202	88%	92%	107%	line WINCHSTR to VAIL 345 ck 1
CAT07500 500/230 ck 3 tran	598	line_417	Div	85%	102%	line CHOLLA to SAGUARO 500 ck 1
CAT07500 500/230 ck 3 tran	598	line_802	Div	89%	108%	Toltec-Saguaro 500kV ck 1
CAT07500 500/230 ck 3 tran	598	tran_623	94%	96%	111%	tran CAT07500 500 to CATSHV07 230 ck 1
CAT07500 500/230 ck 4 tran	598	line_202	0%	0%	107%	line WINCHSTR to VAIL 345 ck 1
CAT07500 500/230 ck 4 tran	598	line_417	Div	0%	102%	line CHOLLA to SAGUARO 500 ck 1
CAT07500 500/230 ck 4 tran	598	line_802	Div	0%	108%	Toltec-Saguaro 500kV ck 1
CAT07500 500/230 ck 4 tran	598	tran_623	0%	0%	111%	tran CAT07500 500 to CATSHV07 230 ck 1

Bus	Outage	50%	75%	100%	Outage description
14001 FOURCORN 500	base	1.072	1.071	1.049	Base system (n-0)
14002 MOENKOPI 500	base	1.087	1.086	1.065	Base system (n-0)
14003 NAVAJO 500	base	1.092	1.091	1.079	Base system (n-0)
14006 YAVAPAI 500	base	1.058	1.056	1.037	Base system (n-0)
14007 GILARIVR 500	base	1.066	1.065	1.061	Base system (n-0)
14008 JOJOBA 500	base	1.055	1.054	1.048	Base system (n-0)
14009 REDHAWK 500	base	1.053	1.053	1.052	Base system (n-0)
14010 TS5 500	base	1.058	1.057	1.052	Base system (n-0)
14011 RACEWAY 500	base	1.054	1.053	1.035	Base system (n-0)
14016 PNPKAPS 500	base	1.054	1.052	0	Base system (n-0)
14017 SECNOL 500	base	1.052	1.054	1.031	Base system (n-0)
14018 VV1 500	base	1.063	1.061	1.043	Base system (n-0)
14355 PRESCOTT 115	base	1.051	1.049	0	Base system (n-0)
15001 CORONADO 500	base	1.065	1.065	1.044	Base system (n-0)
15034 PERKINS 500	base	1.053	1.052	1.041	Base system (n-0)
15061 RUDD 500	base	1.055	1.054	1.048	Base system (n-0)
15090 HASSYAMP 500	base	1.052	1.052	1.051	Base system (n-0)
15092 ARLINTON 500	base	1.053	1.053	1.052	Base system (n-0)
15093 HARQUAHA 500	base	1.066	1.066	1.066	Base system (n-0)
15094 MESQUITE 500	base	1.053	1.053	1.052	Base system (n-0)
15113 KNOLL 115	base	0	0.969	0.948	Base system (n-0)
15116 MORRISAZ 115	base	0	0.968	0.946	Base system (n-0)
17012 MARANA 115	base	0	0.953	0.947	Base system (n-0)
17023 VALEN-SW 115	base	0.956	0.945	0	Base system (n-0)
17666 BOPP 115	base	0.954	0.943	0	Base system (n-0)
19038 MEAD 500	base	1.073	1.072	1.067	Base system (n-0)
19047 DEL BAC 115	base	0.97	0.956	0.944	Base system (n-0)
19064 TUCSON 115	base	0	0.954	0.945	Base system (n-0)
19201 BLACKMTN 115	base	0.962	0.94	0	Base system (n-0)
19203 BRAWLEY 115	base	0.964	0.942	0	Base system (n-0)
19210 RATTLSNK 115	base	0.966	0.944	0.947	Base system (n-0)
19212 SANDARIO 115	base	0.964	0.943	0.965	Base system (n-0)
19213 SANXAVER 115	base	0.963	0.941	0	Base system (n-0)
19214 SNYDHILL 115	base	0.962	0.94	0	Base system (n-0)
19216 TWINPEAK 115	base	0.966	0.944	0.947	Base system (n-0)
19221 NOGALES 115	base	0	0.959	0.945	Base system (n-0)
22254 ENVIREPL 69	base	1.017	1.017	1.017	Base system (n-0)
80000 REDMSA_E 500	base	1.087	1.086	1.07	Base system (n-0)
90100 WINCHSTR 500	base	1.056	1.052	1.04	Base system (n-0)
90113 CAT13500 500	base	1.056	1.051	1.037	Base system (n-0)
14350 ADAMS 115	line_84	0.842	0.821	0.807	line ADAMS to APACHE 115 ck 1
19221 NOGALES 115	line_84	0.913	0.894	0.882	line ADAMS to APACHE 115 ck 1

Bus	Outage	50%	75%	100%	Outage description
17020 SAN RAF 230	line_252	0.898	0.892	0.887	line APACHE to BUTERFLD 230 ck 1
15101 ASARCOSR 115	line_118	1.215	1.203	1.147	line ASARCOTP to BONNEYTP 115 ck 1
15102 ASARCOTP 115	line_118	1.215	1.203	1.147	line ASARCOTP to BONNEYTP 115 ck 1
15108 HAYDENAZ 115	line_118	1.215	1.203	1.147	line ASARCOTP to BONNEYTP 115 ck 1
15111 KEARNY 115	line_118	1.195	1.184	1.13	line ASARCOTP to BONNEYTP 115 ck 1
15112 KEARNYTP 115	line_118	1.195	1.184	1.13	line ASARCOTP to BONNEYTP 115 ck 1
17003 AVRA 115	line_258	0.913	0.88	0	line BICKNELL to THREEPNT 115 ck 1
17022 THREEPNT 115	line_258	0.846	0.806	0	line BICKNELL to THREEPNT 115 ck 1
17023 VALEN-SW 115	line_258	0.828	0.787	0	line BICKNELL to THREEPNT 115 ck 1
17089 SNDARIO 115	line_258	0.896	0.86	0	line BICKNELL to THREEPNT 115 ck 1
17666 BOPP 115	line_258	0.826	0.785	0	line BICKNELL to THREEPNT 115 ck 1
15108 HAYDENAZ 115	line_127	1.114	1.108	1.081	line HAYDENAZ to ASARCOTP 115 ck 1
15111 KEARNY 115	line_127	1.104	1.098	1.071	line HAYDENAZ to ASARCOTP 115 ck 1
15112 KEARNYTP 115	line_127	1.104	1.098	1.071	line HAYDENAZ to ASARCOTP 115 ck 1
15111 KEARNY 115	line_132	0.905	0.9	0.889	line KNOLL to MORRISAZ 115 ck 1
15112 KEARNYTP 115	line_132	0.905	0.9	0.889	line KNOLL to MORRISAZ 115 ck 1
15116 MORRISAZ 115	line_132	0.824	0.818	0.805	line KNOLL to MORRISAZ 115 ck 1
19053 LIBERTY 345	line_436	1.09	1.089	1.086	line LIBTYPHS to LIBERTY 230 ck BY
19054 LIBTYPHS 230	line_436	1.08	1.08	1.077	line LIBTYPHS to LIBERTY 230 ck BY
19047 DEL BAC 115	line_472	0	0.875	0.892	line MARANA to RATTLSNK 115 ck 1
19064 TUCSON 115	line_472	0	0.862	0.892	line MARANA to RATTLSNK 115 ck 1
19201 BLACKMTN 115	line_472	0.898	0.814	0	line MARANA to RATTLSNK 115 ck 1
19203 BRAWLEY 115	line_472	0.9	0.816	0	line MARANA to RATTLSNK 115 ck 1
19210 RATTLSNK 115	line_472	0.903	0.819	0	line MARANA to RATTLSNK 115 ck 1
19212 SANDARIO 115	line_472	0.901	0.817	0	line MARANA to RATTLSNK 115 ck 1
19213 SANXAVER 115	line_472	0.899	0.814	0	line MARANA to RATTLSNK 115 ck 1
19214 SNYDHILL 115	line_472	0.898	0.814	0	line MARANA to RATTLSNK 115 ck 1
19216 TWINPEAK 115	line_472	0.902	0.819	0	line MARANA to RATTLSNK 115 ck 1
19221 NOGALES 115	line_472	0	0.894	0	line MARANA to RATTLSNK 115 ck 1
15031 PERK PS1 500	line_101	1.093	1.092	1.088	line PERKINPS to WESTWING 500 ck 1
15032 PERK PS2 500	line_101	1.093	1.092	1.088	line PERKINPS to WESTWING 500 ck 1
15033 PERKINPS 500	line_101	1.093	1.092	1.088	line PERKINPS to WESTWING 500 ck 1
15107 GOLDFELD 115	line_176	0	0	90%	line SANTAN to THUNDRST 230 ck 1
16700 KANTOR 115	line_250	0.928	0.911	0.899	line SONOITA to VALENCIA 115 ck 1
16701 CANEZ 115	line_250	0.92	0.903	0.891	line SONOITA to VALENCIA 115 ck 1
16702 SONOITA 115	line_250	0.918	0.902	0.89	line SONOITA to VALENCIA 115 ck 1
79028 GLEN PS 230	tran_592	1.054	1.054	1.053	tran GLEN PS 230 to GLENCANY 230 ck 1
79093 NAVAJO 230	tran_592	1.054	1.054	1.053	tran GLEN PS 230 to GLENCANY 230 ck 1
19053 LIBERTY 345	tran_582	1.122	1.122	1.119	tran LIBERTY 345 to LIBTYPHS 230 ck 1
16106 VAIL2 345	tran_569	1.149	1.149	1.138	tran VAIL2 345 to VAIL 138 ck 1
16107 WESTWING 345	tran_526	1.053	0	0	tran WESTWING 500 to WESTWING 345 ck 1

