ORIGINAL

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS
MARC SPITZER – Chairman
WILLIAM A. MUNDELL
JEFF HATCH-MILLER
MIKE GLEASON
KRISTIN K. MAYES

IN THE MATTER OF SERVICE QUALITY ISSUES, ANALYSIS OF TRANSMISSION ALTERNATIVES AND PROPOSED PLAN OF ACTION IN THE SANTA CRUZ ELECTRIC DIVISION OF CITIZENS UTILITIES COMPANY	DOCKET NO. E-01032A-99-0401 **NOTICE OF FILING RESPONSE TO COMMISSION QUESTIONS AND UPDATED OUTAGE RESPONSE PLAN FOR SANTA CRUZ COUNTY**

Tucson Electric Power Company and UniSource Energy Services, Inc., through undersigned counsel, hereby file their Response to Commission Questions and Updated Outage Response Plan for Santa Cruz County.

RESPECTFULLY SUBMITTED this 9th day of February 2004

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TUCSON ELECTRIC POWER COMPANY
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RESPONSE TO COMMISSION QUESTIONS

AND

UPDATED OUTAGE RESPONSE PLAN

FOR

SANTA CRUZ COUNTY

(DECISION NO. 66615)

DOCKET NO. E-01032A-99-0401

FEBRUARY 9, 2004

RESPONSE TO COMMISSION QUESTIONS SET FORTH IN DECISION NO. 66615

I. INTRODUCTION

In Decision No. 66615, the Arizona Corporation Commission ("Commission") ordered Tucson Electric Power Company ("TEP") and UniSource Energy Services ("UES") to file responses to the following questions:

a. Can Citizens' operating procedures be improved to shorten the restoration time for transmission outage events utilizing TEP's operations center and field personnel?

b. Are any of the following improvements cost effective as interim restoration of service solutions to the construction of a second transmission line?

   i. A limited number of automated or remote controlled distribution feeder ties between substations.
   ii. Improved remote electronic dispatch control capability of the Valencia generator or improved generator controls.

c. What refinements are appropriate in Citizens' RAC-2 peak load forecast? Please define the annual hours of exposure when load is forecast to exceed the capacity of the existing transmission line.

d. Is the proposed interconnection with Mexico at the Gateway substation an interim service restoration solution for delay of the proposed South to Gateway transmission line through the Coronado National Forest?

e. How much emergency service is available from TEP via a Kantor feeder tied to TEP's 46 kV line?

Included in this response is also an updated Outage Response Plan.

II. BACKGROUND

Customers have, from time to time, raised concerns regarding the frequency and duration of electric service outages in Santa Cruz County. In Decision No. 62011 (November 2, 1999), the Commission (i) ordered UES' predecessor-in-interest, Citizens Communications Company ("Citizens")[1] to improve the reliability of electric service to customers in Santa Cruz County; and (ii) approved a Settlement Agreement between the Commission Utilities Division and Citizens that included the construction of a second transmission line to Nogales, Arizona.

[1] UniSource Energy Services acquired Citizens' Arizona gas and electric systems in August 2003.

In response to Decision No. 62011, distribution facilities in Santa Cruz County have been upgraded to improve the continuity of service. Additionally, the Commission has granted a certificate of environmental compatibility for the construction of a second transmission line from Tucson to the Arizona-Mexico border. Commencement of construction on the second transmission line is contingent upon obtaining required federal agency approvals.

Since UES acquired the Citizens system in August 2003, TEP and UES have focused their efforts on further improving electric service reliability to Santa Cruz County. Some of the steps undertaken by TEP and UES to improve reliability have been previously discussed with Staff, identified in a pleading submitted to the Commission and/or discussed at the Commission's December 3, 2003 Open Meeting. See e.g. Joint Applicants' Supplement to: Joint Application for Delay of the In-Service Deadline, etc. filed in Docket No. E-01032A-99-0401.

This Response incorporates the information previously provided to the Commission, further addresses those questions specifically identified in Decision No. 66615, includes an update to the Outage Response Plan previously submitted to the Commission.[2]

TEP and UES reserve their right to supplement this Response in order to address comments to the information contained herein submitted by the Commission, Staff or any other interested party.