Bus	Bus Name	Outage	50%	75%	100%	Outage description
14350	ADAMS 115	line_84	-0.125	-0.141	-0.144	line ADAMS to APACHE 115 ck 1
15101	ASARCOSR 115	line_118	0.186	0.18	0.133	line ASARCOTP to BONNEYTP 115 ck 1
15101	ASARCOSR 115	line_132	-0.11	-0.109	-0.111	line KNOLL to MORRISAZ 115 ck 1
15102	ASARCOTP 115	line_118	0.186	0.18	0.133	line ASARCOTP to BONNEYTP 115 ck 1
15102	ASARCOTP 115	line_132	-0.11	-0.109	-0.111	line KNOLL to MORRISAZ 115 ck 1
17003	AVRA 115	line_258	-0.056	-0.071	0	line BICKNELL to THREEPNT 115 ck 1
14351	BAGDAD 115	line_62	-0.056	-0.056	-0.055	line YAVAPAI to WILOWLKE 230 ck 1
14351	BAGDAD 115	line_74	-0.056	-0.056	-0.055	line WILOWLKW to PRESCOTT 230 ck 1
14351	BAGDAD 115	line_75	-0.056	-0.056	-0.055	line WILOWLKW to WILOWLKE 230 ck 1
19201	BLACKMTN 115	line_312	0	0.06	0	line BRAWLEY to SANXAVER 115 ck 1
19201	BLACKMTN 115	line_316	0	0.06	0	line RATTLSNK to TWINPEAK 115 ck 1
19201	BLACKMTN 115	line_318	0	0.06	0	line SANDARIO to BRAWLEY 115 ck 1
19201	BLACKMTN 115	line_319	0	0.06	0	line SANXAVER to SNYDHILL 115 ck 1
19201	BLACKMTN 115	line_320	0	0.06	0	line SNYDHILL to BLACKMTN 115 ck 1
19201	BLACKMTN 115	line_322	0	0.06	0	line TWINPEAK to SANDARIO 115 ck 1
19201	BLACKMTN 115	line_472	-0.064	-0.127	0	line MARANA to RATTLSNK 115 ck 1
17666	BOPP 115	line_258	-0.128	-0.158	0	line BICKNELL to THREEPNT 115 ck 1
17666	BOPP 115	line_474	0	0.057	0	line THREEPNT to VALEN-SW 115 ck 1
17666	BOPP 115	line_475	0	0.057	0	line VALEN-SW to BOPP 115 ck 1
19203	BRAWLEY 115	line_312	0	0	-0.054	line BRAWLEY to SANXAVER 115 ck 1
19203	BRAWLEY 115	line_316	0	0.058	0	line RATTLSNK to TWINPEAK 115 ck 1
19203	BRAWLEY 115	line_318	0	0.058	0	line SANDARIO to BRAWLEY 115 ck 1
19203	BRAWLEY 115	line_319	0	0	-0.055	line SANXAVER to SNYDHILL 115 ck 1
19203	BRAWLEY 115	line_322	0	0.058	0	line TWINPEAK to SANDARIO 115 ck 1
19203	BRAWLEY 115	line_472	-0.064	-0.126	0	line MARANA to RATTLSNK 115 ck 1
17007	BUTERFLD 230	line_252	-0.089	-0.093	-0.093	line APACHE to BUTERFLD 230 ck 1
14202	CACTUS 230	line_23	-0.062	-0.062	-0.062	line CACTUS to PNPKAPS 230 ck 1
16701	CANEZ 115	line_250	-0.07	-0.08	-0.078	line SONOITA to VALENCIA 115 ck 1
14205	COCONINO 230	line_26	-0.065	-0.062	-0.071	line COCONINO to VERDE S 230 ck 1
14205	COCONINO 230	line_53	0	0	-0.053	line VERDE N to VERDE S 230 ck 1
19047	DEL BAC 115	line_472	0	-0.08	-0.052	line MARANA to RATTLSNK 115 ck 1
17547	EMPIREsw 230	line_252	-0.076	-0.079	-0.078	line APACHE to BUTERFLD 230 ck 1
79028	GLEN PS 230	line_345	0	0	0.051	line KAYENTA to LNGHOUSE 230 ck 1
79028	GLEN PS 230	line_348	0	0	0.051	line NAVAJO to LNGHOUSE 230 ck 1
79028	GLEN PS 230	tran_592	0.055	0.057	0.078	tran GLEN PS 230 to GLENCANY 230 ck 1
15107	GOLDFELD 115	line_176	0	0	-0.059	line SANTAN to THUNDRST 230 ck 1
15206	GOLDFELD 230	line_176	0	0	-0.062	line SANTAN to THUNDRST 230 ck 1
15108	HAYDENAZ 115	line_118	0.186	0.179	0.133	line ASARCOTP to BONNEYTP 115 ck 1
15108	HAYDENAZ 115	line_127	0.085	0.085	0.067	line HAYDENAZ to ASARCOTP 115 ck 1
15108	HAYDENAZ 115	line_132	-0.11	-0.109	-0.111	line KNOLL to MORRISAZ 115 ck 1
15109	HORSMESA 115	line_176	0	0	-0.056	line SANTAN to THUNDRST 230 ck 1
16700	KANTOR 115	line_250	-0.056	-0.064	-0.061	line SONOITA to VALENCIA 115 ck 1
17039	KARTCHNR 115	line_202	-0.053	0	-0.056	line WINCHSTR to VAIL 345 ck 1
17039	KARTCHNR 115	line_252	-0.069	-0.072	-0.073	line APACHE to BUTERFLD 230 ck 1
15111	KEARNY 115	line_118	0.17	0.164	0.121	line ASARCOTP to BONNEYTP 115 ck 1
15111	KEARNY 115	line_127	0.079	0.078	0.061	line HAYDENAZ to ASARCOTP 115 ck 1
15111	KEARNY 115	line_128	-0.066	-0.065	-0.075	line HAYDENAZ to KEARNYTP 115 ck 1
15111	KEARNY 115	line_132	-0.12	-0.119	-0.121	line KNOLL to MORRISAZ 115 ck 1
15112	KEARNYTP 115	line_118	0.17	0.164	0.121	line ASARCOTP to BONNEYTP 115 ck 1
15112	KEARNYTP 115	line_127	0.079	0.078	0.061	line HAYDENAZ to ASARCOTP 115 ck 1
15112	KEARNYTP 115	line_128	-0.066	-0.065	-0.075	line HAYDENAZ to KEARNYTP 115 ck 1
15112	KEARNYTP 115	line_132	-0.12	-0.119	-0.121	line KNOLL to MORRISAZ 115 ck 1
14215	LEUPP 230	line_26	0	0	-0.053	line COCONINO to VERDE S 230 ck 1
19053	LIBERTY 345	line_436	0.064	0.065	0.071	line LIBTYPHS to LIBERTY 230 ck BY
19053	LIBERTY 345	tran_582	0.096	0.098	0.104	tran LIBERTY 345 to LIBTYPHS 230 ck 1
19054	LIBTYPHS 230	line_436	0.073	0.075	0.081	line LIBTYPHS to LIBERTY 230 ck BY
79096	LNGHOUSE 230	line_343	0.062	0.064	0.084	line GLEN PS to NAVAJO 230 ck 1
79096	LNGHOUSE 230	line_345	0	0	0.06	line KAYENTA to LNGHOUSE 230 ck 1
79096	LNGHOUSE 230	line_348	0.061	0.063	0.084	line NAVAJO to LNGHOUSE 230 ck 1
79096	LNGHOUSE 230	tran_592	0.062	0.064	0.084	tran GLEN PS 230 to GLENCANY 230 ck 1
15116	MORRISAZ 115	line_132	-0.149	-0.15	-0.142	line KNOLL to MORRISAZ 115 ck 1

15117 MRMNFLAT 115	line_176	0	0	-0.058	line SANTAN to THUNDRST 230 ck 1
79093 NAVAJO 230	line_343	0	0.051	0.073	line GLEN PS to NAVAJO 230 ck 1
79093 NAVAJO 230	line_348	0	0	0.051	line NAVAJO to LNGHOUSE 230 ck 1
79093 NAVAJO 230	tran_592	0.054	0.056	0.077	tran GLEN PS 230 to GLENCANY 230 ck 1
19221 NOGALES 115	line_472	0	-0.065	0	line MARANA to RATTLSNK 115 ck 1
19221 NOGALES 115	line_84	-0.058	-0.065	-0.063	line ADAMS to APACHE 115 ck 1
17015 PANTANO 115	line_202	-0.051	0	-0.053	line WINCHSTR to VAIL 345 ck 1
17015 PANTANO 115	line_252	-0.065	-0.067	-0.067	line APACHE to BUTERFLD 230 ck 1
17016 PANTANO 230	line_202	0	0	-0.052	line WINCHSTR to VAIL 345 ck 1
17016 PANTANO 230	line_252	-0.063	-0.065	-0.064	line APACHE to BUTERFLD 230 ck 1
15031 PERK PS1 500	line_101	0.054	0.055	0.062	line PERKINPS to WESTWING 500 ck 1
15032 PERK PS2 500	line_101	0.054	0.055	0.062	line PERKINPS to WESTWING 500 ck 1
15033 PERKINPS 500	line_101	0.054	0.055	0.062	line PERKINPS to WESTWING 500 ck 1
19210 RATTLSNK 115	line_472	-0.063	-0.125	0	line MARANA to RATTLSNK 115 ck 1
17020 SAN RAF 230	line_252	-0.092	-0.096	-0.096	line APACHE to BUTERFLD 230 ck 1
19212 SANDARIO 115	line_316	0	0.057	0	line RATTLSNK to TWINPEAK 115 ck 1
19212 SANDARIO 115	line_322	0	0.057	0	line TWINPEAK to SANDARIO 115 ck 1
19212 SANDARIO 115	line_472	-0.063	-0.126	0	line MARANA to RATTLSNK 115 ck 1
19213 SANXAVER 115	line_312	0	0.059	0	line BRAWLEY to SANXAVER 115 ck 1
19213 SANXAVER 115	line_316	0	0.059	0	line RATTLSNK to TWINPEAK 115 ck 1
19213 SANXAVER 115	line_318	0	0.059	0	line SANDARIO to BRAWLEY 115 ck 1
19213 SANXAVER 115	line_319	0	0	-0.077	line SANXAVER to SNYDHILL 115 ck 1
19213 SANXAVER 115	line_322	0	0.059	0	line TWINPEAK to SANDARIO 115 ck 1
19213 SANXAVER 115	line_472	-0.064	-0.127	0	line MARANA to RATTLSNK 115 ck 1
17089 SNDARIO 115	line_256	0	0	0.052	line AVRA to SNDARIO 115 ck 1
17089 SNDARIO 115	line_258	-0.075	-0.095	0	line BICKNELL to THREEPNT 115 ck 1
19214 SNYDHILL 115	line_312	0	0.06	0	line BRAWLEY to SANXAVER 115 ck 1
19214 SNYDHILL 115	line_316	0	0.06	0	line RATTLSNK to TWINPEAK 115 ck 1
19214 SNYDHILL 115	line_318	0	0.06	0	line SANDARIO to BRAWLEY 115 ck 1
19214 SNYDHILL 115	line_319	0	0.06	0	line SANXAVER to SNYDHILL 115 ck 1
19214 SNYDHILL 115	line_322	0	0.06	0	line TWINPEAK to SANDARIO 115 ck 1
19214 SNYDHILL 115	line_472	-0.064	-0.127	0	line MARANA to RATTLSNK 115 ck 1
16702 SONOITA 115	line_250	-0.073	-0.084	-0.082	line SONOITA to VALENCIA 115 ck 1
15127 SPURLOCK 115	line_176	0	0	-0.053	line SANTAN to THUNDRST 230 ck 1
15128 STEWMTN 115	line_176	0	0	-0.059	line SANTAN to THUNDRST 230 ck 1
17022 THREEPNT 115	line_258	-0.125	-0.154	0	line BICKNELL to THREEPNT 115 ck 1
15216 THUNDRST 230	line_176	0	0	-0.067	line SANTAN to THUNDRST 230 ck 1
19064 TUCSON 115	line_472	0	-0.092	-0.053	line MARANA to RATTLSNK 115 ck 1
19216 TWINPEAK 115	line_316	0	0.056	0.053	line RATTLSNK to TWINPEAK 115 ck 1
19216 TWINPEAK 115	line_472	-0.063	-0.125	0	line MARANA to RATTLSNK 115 ck 1
16106 VAIL2 345	tran_569	0.137	0.138	0.149	tran VAIL2 345 to VAIL 138 ck 1
17023 VALEN-SW 115	line_258	-0.128	-0.158	0	line BICKNELL to THREEPNT 115 ck 1
17023 VALEN-SW 115	line_474	0	0.055	0	line THREEPNT to VALEN-SW 115 ck 1
14247 VERDE S 230	line_53	-0.05	0	-0.057	line VERDE N to VERDE S 230 ck 1
16107 WESTWING 345	tran_526	0.053	0	0	tran WESTWING 500 to WESTWING 345 ck 1
14259 WESTWNGE 230	tran_523	0	0	-0.054	tran WESTWING 500 to WESTWNGE 230 ck 1

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX E
Meeting Notes

SWAT
Southwest Area Transmission

CATS HV Study Group Meeting Minutes

Santa Cruz Offices, Casa Grande, Arizona
September 8, 2005

1. Introduction and Meeting Purpose

Mark Etherton (SCWPDA) stated the purpose is to estimate the long-term transmission needs in the study area between Phoenix and Tucson. This is to be done by:

1) Defining the study area's geographic boundary
2) Identifying Regional Land Use plans
3) Updating Projected Ultimate Loads based on land use plans
4) Identifying Transmission Station Needs and Alternatives to Interconnect
5) Analyzing transmission alternatives and opportunities
6) Publishing results

The previous saturated load study was completed a few years ago and due to tremendous growth it is time to do an update. The intent is to update these high level plans every 5 years. This meeting will examine land use and load growth assumptions, determine which commercial and residential areas would impact load densities, and update the load study.

Discussion Following the Meeting Purpose:

- Western requested load projections focus on the 15-year horizon rather than saturated load projections. Western believes the 15-year projections would be much more realistic and applicable to ten-year transmission planning for this particular CATS HV study area.

2. Review of Meeting Notes from July 28, 2005 Meeting

The following corrections were requested to the July 28, 2005 notes:

1) "The report can be found on the WesTTrans OASIS site..." should be changed to read "The new *path rating* can be found on the WesTTrans OASIS site, ..."
2) The term "Western guy ...." should be replaced with "Tom Field of Western ...."
3) Add "Casa Grande voiced a concern about possible problems caused by overlapping territories between existing load-serving entities because they are not building their systems in a coordinated long-term plan."

3. Steps to Develop of Long-Term HV Transmission System

The proposed development of the Long Term HV (115kV and higher) transmission system will be accomplished by:

- **Determining the study area's geographic boundary**
  The group defined the study area boundary between Phoenix and Tucson, or from the Gila Indian Reservation to the Saguaro Power plant. A map will be used to define the study boundary.
- **Identifying Regional Land Use plans**
  Comprehensive and/or General Plans and discussions with Town/City/County planners will assist with identifying land use plans
- **Updating Projected Ultimate Loads based on land use plans**
  Estimated total demands will be calculated using projected land uses and average electric demands for defined demand types (i.e. residential/commercial loads)
- **Identifying Transmission Station Needs and Alternatives to Interconnect**
  Based on estimated size and location of the Projected Ultimate Loads, substation locations will be proposed and transmission lines will be proposed to best serve the proposed substations.
- **Analyze transmission alternatives and opportunities**
  Participants will review the transmission proposals and narrow the alternatives to the optimum locations and routes.
- **Publish Findings**

Discussion Following the Development of the Long Term HV Transmission System
To help Western with its 10 Year Plan, Western would like the map for this study to be similar to the ones that SRP and APS developed for planning the greater Phoenix area. Western would like the CATS map to include:

- The study area divided into one square-mile blocks with a number in each square mile representing either its projected peak load for a 15-year horizon or its saturated load at some indefinite future time.
- The service territories of each load-serving entity.
- The natural and man-made barriers (both existing and anticipated).
- The existing transmission system.
- The proposed or planned new transmission facilities (both lines and stations).

4. Summary of Regional General Plans

City of Casa Grande

Casa Grande presented an overview of their General Plan 2010. Presentation highlights include:

- A general plan process occurs every 10 years and is approved by voters. Casa Grande's general plan is available on their website.
- Casa Grande has defined boundaries with Maricopa and Coolidge and is in the process of negotiating another boundary. The City limits are currently 60 sq miles, but the planning area encompasses 270 sq miles.
- The estimated population in the Casa Grande plan is 391,877.
- General Plan assumptions included: 30% of the land for open areas such as streets, parks, etc. and 2.8 persons per dwelling unit.
- If Casa Grande used a general plan similar to the Chandler's, Casa Grande could be home to 1.2 million people. The current population is 35,000.
- There were 1135 new home permits issued last year. There will be 1750 new homes this year with an anticipated 2500 to 3000 next year. Maricopa is building 800 new homes per month.

Pinal County

Pinal County provided the following information about growth in the region:

- The county is addressing 18 major plan amendments and 12 in district 3.
- Combined, Maricopa, Casa Grande, and Coolidge are issuing 2000 to 2500 building permits per month.
- Projections estimate 1 to 1.5 million homes in AMA (active management area) west of Casa Grande.
- Pinal County will be revising their general plan incorporate the general plan of each municipality.
- 300,000 establishments are going through zoning.
- Pinal County was 6th fastest growing county in country based on 2003 to 2004 data. There was a 19.3 % growth rate from 2004 to 2005.
- Pinal county has met with SRP to be educated about the growth and electric needs
- CATS HV members may want to note the following meeting: Arizona's Town Hall meeting, held in the spring of 2006, will address the development in Arizona. Participants will be try to figure out when enough growth is enough growth.

Maricopa and Electrical District #3

Mark mentioned that ED3 has been working with the City of Maricopa as they develop their General Plan to identify the electrical requirements to match the growth expected in the General Plan. ED3 has determined that the bulk transmission needs for the area can be served from two bulk transmission substations (Pinal West and Maricopa) to meet the currently identified General Plan growth. ED3 expects to also identify potential 69kV substations and 69kV corridors as part of the General Plan effort.

5. Utility Assumptions and Relationship to Land Use Plans

The lively discussion of utility assumptions and relationship to land use plans netted the following conclusions:

- Coincident peak load/demand will be used in this analysis
- 4 kW peak per residential house (dwelling)
- SRP estimates typical load density at 14 to 15 MW per square mile, but it is not just residential.
- APS estimates when an area is 95% residential that 7 to 8 MW/square mile is a reasonable demand.
- SRP said it is difficult to estimate load densities for commercial loads.
- K.R. Saline has been using the rule of thumb that every commercial 100,000 square feet equals 1 MW.
- APS estimates heavy commercial loads at 40 to 45 kW per acre, including parking areas, 30 kW per acre medium commercial loads and 14 kW per acre for light loads.
- Reservation land will be very minimally developed

Discussion following Utility Assumptions and relationship to land use plans:

- Casa Grande offered access to planned area developments as land use guides to determine dwellings per square mile for our residential density and then apply 4kW per residential to determine the load density.
- 2005 Peak summer loads were
    a. APS's peak load was about 7,000 MW
    b. SRP's peak load was about 6,100 MW.
- Other impacts to limiting load growth/development:
    a. Fuel prices
    b. Water availability
- ED2 suggested that the active management areas (AMA) of each city for determining the water issues should be consulted for this analysis. AMA requires that all land developers must prove that they have 100 years of water before they can build.

6. Projects of Mutual Interest to CATS HV Region

Southwest Transmission Cooperative 230kV Saguaro South Line

STWC presented their planned "Saguaro Southern Line Project" located in the western portion of their system. A diagram of the project was provided and is attached. SWTC has an immediate need for the proposed facility at Red Rock (not the existing Red Rock substation on the WAPA system) for 2007. SWTC's Red Rock facility connects to the existing Saguaro substation via a 230kV line. Red Rock will eventually have 230kV link to a proposed 230kV Sandario substation via the existing Twin Peaks substation in 2013 and 2014. The Red Rock substation will be a 230/24.9-kV substation with a 17-20MW load. SWTC will also be building a 115 kV line from Sandario to the proposed BOPP substation in 2012 and a 115 kV line from the proposed BOPP substation to the existing Valencia substation in 2009.

Western Ten-Year Transmission Plan

Western will provide a status update on the Ten Year Planning process at the next meeting. For this meeting, Western stated that Western:

- requested annual peak load projections from each customer that has loads embedded on the Western system.
- Is concurrently performing an in-house annual load projection for each load based on metered peak loads from prior years.

Discussion Following Projects of Mutual interest to CATS HV region:

The ACC asked about 69 kV subtransmission plans to be studied. The focus for this analysis is 115kV and higher for the January 2006 deadline. After January, the Study Group may address subtransmission plans.

Next CATS HV Meeting

The next CATS HV meeting will:

- review, update, and tweak the first draft of the saturated load study area
- review the load projections using assumptions gathered from this meeting
- hear Western's 10 Year Plan update

The next CATS HV meeting will be October 6th hosted by the Santa Cruz Water and Power Districts Association offices, Casa Grande, Arizona 1:30 pm to 4:00 pm.

CATS HV Study Group

September 8, 2005
1:30PM to 4:00PM
Location: Santa Cruz Water & Power Districts Association
Conference Room
410 E. Florence Blvd.
Casa Grande, AZ

Meeting called by: CATS HV Study Group

Purpose: CATS HV Study Group meeting to review items of mutual interest for the HV system between Phoenix and Tucson.

----- Agenda Topics -----

1. **Introductions and Meeting Purpose**
2. **Summary of Meeting Notes from July 28, 2005 meeting**
3. **Steps of Development of Long-Term HV Transmission System**
   - **Identification of Regional Land Use Plans**
   - **Update Projected Ultimate Loads based on Land Use Plans**
   - **Transmission Station Needs and Alternatives to Interconnect**
   - **Analysis of Alternatives and Opportunities**
   - **Draft Report**
4. **Summary of Regional General Plans**
   - **City of Casa Grande, Coolidge, Florence, Maricopa, etc.**
   - **Pinal County**
   - **Others?**
5. **Utility Assumptions and Relationship to Land Use Plans**
6. **Projects of Mutual Interest to CATS HV region**
   - **Southwest Transmission Company 230kV line, Saguaro south**
   - **Western Ten-Year Transmission Plan**
   - **Others?**

Action Items:

1. _____
2. _____
3. _____
4. _____

CATS HV Study Group

8-Sep-05

1:30PM to 4:00PM

Location: Santa Cruz Offices

Conference Room

410 E. Florence Blvd.

Casa Grande, AZ

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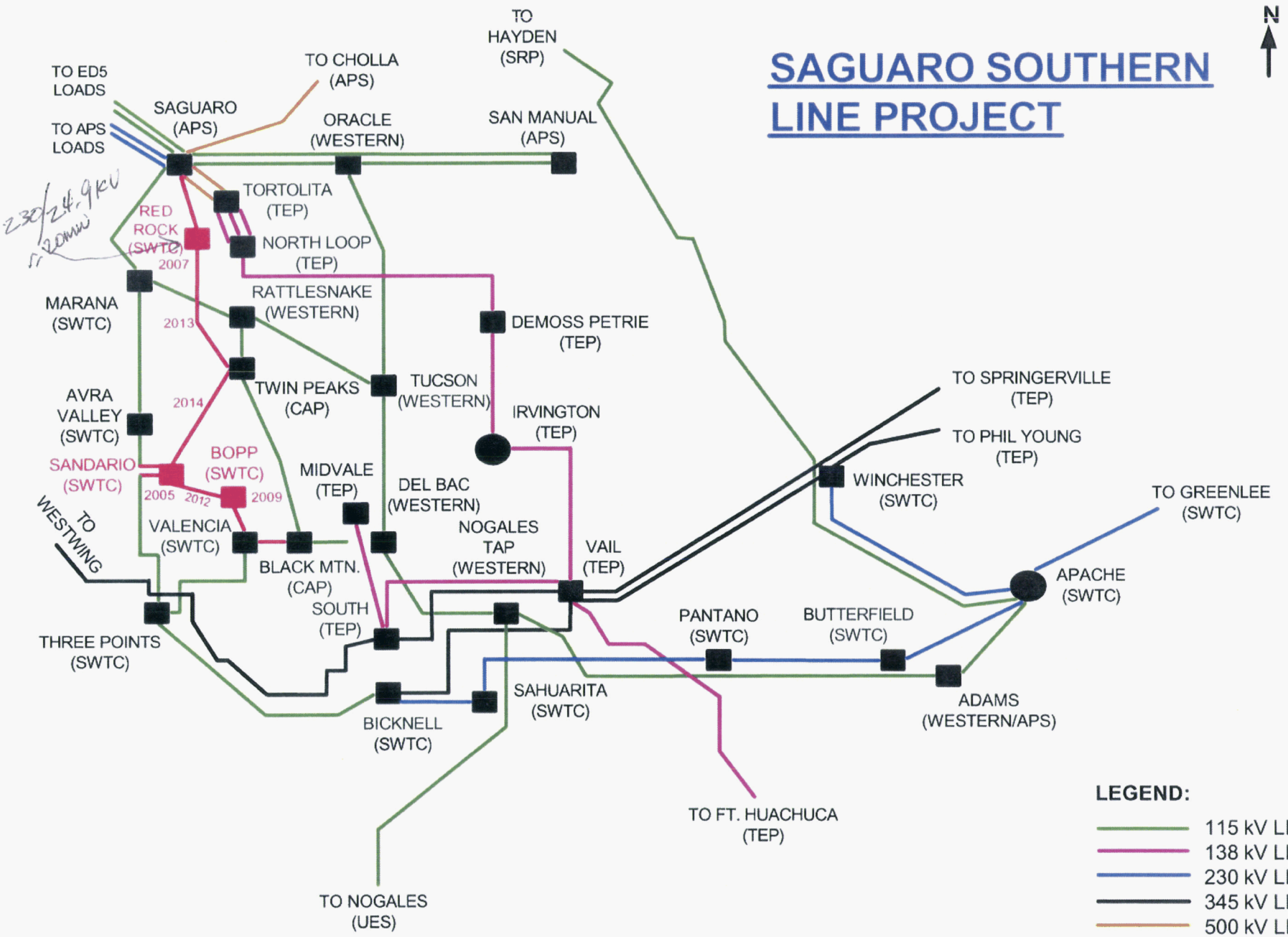
SAGUARO SOUTHERN LINE PROJECT
N
TO HAYDEN (SRP)
TO CHOLLA (APS)
TO ED5 LOADS
TO APS LOADS
SAGUARO (APS)
ORACLE (WESTERN)
SAN MANUAL (APS)
TORTOLITA (TEP)
RED ROCK (SWTC)
2007
NORTH LOOP (TEP)
MARANA (SWTC)
RATTLESNAKE (WESTERN)
2013
DEMOSS PETRIE (TEP)
TWIN PEAKS (CAP)
TUCSON (WESTERN)
AVRA VALLEY (SWTC)
2014
IRVINGTON (TEP)
SANDARIO (SWTC)
BOPP (SWTC)
2005
2012
2009
MIDVALE (TEP)
DEL BAC (WESTERN)
TO WESTWING
VALENCIA (SWTC)
NOGALES TAP (WESTERN)
VAIL (TEP)
BLACK MTN. (CAP)
SOUTH (TEP)
THREE POINTS (SWTC)
PANTANO (SWTC)
BUTTERFIELD (SWTC)
SAHUARITA (SWTC)
BICKNELL (SWTC)
ADAMS (WESTERN/APS)
TO FT. HUACHUCA (TEP)
TO NOGALES (UES)
TO SPRINGERVILLE (TEP)
TO PHIL YOUNG (TEP)
WINCHESTER (SWTC)
TO GREENLEE (SWTC)
APACHE (SWTC)
LEGEND:
115 kV LINES
138 kV LINES
230 kV LINES
345 kV LINES
500 kV LINES
PROPOSED FACILITIES