III. RESPONSE TO COMMISSION QUESTIONS.

A. Can Citizens' operating procedures be improved to shorten the restoration time for transmission outage events utilizing TEP's operations center and field personnel?

Since the acquisition of Citizens' electric properties in Santa Cruz County, UES and TEP have undertaken an analysis of how to improve procedures to shorten the restoration time for transmission outages. Steps have already been taken to implement the improvements. Attached hereto as Exhibit 2, and by this reference incorporated herein, is a summary of synergies and integration opportunities that will improve the restoration time. As noted in the summary, some steps have already been implemented and others are scheduled to take place. TEP has already taken significant steps and now plays an active role in supporting the maintenance and operation of the UES electric system.

For example, TEP has interconnected its radio systems with those of UES. TEP and UES employees are participating in cross-training activities with regards to dispatching, field operations, and field crews. UES "trouble calls" are being routed into TEP's call center. UES is in the process of integrating Remote Terminal Units into TEP's Energy Management System ("EMS") in Santa Cruz County. The EMS data will allow TEP operating personnel to have a real-time view of operating conditions in the Santa Cruz County region. UES and TEP are in the process of integrating the remote control operation of gas turbines located at

[2] Citizens had filed various action plans with the Commission in 1999. Attached hereto as Exhibit 1, and by this reference incorporated herein, is a copy of Citizens' 1999 filings.

the Valencia substation in Nogales. TEP personnel that are knowledgeable about the "WECC reliability criteria" will provide additional support to UES operating personnel.

Another important step that UES and TEP took was to conduct an exchange of supervisory personnel between TEP and UES. Specifically, the District Manager for UES transferred to Tucson to work as Substation Supervisor and a TEP design-build supervisor transferred to Nogales to serve as the District Manager. This exchange allowed TEP to benefit from the experience of a UES employee with detailed and first-hand knowledge of the Santa Cruz County system. Similarly, the transfer of the TEP employee to Nogales provided expertise to UES by an employee with first-hand knowledge of TEP's operations and procedures. This personnel exchange has served to improve communications between the two companies, helped increase communications and will result in a smoother transition from two stand-alone companies who now are working together.

B. Are any of the following improvements cost effective as interim restoration of service solutions to the construction of a second transmission line?

i. A limited number of automated or remote controlled distribution feeder ties between substations.

TEP distribution engineering personnel are currently researching opportunities for feeder ties. To the extent these opportunities are identified TEP will also be looking at the feasibility for adding remote control to such ties.

ii. Improved remote electronic dispatch control capability of the Valencia generator or improved generator controls.

Since the acquisition of Citizens' electric properties in Santa Cruz County TEP has been analyzing the operations of the UES gas turbines in Nogales, Arizona. TEP has worked with UES personnel to verify that the controls on the turbines are fully functional and that any prior issues with those controls have been satisfactorily resolved. TEP is presently working directly with El Paso Natural Gas Company ("El Paso") to determine the viability of transporting natural gas to the turbines in Nogales, Arizona. TEP and El Paso are also researching whether these gas turbines could be run on 100% natural gas. Currently, those turbines are operating on a mixture of gas and fuel oil at full load. Additionally, TEP is reviewing the feasibility of consolidating and moving the remote dispatch control of the gas turbines to TEP's Irvington Control Center.

C. What refinements are appropriate in Citizens' RAC-2 peak load forecast? Please define the annual hours of exposure when load is forecast to exceed the capacity of the existing transmission line.

TEP has prepared a new peak load forecast that replaces Citizens' RAC-2 peak load forecast. The TEP peak load forecast is attached hereto as Exhibit 4, and by this reference incorporated herein[3]. As demonstrated in the graph entitled "TEP Load Forecast for

[3] RW Beck performed Citizens' previous forecasts. The last such forecast is Appendix B to Citizen's 2003 ten -year plan filed with the Commission.