CATS HV Study Group Meeting Minutes

Santa Cruz Offices, Casa Grande, Arizona
October 6, 2005

Introductions and Meeting Purpose

Participants (see attached attendee list) reviewed items of mutual interest for the High Voltage transmission system between the Phoenix and Tucson load centers.

Summary of Meeting Notes from September 8, 2005 meeting

No changes or updates were requested from participants regarding the September meeting minutes.

Steps of Development of Long-Term HV Transmission System

The following steps will be followed to develop the long term HV transmission system.

- Identification of Regional Land Use Plans
  - Presented & Discussed at September 2005 meeting
- Update Projected Ultimate Loads based on Land Use Plans
  - Presented preliminary saturated load values at the October 2005 meeting
- Transmission Station Needs and Alternatives to Interconnect
  - Discussed at October meeting and estimated substations and lines at the October 2005 meeting.
- Analysis of Alternatives and Opportunities
  - Preliminary results anticipated for November 3rd meeting
- Draft Report
  - Anticipated December 2005 – January 2006 timeframe

Draft Findings of Updating Projected Ultimate Loads

Review of Utility Assumptions for Various Load Types

- Participants reviewed the Utility assumptions for the load types discussed at the September 2005 meeting

Summary of General Plans Collected

- General plans were collected from Casa Grande, Coolidge, Eloy, Florence, Marana, Maricopa, Oracle, San Manuel and Pinal County.

First Draft Review of Area by Area Loads

- Participants reviewed the first draft of area loads. The following changes were requested:
  - Coolidge demand appeared to low because of recent General Plan changes which will increase the number of dwelling units per acre for several areas in their planning area.
  - Eloy planning area appeared too small. It was suggested to meet with the Eloy planner to get a better idea on the planning area.

- Florence demand appeared too light. Participants suggested increasing the demand due to known medium and high-density Planned Area Developments (PADS) permitted in town's planning area.
- Casa Grande's planning area should be 270 square miles, not the 204 square miles shown. Casa Grande indicated their planning area and adjacent planning areas may overlap.
- The State trust land usage was discussed. Land use assumptions were generally placed in one of the categories based on their anticipated development as known today for the purposes of reviewing potential bulk station requirements, for discussion only:
  - High = 150MW per 36 sq mile (near existing growth corridors, I-10 & towns)
  - Medium= 100MW per 36 sq mile (further from existing growth corridors, but could be developed in the next 20 years)
  - Low = 50MW per 36 sq mile (far from existing growth corridors, growth unlikely in the next 20 years)
  - None = 0 MW per 36 sq mile (un-developable terrain, large tracts of BLM lands, military area)
  - NOTE: These areas will be reviewed further to examine the specific land use potential for load development.

Potential Bulk Substation Requirements

- 13-14 new receiving (230kV/69kV substations) were identified in the study area.
- Red flags indicated potential locations for new substations
- Blue flags indicated existing substations
- Green Flags indicated existing generation substations
- No new generation is proposed for the region. The existing generation in the study region is limited to Sundance, Desert Basin and Saguaro. Of the three, only Sundance has any proposal to expand its facility. To serve the load in this study area, additional generation may be required and will be determined as the area continues to develop and the transmission system import capability constraints are reviewed.

Transmission Alternatives to Connect Bulk Substations to the System

- Transmission alternatives, to connect the 13 proposed substations resulted in a plan that would upgrade all 115kV to 230kV
- The transmission plan anticipates no 115kV substations and lines remaining, except those lines in area that anticipate no development.
- 230/69kV substations will be used to serve load instead of 230/115kV substations.
- Use of existing corridors was preferred over creating new paths, although there may be opportunities to extend from existing corridors a relatively short distance depending on siting conditions.
- Due to the projected demand and lack of proposed generation in the study region, additional generation may have to be added to support the projected demand.

Projects of Mutual Interest to CATS HV region

- Western provided a status update on their 10 Year Plan process and projects:
  - South of Phoenix conversion in place to Casa Grande.
  - Casa Grande through Empire and ED4 (1950's line construction) substations and lines are intended to be upgraded to 230kV to the ED5 substation. 230kV upgrades will progress north out of the ED5 substation. There are no plans to upgrade the 115kV lines out of ED5 south to Saguaro.
  - Western is trying to project future demand based on past peak metered loads. Western would like to have CATS HV saturated load values sanity check the Western peak loads projected for the next ten years.

CATS HV Study Group

October 6, 2005
1:30PM to 4:00PM
Location: Santa Cruz Water & Power Districts Association
Conference Room
410 E. Florence Blvd.
Casa Grande, AZ

Meeting called by: CATS HV Study Group

Purpose: CATS HV Study Group meeting to review items of mutual interest for the HV system between Phoenix and Tucson.

----- Agenda Topics -----

1. **Introductions and Meeting Purpose**
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3. **Steps of Development of Long-Term HV Transmission System**
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    - **Update Projected Ultimate Loads based on Land Use Plans**
    - **Transmission Station Needs and Alternatives to Interconnect**
    - **Analysis of Alternatives and Opportunities**
    - **Draft Report**
4. **Draft Findings of Updating Projected Ultimate Loads**
    - **Review of Utility Assumptions for Various Load Types**
    - **Summary of General Plans Collected**
    - **First Draft Review of Area by Area Loads**
    - **Potential Bulk Substation Requirements**
5. **Alternatives to Connect Bulk Substations to the System**
6. **Projects of Mutual Interest to CATS HV region**
    - **Western Transmission System Plans**
    - **Others?**

Action Items:

1. _____
2. _____
3. _____
4. _____

CATS HV Study Group

6-Oct-05

1:30PM to 4:00PM

Location: Santa Cruz Offices

Conference Room

410 E. Florence Blvd.

Casa Grande, AZ

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CATS HV 2005 Saturated Load Study Progress

Status Update October 6, 2005

Accomplishments:

- Defined Study area and Demand categories
- Determined land use for: Casa Grande, Coolidge, Eloy, Florence, Marana, Maricopa, Oracle, San Manuel, BLM, roads, remaining undefined area assigned to "County"
- Drafted Land and Demand Assignments
- Meetings with: Pinal County and Town of Florence

Assumptions:

The table below shows the demand assumptions used for the draft Saturated Load Study as determined at the September CATS HV meeting:

Commercial	
Heavy	45kW/acre
Medium	30kW/acre
Light	14kW/acre
Government	use light Commercial

Residential	
Low	4kW per home * 1 d.u. per acre
Medium	4kW per home * 3.5 d.u. per acre
High	4kW per home * 5.0 d.u. per acre

Other Uses	
State Land	0kW per sq mile
Reservation Land	100-500 kW per sq mile
Existing ROW/Roads	0kW per sq mile

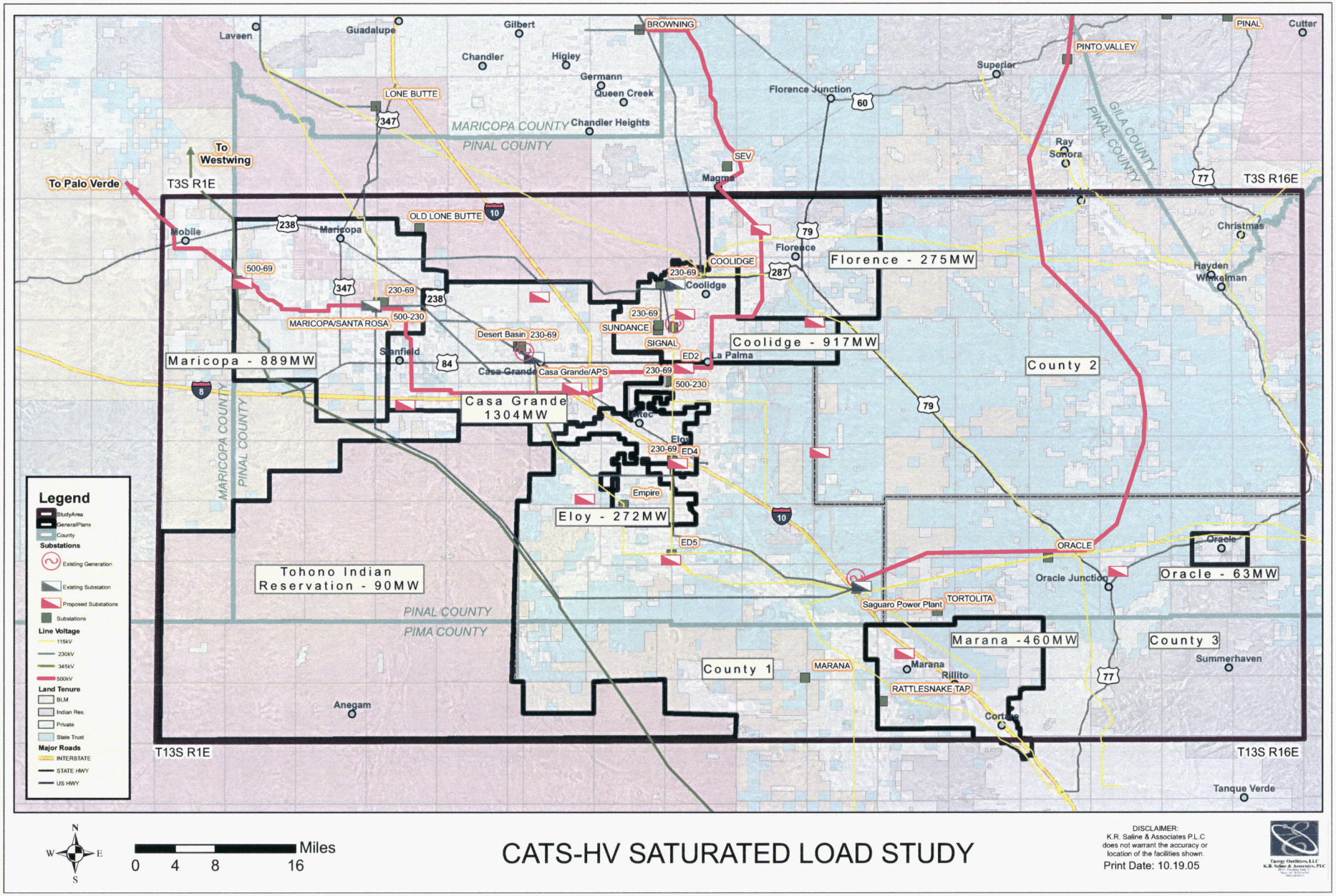
Other Uses	
Agriculture	1000kW per sq mile
Parks	500kW per sq mile