Nogales", TEP's forecast for normal conditions is similar to Citizens' RAC-2. TEP's "high" forecast is somewhat lower than Citizens' RAC-2. TEP is in the process of refining data for Santa Cruz County and has not yet determined the hours of exposure. TEP will supplement this Response with the annual hours of exposure when the load is forecast to exceed the capacity of the existing transmission line.

D. Is the proposed interconnection with Mexico at the Gateway substation an interim service restoration solution for delay of the proposed South to Gateway transmission line through the Coronado National Forest?

TEP and UES do not believe that the interconnection with Mexico at the Gateway substation is an interim service restoration solution. Commencement of construction of the Gateway substation and of the transmission line to interconnect with Mexico is contingent upon issuance of the Presidential permit. The construction activities related to the Gateway project are dependent upon the completion of the Environmental Impact Statement and the issuance of the U.S. Department Of Energy Presidential permit. Consequently, interconnection will not occur prior to the resolution of the Coronado National Forest issues.

E. How much emergency service is available from TEP via a Kantor feeder tied to TEP's 46 kV line?

Due to two-county financing restrictions for TEP an interconnection cannot be operated in parallel with TEP's system because the 46 kV switch must remain open between the systems, except under emergency conditions.

If an outage of the 115kV line to Nogales were to occur UES could declare an emergency and TEP would then be able to close the 46kV switch and provide approximately 20 mw to the Nogales area over the 46kV tie line. This, in combination with the local gas turbines in Nogales (that could produce 47mw of electricity), would allow UES to meet peak load forecasts for UES loads through 2007. Furthermore, the timing for construction of the 46kV line is contingent upon TEP obtaining a right of way from the State. TEP has already applied for the right of way.

Also, UES is adding capacitors in the Nogales region to alleviate low voltage conditions that primarily result from the single 115 kV line serving the area. This issue is not a new concern and was identified in Santa Cruz District Transmission System Action Plan prepared for Citizens by Power Engineers[4]. In fact, TEP has enhanced the recommended solution set forth in the Power Engineers report by locating the capacitors on the distribution side of the system. TEP's analysis has shown that this action will achieve better performance at a lower cost than the Power Engineers' recommendation. UES will install the capacitors prior to the summer of 2004.

[4] This 160 page document is Appendix A to the Citizens 2003 ten-year plan filed with the Commission.

IV. UPDATED OUTAGE RESPONSE PLAN AND ADDITIONAL INFORMATION.

Attached hereto as Exhibit 4, and by this reference incorporated herein, is the updated Outage Response Plan. The updated Outage Response Plan notably reflects the substitution of TEP's dispatcher in place of a lineman as the responsive party in various scenarios. This substitution is the result of the installation of Supervisory Control and Data Acquisition ("SCADA")systems and additional equipment that will allow remote operation of portions of the Santa Cruz County system.

Also, attached hereto as Exhibit 5 and by this reference incorporated herein is a Reliability Must Run ("RMR") study prepared by TEP for UES.

TEP and UES are committed to upgrading electric service to the Santa Cruz County area. In addition to their efforts to construct the second transmission line, improvements have been made to the distribution system in Nogales, Arizona. TEP and UES believe that the Commission has received public comment reflecting improved distribution related reliability. TEP and UES have also replaced a "weak link" in the existing 115 kV line that was identified during the Line Siting hearings that were held in connection with the second transmission line (Line Siting Case No. 111). Specifically, a portion of the 115 kV line that consisted of 4/0 conductor was upgraded to match the balance of the 115kV line conductor in order to eliminate the potential "fuse" in the 115kV line.

V. CONCLUSION.

TEP and UES have taken significant steps to upgrade the reliability of electric service in Santa Cruz County since the acquisition of the Citizens' electric properties. TEP and UES continue to concur with the Commission Staff that a second transmission is a necessary component of the total solution to the Santa Cruz County reliability issues. TEP and UES are putting in place safeguards and contingency plans to minimize the number and duration of outages until the second transmission line is constructed. TEP and UES continue to work with the Commission Staff and customers of Santa Cruz County to identify ways to ensure that they receive safe, adequate and reliable electric service. Additionally, TEP and UES are continuing to press for the Federal agencies to approve and issue the permits necessary to begin construction of the second transmission line. For example, representatives of TEP and UES have had several meetings with the White House Task Force to enlist assistance in seeking the issuance of the permits.