Preliminary Findings:

Planning Area Land Use Assignment				Demand Assignment			
Total Square miles of Study area		5242	sq.mi				
1 acre x 0.001563 =square mile		3354651	acres				
640 acre x 0.001563 = 1 square mile				Estimated Demand			Avg (MW/SQ MILE)
Casa Grande		204	sq. miles	1304	MW		6.40
Coolidge		189	sq. miles	917	MW		4.84
Eloy		71	sq. miles	272	MW		3.82
Florence		144	sq. miles	275	MW		1.91
Marana		120	sq. miles	460	MW		3.83
Maricopa		270	sq. miles	889	MW		3.29
Oracle		11	sq. miles	63	MW		5.56
	Subtotal	1010	sq. miles	4180	MW		
Reservation Land in Study area							
San Carlos Indian Res.	26990 Acres	42	sq. miles	4	MW		0.10
Gila River Indian Res.	156011 Acres	244	sq. miles	24	MW		0.10
Ak-Chin Indian Res.	21458 Acres	34	sq. miles	17	MW		0.50
Tohono Indian Res.	574987 Acres	898	sq. miles	90	MW		0.10
Bureau of Land Management (BLM) land		488	sq. miles	0	MW		0.00
Roads/Highway	15% of study area	786	sq. miles	0	MW		0.00
	Subtotal	2472	sq. miles	135	MW		0.05
County (Total Study Area minus the defined land usage)		1759	sq. miles	4232	MW	Low	2.41
				6487	MW	High	3.69
	Totals	5242	sq. miles	8547	MW	Low	1.63
				10802	MW	High	

Next Steps:

- Address any concerns/changes from 10/6/05 CATS HV meeting
- Locate preliminary substations to serve load and add to map
- Prepare 3-5 alternatives to serve proposed load via transmission alternatives
- Begin PSLF modeling (substations, loads, and lines).



CATS-HV SATURATED LOAD STUDY

DISCLAIMER:
K.R. Saline & Associates P.L.C. does not warrant the accuracy or location of the facilities shown.

Print Date: 10.19.05

CATS HV Study Group Meeting Minutes
Santa Cruz Offices, Casa Grande, Arizona
November 3, 2005

I. Introductions and Meeting Purpose

Everyone in attendance was asked to introduce himself and state their company affiliation. A copy of the agenda and list of attendees is attached to these notes.
The purpose of this meeting is two fold:

1. Review long range load projections prepared by the various cities
2. Discuss study methodology and assumptions for use conducting power flow studies.

II. Summary of meeting notes from the October 6, 2005 meeting.

Notes from the October 6, 2005 prepared and distributed earlier. There was no addition or deletions to these meeting notes.

III. Steps for Development of Long Term HV Transmission System

Mark distributed a map showing the study area, freeways, cities and municipal General Plan boundaries (black boundary lines). Also distributed was a document titled "Summary of Land and Demand". This document was compiled from the specific General Plans land use of the cities shown. Load density for the three Pinal County undefined planning areas (from the planning map), mostly state trust land, was based on the input from neighboring cities, proximity to major freeways, and best use of the land as known today. No available land use data was available for load growth on the four Indian reservations and saturated load was subsequently shown to be low. The total saturated load for the entire study area is approximately 10,399 megawatts.

Discussion Items

In reviewing the saturated load data, Tom Martin-ED2 felt that the loads for the Coolidge area seemed quite high. He felt a 50% load level case should be run as sensitivity. Chuck Russell-SRP stated that current load growth in the SRP area is around 14 mw/square mile. Total build out in some area is expected to be even higher than the 14 mw/square mile.

Given the amount of saturated load, 10,399 megawatts, all 115 KV transmission lines within the study area would need to be converted and modeled at 230 KV.

In dividing the study area into probable receiving station areas, it was decided that each receiving station would serve around 500 megawatts. APS' receiving station design utilizes 230/69 KV transformers that are each rated 188MVA. APS will allow a 20% overload for a single contingency outage. SRP uses 250MVA transformers in their newer

receiving stations. In the past, SRP utilized a design which consisted of four 167 MVA 230/69kV transformers. For the purposes of this study however, the loads will be modeled on the 230kV bus to avoid the need to show the number of transformers and size.

Thus far, all new 230/69kV receiving stations for the study area can be located along existing transmission corridors, with the exception of receiving stations #11, 15, and 16. These will require new transmission corridors.

New transmission represented in the study case would be represented as being built with 1272 ACSS conductor. SRP personnel stated that the base case power flow should show a double circuit line between Santa Rosa and Browning substation. A single circuit 230kV line between Santa Rosa and SE Valley would be determined by the study results.

Draft Study Plan

- The power flow base case to be utilized for the saturated load study transmission analysis will be the 2015 CATS study base case.
- A fifty percent load level (approximately 5000MW) case will initially be built and reviewed under the various conditions prior to proceeding to the "saturated load level".
- Generation Scenarios:
    - Existing generation located within the study area, importing the remainder.
    - Zero generation and import all of the required resources to serve load.
    - Double existing generation at the existing site, importing the remainder.
- Additional generation outside of the study area may also be required.
- Loads in the power flow case will be represented at the 230kV bus with unity power factor.
- Single Contingency, power flow analysis only will be conducted.
- Additional transmission facilities within the study may also be required following the initial review of transmission facilities currently identified on the study map.

Next CATS HV Meeting

Mark stated that at the next CATS HV meeting he would like to present the rough power flow analysis with the system representation currently identified.

Mark stated that the next CATS HV meeting will be December 1st at the same place from 1:30 pm to 4:00 pm.

CATS HV Study Group

November 3, 2005
1:30PM to 4:00PM
Location: Santa Cruz Water & Power Districts Association
Conference Room
410 E. Florence Blvd.
Casa Grande, AZ

Meeting called by: CATS HV Study Group

Purpose: CATS HV Study Group meeting to review items of mutual interest for the HV system between Phoenix and Tucson.

----- Agenda Topics -----

1. **Introductions and Meeting Purpose**
2. **Summary of Meeting Notes from October 6, 2005 meeting**
3. **Steps of Development of Long-Term HV Transmission System**
   - Identification of Regional Land Use Plans — Completed
   - Update Projected Ultimate Loads based on Land Use Plans — Completed
     - Changes to the areas (Coolidge/Florence/Maricopa)
     - Changes to the residential assignment
   - Transmission Station Needs and Alternatives to Interconnect — In Progress
   - Analysis of Alternatives and Opportunities — November
   - Draft Report — December
4. **Alternatives to Connect Bulk Substations to the System**
5. **Generation options to serve load**
   a. increase existing (Sundance/Desert Basin/Saguaro)
   b. add proposed/certificated (Springerville 3/Palo Verde Hub)
   c. new facilities (Toltec/Bowie/Springerville 4/ Desert Rock/Randolf/San Manuel)
6. **Alternatives/Sensitivities**
   - No new generation

Action Items:

1. _____
2. _____
3. _____
4. _____

CATS HV Study Group

3-Nov-05

1:30PM to 4:00PM

Location: Santa Cruz Offices

Conference Room

410 E. Florence Blvd.

Casa Grande, AZ

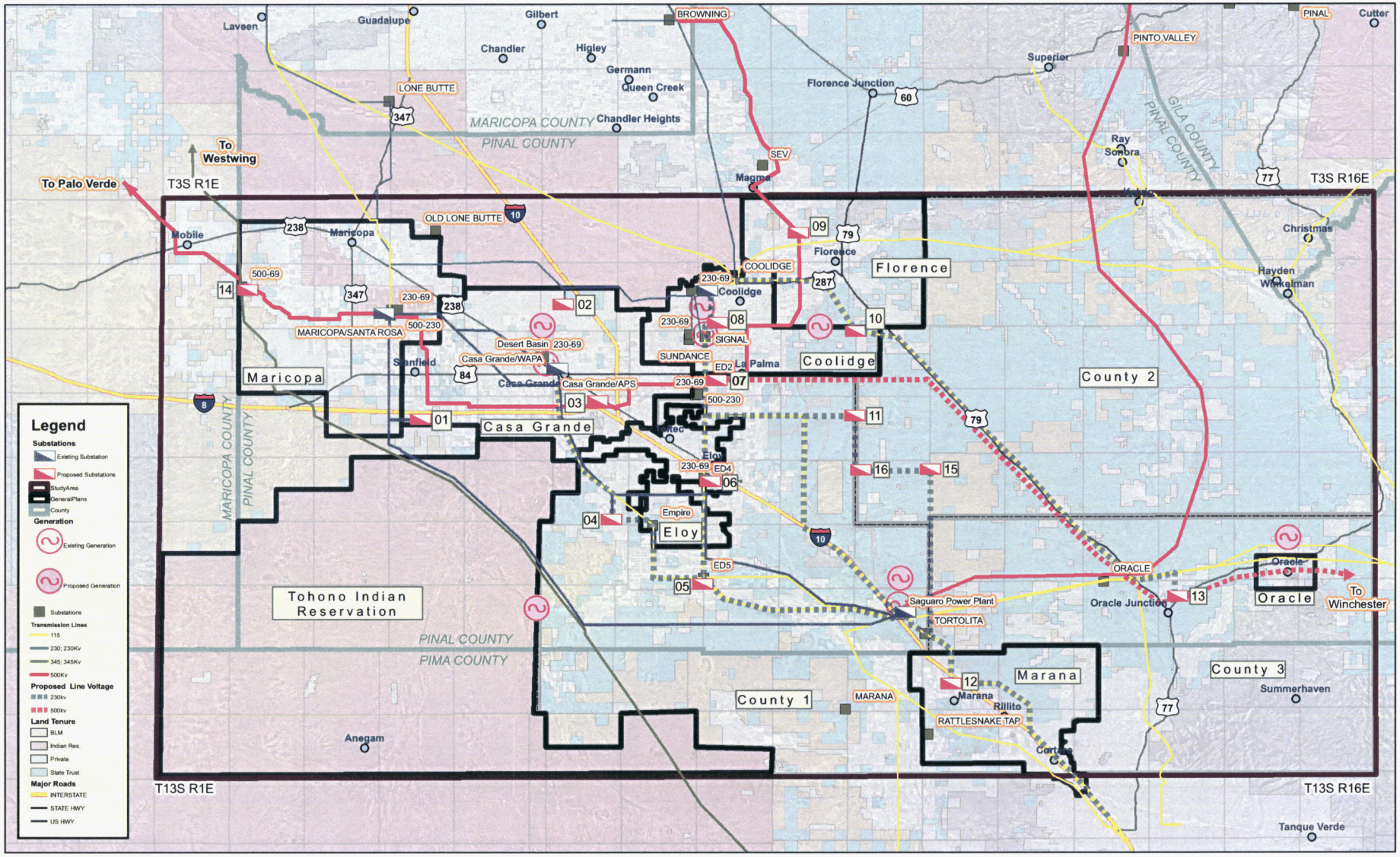
NAME	COMPANY	PHONE	EMAIL
Mark Etherton	SCWPDA	602-809-0707	mle@krsaline.com
ALTON BRUCE	COOLIDGE	520 723 6075	abruce@coolidgeaz.com
BRUCE EVANS	SWTC	520-586-5336	bevans@swtransco.coop
Reuben Ruiz	CAP	623-869-2370	rruiz@cap-az.com
Jim TANG	CAP	623-869-2673	JTANG@CAP-AZ.COM
CHUCK RUSSELL	SRP	602 236 0975	CSRUSSEL@SRPNET.COM
Gary ROMERO	SRP	602-236-0974	gtromero@srpnet.com
Thomas Field	WAPA	602-605-2517	Tfield@wapa.gov
Joshua Johnston	WAPA	602-605-2634	jjohnston@wapa.gov
DAVID WILSON	EDZ	520-723-7741	david.wilson@edz.com
EDOUARD RIVERA	APS	602-371-6140	edouard.rivera@aps.com
Jason Spitzkoff	APS	602-250-1651	jason.spitzkoff@aps.com
DAVID KUHL	PINAL County	520-866-6450	DAVID.KUHL@CO.PINAL.AZ.US
TOM MILETTA	EDZ	520-723-7741	TMILETTA@EDZ.COM
Gilbert Olgin	Florence	520-868-7542	Gilberto@Town.Florence.AZ.US

Summary of Land and Demand

Planning Area Land Use Assignment

Demand Assignment

Total Square miles of Study area				5242	sq.mi			
1 acre x	0.001563	=square mile		3354651	acres			
640 acre x	0.001563	= 1 square mile From Gen plan				Estimated Demand		Avg (MW/SQ MILE)
Casa Grande				204	sq. miles	1330	MW	6.52
Coolidge				120	sq. miles	1098	MW	9.15
Eloy				71	sq. miles	552	MW	7.74
Florence				163	sq. miles	911	MW	5.58
Marana				120	sq. miles	546	MW	4.55
Maricopa				269	sq. miles	1099	MW	4.09
Oracle				11	sq. miles	63	MW	5.56
			Subtotal	959	sq. miles	5599	MW	5.84
County Planning Area 1				882	sq. miles	2259	MW	2.56
County Planning Area 2				1161	sq. miles	1115	MW	0.96
County Planning Area 3				760	sq. miles	1291	MW	1.70
			Subtotal	2803	sq. miles	4665	MW	1.66
Reservation Land in Study area								
San Carlos Indian Res.	26990	Acres		42	sq. miles	4	MW	0.10
Gila River Indian Res.	156011	Acres		244	sq. miles	24	MW	0.10
Ak-Chin Indian Res.	21458	Acres		34	sq. miles	17	MW	0.50
Tohono Indian Res.	574987	Acres		898	sq. miles	90	MW	0.10
			Subtotal	1218	sq. miles	135	MW	0.11
Sonoran Desert National Monument				263	sq. miles	0	MW	0.00
			Totals	**5242**	**sq. miles**	**10399**	**MW**	**1.98**



CATS-HV SATURATED LOAD STUDY

DISCLAIMER:
K.R. Saline & Associates P.L.C. does not warrant the accuracy or location of the facilities shown.

Print Date: 11.01.05

CATS HV Study Group Meeting Minutes

Santa Cruz Offices, Casa Grande, Arizona
December 1, 2005

1) Introductions and Meeting Purpose
Participants (see attached attendee list) reviewed items of mutual interest for the High Voltage transmission system between the Phoenix and Tucson load centers.

2) Summary of Meeting Notes from November 3, 2005 meeting
No changes or updates were requested from participants regarding the November meeting minutes.

3) Steps of Development of Long-Term HV Transmission System
The following steps will be followed to develop the long term HV transmission system.

- Identification of Regional Land Use Plans - complete
- Update Projected Ultimate Loads based on Land Use Plans - complete
- Transmission Station Needs and Alternatives to Interconnect - current meeting
- Analysis of Alternatives and Opportunities – current meeting
- Draft Report for January 2006

4) First pass at Transmission Model Diagram
A presentation was made showing the existing 115kV and 230kV systems and slowly bringing in new 230kV and 500kV elements to the study region. To make the diagram better, it was suggested that another color be used to show those 115kV lines upgraded to 230kV. Participants suggested moving substations for the geographic maps.

Four Additional Geographic maps were used to show:
1) Study area (Phase 1 map)
2) Receiving stations (Phase 2 map)
3) Receiving station boundaries (Phase 3 map)
4) Proposed Generation & transmission (Phase 4 map)

5) Transmission Analysis
The attached power point presentation showed the transmission model, development of the 50% load case, and preliminary findings and conclusions. There were some voltage and overload issues, but not on the newly added elements. The 100% case should find issues as several CATS HV elements were loaded 40-70% in the 50% load case. Unless critical to solving the PSLF case, any overloads seen in the 100% case will be identified, but not mitigated. Also reviewed, and provided, were complete contingency results for the half load case.

Participants discussed the findings of the half load case and items that should be included in the report. Some requested items to place in the report were:

- Study limitations: not addressing outside study area overloads and voltage issues and generation (resource) assumptions impacts the exterior study system
- Tables/charts showing new line miles, upgraded line miles, existing/new substations, generation used
- Maps
- Existing corridors used for most of the additions

6) Alternatives/Sensitivities

For the 100% load case, transmission alternatives that could be used to improve the system include:

a) 2nd Palo Verde–Pinal West 500kV line (already modeled)
b) 2nd Westwing-South 345kV line
c) Additional 230kV out of Pinal West
d) 500kV line from Saguaro to CATS11-Pinal South/CATS 7)

Next Meeting:

The next meeting is scheduled for January 12, 2006 at the Santa Cruz Water & Power Districts Association Conference Room, 410 E. Florence Blvd, Casa Grande, AZ.

CATS HV Study Group

December 1, 2005
1:30PM to 4:00PM
Location: Santa Cruz Water & Power Districts Association
Conference Room
410 E. Florence Blvd.
Casa Grande, AZ

Meeting called by: CATS HV Study Group

Purpose: CATS HV Study Group meeting to review items of mutual interest for the HV system between Phoenix and Tucson.

----- Agenda Topics -----

1. **Introductions and Meeting Purpose**
2. **Summary of Meeting Notes from November 3, 2005 meeting**
3. **Steps of Development of Long-Term HV Transmission System**
   - Identification of Regional Land Use Plans — Completed
   - Update Projected Ultimate Loads based on Land Use Plans — Completed
     - Changes to the areas (Coolidge/Florence/Maricopa)
     - Changes to the residential assignment
   - Transmission Station Needs and Alternatives to Interconnect — First Draft
   - Analysis of Alternatives and Opportunities — First Draft
   - Draft Report — January
4. **First pass at Transmission Model - Diagram**
5. **Transmission Analysis**
   a. Transmission Model
   b. Development of 50% Load Case only
   c. Preliminary Findings and Conclusions
6. **Alternatives/Sensitivities**
   - Resource alternatives

Action Items:

1. _Need to Schedule Next Meeting_____
2. _____
3. _____
4. _____

CATS HV Study Group

1-Dec-05

1:30PM to 4:00PM

Location: Santa Cruz Offices

Conference Room

410 E. Florence Blvd.

Casa Grande, AZ

NAME	COMPANY	PHONE	EMAIL
BRUCE EVANS	SWTC	520-586 5336	bevans@swtransco.coop
CHUCK RUSSELL	SRP	602 236 0975	CSRUSSEL@SRPNET.COM
Gary T. Romero	SRP	602-236-0974	gtromero@srpnet.com
RICHARD GIBSON	CAP	623-869-2494	rgibson@cap-az.com
LEEANN TORKELSON	KRSA	480-610-8741	LVT@KRSALINE.COM.
Robert Kondziolka	SRP	602-236-0971	rekondzi@srpnet.com
TOM NOVY	SRP	602-236-4359	tanovy@srpnet.com
TOM MARTIN	AZ2	520-723-7741	TMARTIN@AZ2.COM
CLAYTON BRUCE	CITY OF COOLIDGE	520 723 6077	cbruce@coolidgeAZ.com
DR. RITTENBACK	PINAL COUNTY	520 866 6452	NA
Evelyn Casuga	APS	520-421-8340	Evelyn.Casuga@aps.com
RICK MILLER	CITY OF C.G.	520-421-8637	rmiller@ci.casa-grande.az.us

CATS HV Study Group Meeting Minutes

Santa Cruz Offices, Casa Grande, Arizona
January 13, 2006

1) Introductions and Meeting Purpose

Participants (see attached attendee list) reviewed items of mutual interest for the High Voltage transmission system between the Phoenix and Tucson load centers.

2) Summary of Meeting Notes from December 1, 2005 meeting

No changes or updates were requested from participants regarding the November meeting minutes.

3) Steps of Development of Long-Term HV Transmission System

The following steps will be followed to develop the long term HV transmission system.

- Identification of Regional Land Use Plans - complete
- Update Projected Ultimate Loads based on Land Use Plans - complete
- Transmission Station Needs and Alternatives to Interconnect - complete
- Analysis of Alternatives and Opportunities – current meeting - complete
- Draft Report for January 2006 – Current meeting

4) Report Review and Comments

a) Executive Summary:

Suggested changes to the executive summary included:

- definition of "saturated" load study
- definition of "corridor" as used in this analysis or change "corridor" to "linear feature"
- Add title of 2003 study referenced in the executive summary for better reference
- Reference current load in study area (approximately 500MW)

b) Report Format:

Suggested changes to the report included

- Address what study work should be performed in the future
- Change title of report to an "interim" or "progress" report for submittal on January 31
- clarify line distance (existing, existing – new, is SEV 500kV project included?) table

c) Additional Sections/remove sections

Suggested changes

- provide more background to why the study was performed (phenomenal growth)
- education for cities/towns/electric personnel
- develop section to address studies that should be conducted in the future or to enhance this study/analysis
- remove reactive support (caps and synchronous condenser) tables and better explain that these were added to support the imports, and that an alternative would be local generation with reactive capability

5) Next Steps
Comments and revisions will be incorporated into the "interim" report by 1/27/06.

As part of their 10 Year plan submittal, SRP presented their summary of the CATS HV and 500kV (Pinal West-SouthEast Valley/Browning) transmission studies (see attachment).

Next Meeting:
No future meetings are planned after the submittal of the progress/interim report, although future meetings are a possibility.

CATS HV Saturated Load Study

January 13, 2006

1:30-4:00 PM

Attendance List

Location: Santa Cruz Water & Power Districts Association Conference Room
410 E. Florence Blvd
Casa Grande, AZ

Name	Company	E-mail	Phone
LEE ANN JORKELSON	KRSA	LVT@KRSALINE.COM	4806108741
JIM TANG	CAP	JTANG@CAP-AZ.COM	623-869-2673
BRUCE EVANS	SWTC	bevans@swtransco.com	520-584-5336
DAVID WILSON	ED2	DAVID.WILSON@ED2	520-723-7741
MARK ETHERTON	ED3/4	MLE@KRSALINE.COM	602-809-0707
CHUCK RUSSELL	SRP	CSRUSSEL@SRPNET.COM	602 236 0975
Bob Smith	APS	robert.smith@aps.com	602-250-1144
Robert Kondziolka	SRP	rcKondzi@srpnet.com	602-236-0971
TOM MARTIN	ED-2	TMARTIN@ED2.COM	520-723-7201
TOM NOVY	SRP	TANOVY@SRPNET.COM	602 236 [illegible]
Jerry Smith	ACC	JSmith@cc.state.az.us	602-542-7271
Laurie A Woodall	Az Atty Gen	laurie.woodall@azag.gov	602 542-8861
Leonard York	WAPA	YORK@WAPA.GOV	602-605-2797
RON MOULTON	WAPA	MOULTON@WAPA.GOV	602.605.2666

CATS HV Study Group

January 13, 2006
1:30PM to 4:00PM
Location: Santa Cruz Water & Power Districts Association
Conference Room
410 E. Florence Blvd.
Casa Grande, AZ

Meeting called by: CATS HV Study Group

Purpose: CATS HV Study Group meeting to review items of mutual interest for the HV system between Phoenix and Tucson.