CITIZENS UTILITIES COMPANY

RESTORATION OF SERVICE

FOLLOWING

TRANSMISSION LINE OUTAGES

(Originally filed with the Arizona Corporation Commission on April 15, 1999)

Scenario 1: Loss of transmission line north of the Nogales Tap

Step	Procedure	Time	Cum. Time	Who	Location
1	CUC Starts Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Instrument Electrician	Control Room
2	WAPA remotely opens breaker 362 at the Nogales Tap	0:05	0:05	Dispatcher	WAPA Dispatch
3	CUC remotely opens breakers at Sonoita, Kantor, Cañez	0:10	0:15	Lineman/Engineer	SCADA
4	CUC manually opens breakers at Valencia substation	0:05	0:20	Lineman	Valencia
5	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st	0:15	0:20	Automatic	Control Room
	Manually increase speed on both turbines to 100.5%			Operator	Control Room
6	Manually close circuit 6241 – circuit 6241 restored – Valencia	0:03	0:21	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
7	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:24	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
8	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:27	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
9	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:30	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
10	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:33	Lineman	Valencia
	Parallel 3rd turbine at Valencia Plant Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%	0:03	0:36	Operator	Control Room
11	Remotely close circuit 6207 – circuit 6207 restored – Sonoita	0:03	0:39	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
12	Remotely close circuit 6204 – circuit 6204 restored – Sonoita	0:03	0:42	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
13	Remotely close circuit 6203 – circuit 6203 restored – Sonoita	0:03	0:45	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room

14	Remotely close circuit 6206 – circuit 6206 restored – Sonoita	0:03	0:48	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
15	Remotely close circuit 6205 – circuit 6205 restored – Sonoita	0:03	0:51	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
16	Remotely close circuit 8201 – circuit 8201 restored – Cañez	0:03	0:54	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
17	Remotely close circuit 8202 – circuit 8202 restored – Cañez	0:03	0:57	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
18	Remotely close circuit 8203 – circuit 8203 restored – Cañez	0:03	0:60	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
19	Remotely close circuit 7201 – circuit 7201 restored – Kantor	0:03	1:03	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
20	Remotely close circuit 7202 – circuit 7202 restored – Kantor	0:03	1:06	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
21	Remotely close circuit 7203 – circuit 7203 restored – Kantor	0:03	1:09	Lineman/Engineer	SCADA
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Scenario 2: Loss of transmission line between Sonoita and Valencia substation

Step	Procedure	Time	Cum. Time	Who	Location
1	CUC Starts Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Instrument Electrician	Control Room
2	CUC manually opens both circuit switchers at Valencia Substation, lock & tag	0:03	0:03	Lineman	Valencia
3	CUC manually opens 115 kV switch facing Nogales, lock & tag	0:25	0:28	Lineman	Sonoita
4	WAPA remotely closes breaker 362 at the Nogales Tap – Service restored to northern county area.	0:02	0:30	Dispatcher	WAPA Dispatch
5	CUC manually opens breakers at Valencia substation	0:05	0:08	Lineman	Valencia
6	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st	0:15	0:15	Automatic	Control Room
7	Manually increase frequency on both turbines to 100.5%			Instrument Electrician	Control Room
	Manually close circuit 6241 – circuit 6241 restored – Valencia	0:01	0:16	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
8	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:19	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
9	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:22	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
10	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:25	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
11	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:28	Lineman	Valencia
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Scenario 3: Loss of transmission line north of Sonoita Substation

Step	Procedure	Time	Cum. Time	Who	Location
1	CUC Starts Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Instrument Electrician	Control Room
	Call WAPA Dispatch and put an HLO order on breaker 362	0:01	0:01	Power Supervisor	Control Room
2	CUC remotely opens breakers at Sonoita, Kantor, Cañez	0:10	0:10	Lineman	SCADA
3	CUC manually opens breakers at Valencia substation	0:05	0:10	Lineman	Valencia
4	Manually open both circuit switchers at the Valencia Substation	0:03	0:15	Lineman	Valencia
5	CUC opens 115 kV switch on the north side of Sonoita (lock and tag)	0:25	0:25	Lineman	Sonoita
	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st			Operator	Control Room
6	Manually increase frequency on both turbines to 100.5%	0:05	0:18	Operator	Control Room
	Manually close circuit 6241 – circuit 6241 restored – Valencia			Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
7	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:21	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
8	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:24	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
9	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:27	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
10	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:30	Lineman	Valencia
	Parallel 3rd turbine at Valencia Plant Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
	Manually close both circuit switchers at the Valencia Substation	0:03	0:33	Lineman	Valencia
11	Remotely close circuit 6207 – circuit 6207 restored – Sonoita	0:03	0:36	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
12	Remotely close circuit 6204 – circuit 6204 restored – Sonoita	0:03	0:39	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room

13	Remotely close circuit 6203 – circuit 6203 restored – Sonoita	0:03	0:42	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
14	Remotely close circuit 6206 – circuit 6206 restored – Sonoita	0:03	0:45	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
15	Remotely close circuit 6205 – circuit 6205 restored – Sonoita	0:03	0:48	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
16	Manually open circuit switcher on high side of transformer at Cañez Substation	0:03	0:30	Lineman	Cañez
17	Manually open switch KT115-3 at Kantor Substation	0:05	0:50	Lineman	Kantor
18	Manually close group operated switch (distribution) south of the Cañez substation on Pendelton Road on circuit 8201 – circuit 8201 restored through circuit 6204– Cañez bus energized. Pole #7995	0:03	0:40	Lineman	Switch on Pendelton
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
19	Remotely close circuit 8202 – circuit 8202 restored – Cañez	0:03	0:43	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
20	Remotely close circuit 8203 – circuit 8203 restored – Cañez	0:03	0:46	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
21	Manually close recloser at four winds ranch on circuit 7201 – circuit 7201 restored through circuit 8203 - Kantor bus energized	0:03	0:50	Lineman	4 Winds Ranch
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
22	Remotely close circuit 7202 – circuit 7202 restored – Kantor	0:03	0:53	Lineman	SCADA
	Balance loads between Valencia turbines Manually increase speed on both turbines to 100.5%			Operator	Control Room
23	Remotely close circuit 7203 – circuit 7203 restored – Kantor	0:03	0:56	Lineman	SCADA
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Transmission Service Restoration Procedure
North of Nogales Tap

Step	Procedure	Time	Cum. Time	Who	Location
1	WAPA reports service restored to line north of the Nogales Tap	0:00	0:00	WAPA	WAPA Dispatch
2	WAPA monitors Sync scope at the Nogales tap and sends reports to power plant control room.	0:05	0:05	WAPA	Nogales Tap
3	Valencia turbines synchronize with WAPA	0:02	0:07	Operator	Control Room
4	WAPA closes breaker at Nogales Tap	0:01	0:08	Operator	WAPA Dispatch
5	Load is dropped sequentially by each unit	0:05	0:13	Operator	Control Room
6	System Normal				

Between Sonoita and Nogales Tap

Step	Procedure	Time	Cum. Time	Who	Location
1	CUC crews report completed construction on lines	0:00	0:00	Electric Superintendent	Work site
2	Inform WAPA that CUC will be restoring service to WAPA	0:01	0:01	Operator	Control Room
3	Open breakers at the Valencia turbines	0:05	0:06	Operator	Control Room
4	Manually open group operated switch (distribution) south of the Cañez substation on Pendelton Road on circuit 8201 – circuit 8201 disconnected from circuit 6204– Cañez bus de-energized. Pole #7995	0:03	0:09	Lineman	Switch on Pendelton
5	Manually close circuit switcher on high side of transformer at Cañez Substation	0:03	0:12	Lineman	Cañez
6	Manually close switch KT115-3 at Kantor Substation	0:03	0:15	Lineman	Kantor
7	Manually open recloser at four winds ranch on circuit 7201 – circuit 7201 disconnected from circuit 8203	0:03	0:18	Lineman	4 Winds Ranch
8	Close 115 kV switch on the north side of Sonoita	0:03	0:21	Lineman	Sonoita Substation
9	WAPA closes breaker at Nogales Tap	0:03	0:24	WAPA	WAPA Dispatch
10	System Normal				