----- Agenda Topics -----

1. **Introductions and Meeting Purpose**
2. **Summary of Meeting Notes from December 1, 2005 meeting**
3. **Steps of Development of Long-Term HV Transmission System**
   - Identification of Regional Land Use Plans — Completed
   - Update Projected Ultimate Loads based on Land Use Plans — Completed
   - Transmission Station Needs and Alternatives to Interconnect — Completed
   - Analysis of Alternatives and Opportunities — Completed
   - Draft Report — Today
4. **Report Review and Comments**
   a. Executive Summary
   b. Format of report
   c. Additional sections / remove sections?
5. **Next Steps**
   - Incoprorate comments/revisions
   - Publish Final by 1/27/06 so utilities can include in 10 year filings on January 31, 2006 to ACC

Action Items:

1. _____
2. _____
3. _____

Some of the regional planning organizations that SRP participates in are Western Electricity Coordinating Council (WECC), Southwest Area Transmission Planning Group (SWAT), Southwest Expansion Planning Group (STEP), and the Seams Steering Group-Western Interconnection (SSG-WI) Planning Work Group. Due to the broadening of the regional planning processes, the Central Arizona Transmission System (CATS) study group is no longer an independent regional planning entity and now is a technical study work group within the SWAT organization. However, the CATS-EHV and CATS-HV work groups still address the transmission issues within their defined areas in Arizona.

This year the CATS-HV group has taken a cursory look at the transmission needs in the greater Pinal County area. SRP's interest in this group is twofold: 1) SRP has a large portion of Pinal County in it's service territory, and 2) SRP has offered to publish the results of the preliminary investigation into transmission requirements in Pinal County through the Pinal West – Browning siting process.

CATS-HV PINAL COUNTY TRANSMISSION STUDY

The CATS-HV subcommittee took a high level look at the 230kV needs in the Casa Grande/Coolidge/Florence/Eloy/Marana area by modifying an existing far term case and adding loads representative of the land uses envisioned by the planning authorities within the area. Where there were not land use plans, an estimate of load was made by uses or projections in the vicinity tempered by proximity to major transportation corridors. The result of this calculation shows an anticipated 10,000+ MW's at some saturated, or build out, time frame for southern Pinal County.

Based upon this estimate of load at build out, existing transmission lines and corridors in the area, and linear features usable as transmission corridors, a network of 230kV transmission lines and

230kV stations was laid out. This load will require approximately 16 new stations (in addition to seven existing stations) and approximately 169 miles of existing 115kV transmission converted to 230kV, 184 miles of new 230kV transmission, and 267 additional miles of 500kV transmission lines (to reach the resources necessary to serve the projected loads). The study looked at some sensitivity to load level and resource location. In the 50% load case, some local and remote generation was used. In the 75% load case, more remote generation was added. And in the 100% load case, mostly remote generation was added.

As noted in the attached report, the one system investigated satisfies the load serving requirements for southern Pinal County. Please see the attached report in Appendix 1.

500kV TRANSMISSION

The SRP 500kV-transmission system is shown on Attachment A. This system provides major support to SRP's local transmission network and generally delivers bulk power from remote generation to the Valley.

Pinal West – Southeast Valley/Browning

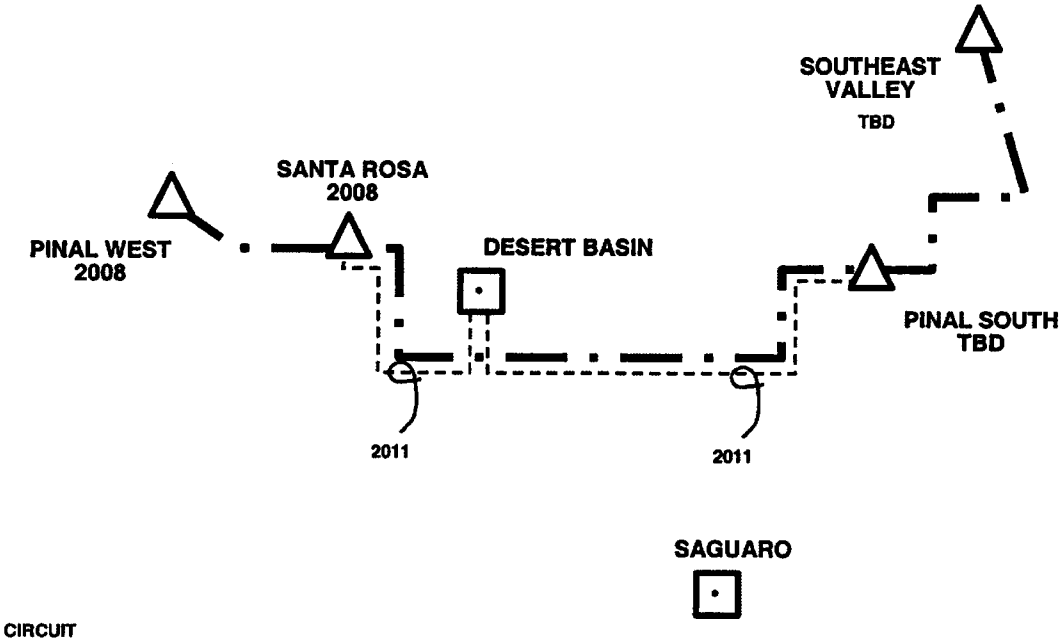
In November of 2005, SRP received the Certificate of Environmental Compatibility for this project. SRP is in process of engineering for the separate segments of this transmission line project. The project will be staged such that the segment from Pinal West to the APS Santa Rosa Substation will be complete by 2008. A new 500/230kV substation will be constructed at the Santa Rosa Substation. The 230kV portion from Browning to the proposed Dinosaur (formerly RS19) Substation in the southeast valley will be built by 2008. A new 230/69kV substation will be constructed at the Dinosaur substation site. The remainder of the EHV project will be constructed in two phases. The segment from Santa Rosa to the proposed Pinal South is being proposed as a double circuit 500/230kV line (see Attachment D) and construction on that segment is proposed for

DRAFT/
Preliminary
1/12/06

JANUARY 1, 2006

PINAL COUNTY 230kV SYSTEM

ATTACHMENT D



FUTURE 500kV CIRCUIT

FUTURE 230kV CIRCUIT

EXISTING 230kV SUBSTATIONS

FUTURE 230kV SUBSTATIONS

GENERATING STATION

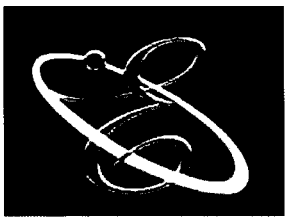
1/13/2006 000705-4

CATS-HV Saturated Load and Transmission Study

A Transmission Option to
Serve Saturated Loads
in Pinal County, Arizona

APPENDIX F
Completion of Interim Report Tasks

SWAT
Southwest Area Transmission



K. R. Saline & Associates, PLC

April 5, 2006

San Carlos Irrigation Project
c/o Alex Romero
13805 N. Arizona Blvd.
P. O. Box 250
Coolidge, AZ 85228

Dear Mr. Romero,

K. R. Saline & Associates, PLC is an electric utility consulting firm located in Mesa, Arizona. In 2005 we conducted a saturated load and transmission study for the Southwest Area Transmission ("SWAT") Oversight Committee and the Central Arizona Transmission – High Voltage sub-committee ("CATS-HV"). The purpose of the saturated load and transmission study was to develop a high voltage transmission infrastructure that could handle the calculated ultimate (or saturated) loads in the Pinal County area between Phoenix-Tucson and Globe-Mobile based on publicly available general plans.

We invite you to participate in completing the final report which could include land use data for the San Carlos Irrigation Project. If the data is readily available, please send me a General Plan map, zoning map, tabular data, or electric load in megawatts by substation delivery point to the address or e-mail noted below by April 30th, 2006. Your involvement will allow us to put together more accurate models and will apprise the nation of growth adjacent to tribal lands. If no information is received by April 30th, 2006, the assumptions in the interim CATS-HV saturated load and transmission study will be used in the final report. A copy of the interim study is enclosed; it is also available at www.azpower.org/SWAT. Along with the data requested, please also provide us with the name, address, phone number, and e-mail of the contact person to whom future CATS-HV meeting notices, agendas, and minutes should be sent, if you'd prefer someone else to be the recipient of these notices.

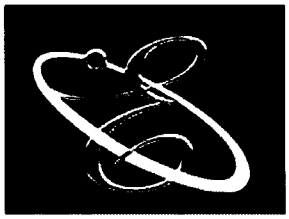
We also invite you to attend the next CATS-HV meeting (held jointly with the CATS-Extra High Voltage committee) on April 18, 2006 at Salt River Project's 64th Street and Thomas facility. The agenda is included.

Your assistance in forwarding this letter and request to the appropriate person within your organization would be greatly appreciated.

Regards,

LeeAnn Torkelson
CATS-HV Subcommittee Chair
K. R. Saline & Associates, PLC
160 N. Pasadena Suite 101
Mesa, AZ 85201-6764
lvt@krsaline.com

Enclosures



K. R. Saline & Associates, PLC

April 5, 2006

Arizona Tribal Energy Association
4645 S. Lakeshore Drive Suite 16
Tempe, Arizona 85282

Dear Arizona Tribal Energy Association,

K. R. Saline & Associates, PLC is an electric utility consulting firm located in Mesa, Arizona. In 2005 we conducted a saturated load and transmission study for the Southwest Area Transmission ("SWAT") Oversight Committee and the Central Arizona Transmission – High Voltage sub-committee ("CATS-HV"). The purpose of the saturated load and transmission study was to develop a high voltage transmission infrastructure that could handle the calculated ultimate (or saturated) loads in the Pinal County area between Phoenix-Tucson and Globe-Mobile based on publicly available general plans.

We invite you to participate in completing the final report which could include land use data for the Gila River Indian Community, Tohono-O'odham, and the Ak-Chin Indian Reservation. If the data is readily available, please send me a General Plan map, zoning map, tabular data, or electric load in megawatts by substation delivery point to the address or e-mail noted below by April 30th, 2006. Your involvement will allow us to put together more accurate models and will apprise the nation of growth adjacent to tribal lands. If no information is received by April 30th, 2006, the assumptions in the interim CATS-HV saturated load and transmission study will be used in the final report. A copy of the interim study is enclosed; it is also available at www.azpower.org/SWAT. Along with the data requested, please also provide us with the name, address, phone number, and e-mail of the contact person to whom future CATS-HV meeting notices, agendas, and minutes should be sent.

We also invite you to attend the next CATS-HV meeting (held jointly with the CATS-Extra High Voltage committee) on April 18, 2006 at Salt River Project's 64th Street and Thomas facility. The agenda is included.

Your assistance in forwarding this letter and request to the appropriate person within your organization and to the appropriate Gila River, Tohono-O'odham, and Ak-Chin personnel would be greatly appreciated.

Regards,

LeeAnn Torkelson
CATS-HV Subcommittee Chair
K. R. Saline & Associates, PLC
160 N. Pasadena Suite 101
Mesa, AZ 85201-6764
lvt@krsaline.com

Enclosures

From: LeeAnn V. Torkelson
Sent: Tuesday, July 11, 2006 12:51 PM
To: 'Alex Romero - SCIP'
Subject: FW: CATS-HV Saturated Load Interim Report comments?

Attachments: CATSHV INTERIM REPORT_01-27-06.pdf
Hello Mr. Romero;
I hope you've received the messages regarding the CATS HV Interim Report. I was wondering if you had any comments to include with the final report and if you could send those comments to me as soon as possible, preferably before the next CATS HV meeting on July 20, 2006. For documentation purposes, if you have no comments, please e-mail me/ call me to indicate that SCIP has no comments.

Your help is greatly appreciated. Hope to see you at future CATS meetings!
LeeAnn Torkelson

From: LeeAnn V. Torkelson
Sent: Thursday, May 18, 2006 9:15 AM
To: 'Charles Wiese'; 'Alex Romero - SCIP'; 'manager@gilanet.net'; 'Charles Wiese'; Leonard S. Gold (lgold@lsgrrc.com)
Subject: CATS-HV Saturated Load Interim Report comments?

Hello Gentlemen,
In April I hope you received the letter and copy of the CATS HV Saturated Load Interim report with the request for comments. At the suggestion of Mr. Pezalla, the letter and report were sent to the Arizona Tribal Energy Authority to contact the Ak-Chin, Gila River, and Tohono communities.