Between Sonoita and Valencia Substations

Step	Procedure	Time	Cum. Time	Who	Location
1	CUC crews report completed construction on lines	0:00	0:00	Electric Superintendent	Work site
2	Inform WAPA that CUC will be restoring service to WAPA	0:01	0:01	Operator	Control Room
3	Open breakers at the Valencia turbines	0:05	0:06	Operator	Control Room
4	Manually close 115 kV switch facing Nogales	0:03	0:09	Lineman	Sonoita Substation
5	Manually close both circuit switchers at the Valencia substation	0:03	0:12	Lineman	Valencia
6	WAPA closes breaker at Nogales Tap	0:03	0:15	WAPA	WAPA Dispatch
7	System Normal	0:03	0:18		

BEFORE THE ARIZONA CORPORATION COMMISSION

JIM IRVIN
COMMISSIONER-CHAIRMAN
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WS-02334A-98-0611
W-03454A-98-0611
W-03455A-98-0611
W-01595A-98-0611
T-03054A-98-0611

NOTICE OF FILING

Citizens Utilities Company hereby provides notice of filing its Supplement to Santa Cruz Electric Division Transmission Alternatives and Plan of Action.

RESPECTFULLY SUBMITTED this 7th day of May, 1999.

Deborah R. Scott
Associate General Counsel
Citizens Utilities Company
2901 N. Central Avenue, Suite 1660
Phoenix, Arizona 85012

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Original and ten copies filed this
7th day of May, 1999, with:

Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

Copies of the foregoing mailed/delivered
this 7th day of May, 1999, to:

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SUPPLEMENT TO

CITIZENS UTILITIES COMPANY'S

SANTA CRUZ ELECTRIC DIVISION TRANSMISSION ALTERNATIVES AND PLAN OF ACTION

DOCKET Nos. E-1032A-98-0611, et al

MAY 7, 1999

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SUPPLEMENT TO

CITIZENS UTILITIES COMPANY'S

SANTA CRUZ ELECTRIC DIVISION
TRANSMISSION ALTERNATIVES
AND
PLAN OF ACTION

DOCKET Nos. E-1032A-98-0611, et al

MAY 7, 1999

Citizens Utilities Company, Corporate Separation
Docket Nos. E-01032A-98-0611, *et al.*

Supplement to Santa Cruz Electric Division Transmission Alternatives and Plan of Action

Introduction:

In October 1998, Citizens Utilities Company ("Citizens") filed a Notice of Intent ("Notice") that stated that Citizens intended separate its public services divisions, which provide electric, gas, water and wastewater service, and its telecommunications divisions. In its Notice, Citizens proposed to form a public utility holding company to hold the stock of Citizens' telecommunications subsidiaries.

Because of the Commission's concern with service problems in Citizens Santa Cruz Electric Division, in Decision No. 61383, the Commission ordered Citizens to file an Analysis of Alternatives and Plan of Action ("Plan") to rectify the service problems in Santa Cruz. The Commission indicated that the Plan should include a cost-benefit analysis of alternatives, the alternative chosen and proposed deadlines for implementation of the alternative chosen.

The Transmission Alternatives and Plan of Action ("Report"), filed by Citizens on April 15th, 1999 and this Supplement to the Report ("Supplement") are filed to comply to with Decision No. 61383. These documents address both the power supply improvements and the 1999 system improvements currently underway in the Santa Cruz Electric District. The Report outlines the planning process and implementation schedule for new transmission facilities. However, despite Citizens' good faith effort to comply with the Commission Decision, there are some requirements that it is unable to provide at this point in the planning process. These items are discussed below.

Proposed Deadlines for Implementation of Second Transmission Line

The Report provides milestones for completion of critical steps in the process of planning, permitting, design (including right-of-way procurement), and construction. No date-certain deadlines could be included at this point. Citizens is at the initial stage of planning, and there are a number of unanswered questions, including: which interconnection point is feasible; what are the environmental consequences of any particular route; and what are the specific costs, other than planning-level estimates, associated with the various conceptual alternatives. Based on the information presently available, Citizens' consultants, Power Engineers and Dames & Moore, estimate that from start to finish, it will require a minimum of approximately four years to complete a new 115-kV transmission line. If a federal land management

agency is involved and an Environmental Impact Statement is required under the provisions of the National Environmental Policy Act, a minimum of an additional six months must be added to the permitting schedule.

Cost-Benefit Analysis

Today no meaningful cost-benefit analysis can be made, although the Report has identified a range of costs for each alternative. With the current load levels in Santa Cruz District, Citizens has adequate capacity to serve the maximum expected load. The generating capacity at Valencia Power Plant is capable of providing an alternate source of power if the existing transmission line is out of service for an extended period of time. Load growth will cause the maximum capacity required to exceed the capacity of the existing generating units in the next few years. The costs, benefits and consequences of the various alternatives will be determined during the execution of the plan of action that was filed as part of the Report on April 15, 1999. Citizens is committed to starting this process immediately.

While Santa Cruz has experienced service problems this year, it is important to recognize that the number and length of the outages last summer and fall were unusual. Nonetheless, Citizens has taken and will continue to take extraordinary steps to avoid such outages in the future. Those system improvements are discussed in detail in this Supplement.

Identification of Preferred Route

At this time, Citizens is able to identify a preferred alternative route based on system performance and cost. If Citizens is the only participant in the construction of a second transmission line, then based on the information presently available, Citizens' preferred alternative would be to construct a 115-kV line from Arizona Electric Power Cooperative's (AEPCO) Bicknell Substation to Citizens' Valencia Substation. The preferred route for the line would be the alignment generally west of Interstate 17. This interconnection appears to perform best technically, is the lowest capital cost and the route generally crosses terrain that has other linear developments, such as a natural gas pipe line and interstate highway.

If there are other participants in the transmission line construction, the preferred alternative may change. For instance, if AEPCO and Citizens' collective needs are considered, one of the alternatives that interconnect with AEPCO's system to the east may be preferred. Public Service New Mexico (PNM) is exploring the possibility of a high voltage interconnection with Mexico. If PNM and Citizens were participants in a joint transmission line, then the preferred alternative might change.

Further, Citizens is aware that it does not have the last word on determining the best alternative. Facts and circumstances will almost certainly change as Citizens moves through the planning process. It is likely that a comparison of alternative routes will be required for the Certificate of Environmental Compliance, and for NEPA compliance if alternatives cross federal lands. In that case, an environmentally preferred alternative would be selected following the environmental analysis, which may or may not be the least cost or best performing route. The result could be that the route approved by the Siting Committee (under the ACC) and federal land management agencies would be different than Citizens' initially preferred route.

Planned Improvements That Are Not Dependent On Construction of Second Transmission Line.

Citizens is currently replacing poles and cable. Attachment IV includes detailed schedules showing the areas where replacements will be made, the number of poles or amount of cable that will be replaced, and the capital expenditures to do so, for the years 1999-2003.

SANTA CRUZ POWER SUPPLY IMPROVEMENTS

SANTA CRUZ POWER SUPPLY IMPROVEMENTS

Citizens is actively pursuing and implementing improvements to the transmission and generation system serving its customers in Santa Cruz County. Work to be completed before the summer of 1999 includes the addition of a new system to synchronize Citizens' generation units with the Western Area Power Administration ("WAPA"); installation of new 115-kV switching station to replace the existing tie to the WAPA's system; and planning efforts for a second transmission source into the service area. The following is a description of each project.