With a meeting next week to begin the finalization of the CATS HV report, I'd like to find out if you have any comments/suggestions for the final report.

Attached, for your reference is the CATS HV Interim report.

I look forward to hearing from you!

LeeAnn
LeeAnn Torkelson
K.R. Saline & Associates, PLC.
480-610-8741

May 19, 2006

Linda Beals
Arizona State Land Department
1616 West Adams Street
Phoenix, Arizona 85007

Dear Linda,

On behalf of the Central Arizona Transmission System-High Voltage (CATS-HV) Committee, thank you for meeting with Rob Kondziolka and me on May 18, 2006 regarding the CATS-HV Saturated Load and Transmission Interim Study. We look forward to receiving a letter indicating the review of the report and any comments and suggestions regarding the assumptions made for State Land development to incorporate into the final report and future studies.

The next meeting of the CATS-HV will be held jointly with the CATS-EHV committee on May 26, 2006 at the SRP 64th Street and Thomas facility. An agenda will be distributed prior to the meeting.

Per your request, enclosed are three bound copies of the Interim CATS-HV Saturated Load and Transmission Study dated January 27, 2006.

We look forward to working with you and your staff.

Sincerely,

LeeAnn Torkelson
K.R. Saline & Associates, PLC
Chairman, CATS-HV committee

CC: Robert Kondziolka, Salt River Project (via e-mail)
Attachments: Three (3) CATS-HV Saturated Load and Transmission Study Interim Reports

K. R. Saline & Associates, PLC
160 N. Pasadena, Suite 101 ◆ Mesa, AZ 85201-6764 ● Phone 480.610.8741 ◆ Fax 480.610.8796

CATS HV Saturated Load Study

A status report to the
Pinal Governmental Alliance

Presented by LeeAnn Torkelson

March 17, 2006

CATS HV Saturated Load Study
CATS Background

- CATS HV = **C**entral **A**rizona **T**ransmission **S**ystem – **H**igh **V**oltage
- A subcommittee of SWAT (**S**outh**w**est **A**rea **T**ransmission)
- CATS Participants: City, County, Federal, Arizona government, Utilities, any interested party.

CATS HV Saturated Load Study Background

- The 2005 CATS HV Saturated Load Study was a unique and pioneering effort between municipalities and electric utilities to study the long term future electrical demand and transmission system due to phenomenal growth in Pinal County.
  - Size of study area (5200 sq miles!!)
  - Open, objective, transparent process
  - Use of municipality and county general plans and zoning
- The joint effort was called the "Saturated Load Study"

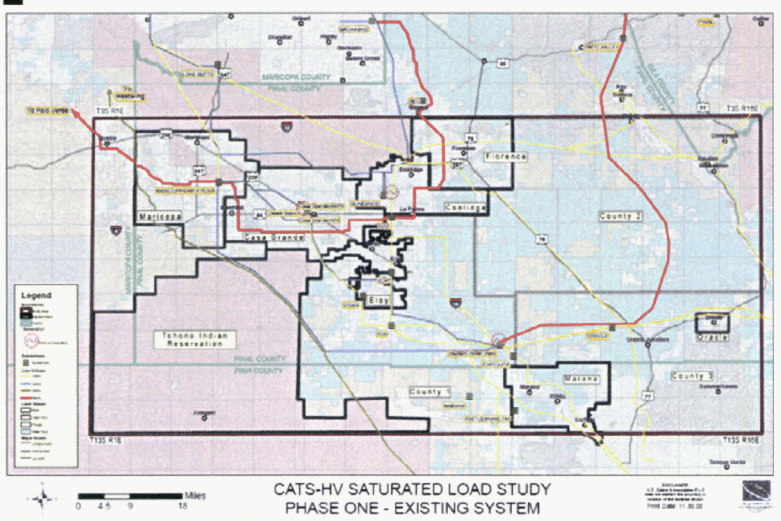
CATS HV Saturated Load Study Saturated Load Study – What is it?

- A calculation of the potential ultimate electric load based on publicly available land use data.
  - General plans
  - Zoning maps
- A transmission solution to serve the potential ultimate electric load.

CATS HV Saturated Load Study
The Saturated Load Study Process

- Define the study area
- Gather general plans or zoning maps
- Determine electric load demand by land use type
  - Residential (low density homes vs. apartments)
  - Commercial, Industrial, Open Space
- Define electric load in undefined areas
- Model a transmission system to serve the ultimate potential load

CATS HV Saturated Load Study
Process – Define Study area & General Plans

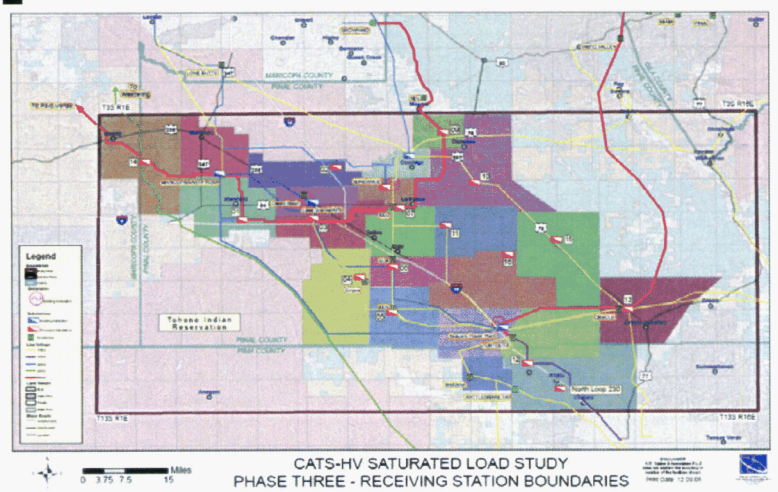


CATS-HV SATURATED LOAD STUDY
PHASE ONE - EXISTING SYSTEM

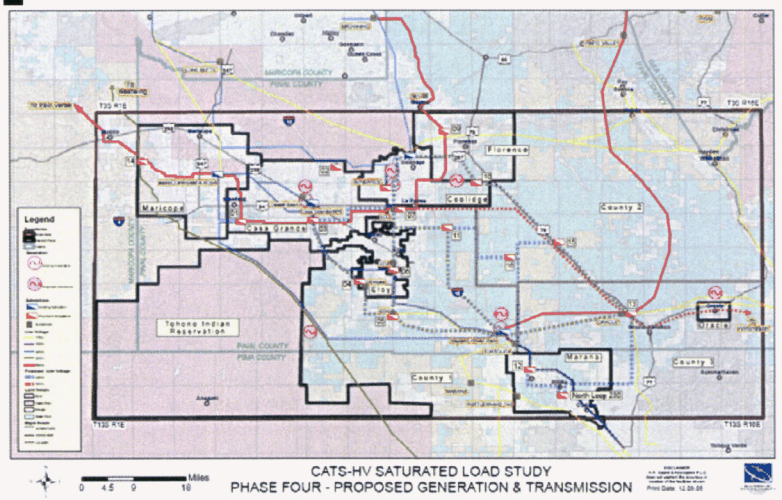
CATS HV Saturated Load Study
Process – Define Electric Load by land use

- Utilities provided estimates of demand by type (residential, commercial, industrial)
  - Residential 4kW per dwelling unit
    - Multiplied demand based on # of dwelling units per acre
  - Heavy Commercial – 45kW/acre
  - Medium Commercial – 30kW/acre
  - Light Commercial – 14kW/acre
  - Parks/Open space – 500kW/ sq mile
- Calculated Saturated Load = 10,400MW
  - Approximately the greater Phoenix area load today
  - Study area load about 500MW today

CATS HV Saturated Load Study
Process – Model-Receiving Station areas



CATS HV Saturated Load Study
Process – Generation & Transmission



CATS HV Saturated Load Study
Results and Conclusions

To serve 10,400MW of load the study added:

- Transmission
  - 169 miles of 115kV upgraded to 230kV
  - 184 miles of 230kV
  - 267 miles of 500kV
  - 150 miles of new "corridor" (100 miles of 500kV and 50 miles of 230kV)
- Substations
  - Approximately 500MW per 230kV substation
  - 16 substations 230 and 500kV
- Generation
  - The study assumed mostly imports

SALT RIVER PROJECT

N-1-1 studies for 2007 to accommodate planned construction activity.

APPENDIX 2

Delivering more than power.™

07-0162-01 01/07

2006 CAPITAL PROJECT DESCRIPTION

Budget Year 2013/2014

EHV Diagrams 115, 230 & 500kV
Area Switching Diagrams fountain2.pdf
Rec. Station Diagrams
Dist. Station Diagrams

Date: January 25, 2007 ***Location:*** Fountain/Rio Verde Area

Job Title: New Receiving Station in the Fountain/Rio Verde area

Project Summary: Construct a new Fountain Area Receiving Station with 1-280MVA 345/69kV(or 230/69kV) transformer and connect it to 33E-25N 69kV substation by 5/2014.

Description of Work:

FOUNTAIN HILLS 345(230)KV RECEIVING STATION WORK

- Build two 345kV(230kV) buses with 6" EHPS AL tubing, bays 1-3.
- Install 3-345kV(230kV) 3000A breakers & 7-345kV(230kV) 3000A disconnects.
- Install 1-280MVA 345/69kV(230/69kV) transformer in the bay 2.

345kV(230kV) RECEIVING STATION SUBTOTAL $6,000,000

FOUNTAIN HILLS 69 KV RECEIVING STATION WORK

- Build two 69kV buses with 6" EHPS AL tubing, bays 1-3.
- Install 2-69kV 3000A, 44kA I.C. breakers & 4-69kV 3000A disconnects.
- Terminate 69kV line from 33E-25N into bay 2.

69KV RECEIVING STATION SUBTOTAL $670,000

33E-25N 69kV SUBSTATION WORK

- Install 1-69kV 2000A, 40kA I.C. breaker & 2-69kV 2000A disconnects.

33E-25N STATION SUBTOTAL $245,000

69KV LINE WORK

- Build 1-954ACSS 69kV line from the new receiving station to 33E-25N substation.
- The furthest location of the Receiving Station from 33E-25N is 8 miles.

69KV LINE MAX. SUBTOTAL $2,000,000

ESTIMATED TOTAL $8,915,000

In-Service Date: April 30, 2014

_____ _____
Manager ***Date***

Load Growth Project, TSP Contact Jeff Loehr or Jose Silva (69kV)

Justification:

- During summer peak loading with all projects in, the voltage in the Fountain area falls below the minimum acceptable level at several 69kV stations for an Evergreen/Pima outage. A new receiving station and associated 69kV line work in the area will provide more long-term voltage support than the addition of capacitor banks.

2006 CAPITAL PROJECT DESCRIPTION

SRP

Budget Year 2013/2014

Date: January 25, 2007 ***Location:*** Fountain/Rio Verde Area

Job Title: New Receiving Station in the Fountain/Rio Verde area

Project Summary: Construct a new Fountain Area Receiving Station with 1-280MVA 345/69kV(or 230/69kV) transformer and connect it to 33E-25N 69kV substation by 5/2014.

	Voltage @ Evergreen & Wheeler for outage of Evergreen-Pima 69kV line			
	without the Fountain Hills Rec. station		with the Fountain Hills Rec. station	
Year	**2014**	**2015**	**2014**	**2015**
Evergreen	0.949pu	case diverges	0.993pu	0.988pu
Wheeler	0.950pu	case diverges	0.992pu	0.987pu

NOTE: The Fountain area has 25MVAr of caps added at 33E-25N in 2010.

2003, 2004 Project Summary: The project was removed from the six-year planning period with the addition of FT#3 switching station and 25MVAr cap bank at 33E-25N.

2002 Project Summary: Construct a new Fountain Area Receiving Station or a new 69kV line of unknown mileage and origin in the Fountain area by 05/08

2001 Project Summary: Construct a new Fountain Area Receiving Station or a new 69kV line of unknown mileage and origin in the Fountain area by 05/07.