GENERATOR SYNCHRONIZATION

New control and communication equipment have been installed at the Nogales Tap and at the Valencia Power Plant. A synch-check relay has been added to the 115-kV breaker that will automatically close the breaker and re-establish the tie to WAPA's system when Citizens has been carrying the load on its own generation. The relay equipment was installed in January 1999, and is ready for operation. A telephone line has been ordered from US West to complete the communication link, and a contract has been issued to General Electric Company to inspect, test, and calibrate the generator protection and control systems and develop improved operating procedures for the units. The estimated cost of these improvements is approximately $100,000. The benefits of these improvements are: 1) the units and operators will be prepared to start and carry load on Citizens' generation if there is an extended outage of the transmission line; and 2) when a transmission problem has been repaired and transmission service is again available, it will not be necessary to interrupt service to our customers when we shut down the generators. Attachment I describes the Synchronization Project additions in more detail.

NOGALES SWITCHING STATION

Citizens has contracted with WAPA to construct a new, three breaker switching station to replace the existing tap station serving Citizens' customers in Santa Cruz County. The new station is being constructed on the north side of the existing tap station and will sectionalize WAPA's Del Bac – Apache 115-kV line. It will provide three line terminations in a ring-bus configuration. Building an entirely new station allows for service to continue over the existing facilities during construction and greatly reduces the need for planned service interruptions or the possibility of unintended outages. The estimated cost of the new switching station is $2.1 million and it is scheduled to be in-service by June 30, 1999. The benefit of this improvement is that service to Citizens'

customers will no longer be interrupted every time WAPA's transmission line has an interruption. By using a ring bus arrangement, the possibility that transient or permanent faults on WAPA's line or inside the switching station will cause an interruption to Citizens' customers is greatly reduced. This will significantly improve the power supply service reliability to our customers. Attachment II provides a more detailed description of the Nogales Switching Station Project.

SECOND TRANSMISSION LINE

In February 1999, Citizens provided responses to Staff's first set of data requests in Docket No. E-01032B-98-0621, the Nogales Complaint. The responses addressed the company's efforts to complete planning efforts for a second 115-kV transmission line to serve its customers in Santa Cruz County. A copy of those data responses has been attached as Attachment III. The purpose of this document is to provide an update on the transmission planning efforts since the initial responses.

In the initial response, four potential interconnections and potential line routes were identified. Three of the interconnections would be with Arizona Electric Power Cooperative ("AEPCO") and one would be with Tucson Electric Power Company ("TEP").

The four alternatives and their preliminary cost estimates are summarized as follows:

INTERCONNECTION WITH	FROM SUBSTATION	TO SUBSTATION	COST (Millions)
AEPCO	Bicknell	Valencia	$10.6
AEPCO	Sierra Vista	Valencia	$11.6
AEPCO	Pantano	Valencia	$14.0
TEP	Vail	Valencia	$16.25

POWER FLOW STUDIES

AEPCO has completed preliminary power flow studies and provided copies of the study results. The studies support the Bicknell alternative as the preferred electrical alternative. TEP has performed preliminary power flow studies and responded verbally. TEP's studies indicate an interconnection at its Vail 345 kV substation would perform satisfactorily.

A second 115-kV line into the Nogales area would need to operate in parallel with WAPA's transmission system. Additional power flow studies are expected

to be required by WAPA to assure that there would be no adverse effect on its system.

ENVIRONMENTAL

Of the four alternatives identified so far, the Bicknell and Vail alternatives may present fewer problems from an environmental permitting perspective. These line routes generally follow Interstate Highway 19, parallel existing transmission lines and traverse land previously disturbed by surface mining activity. At the northern end, the route into TEP's Vail substation would need to traverse more highly developed areas. A significant portion of the line route associated with the Sierra Vista and Pantano alternatives would generally follow AZ Highway 82 and traverse a portion of the Coronado National Forrest. This route is in a more environmentally sensitive area and is anticipated to raise more public concern than the routes along I-19.

TRANSMISSION SERVICE COSTS

The addition of a second transmission line interconnected to a system other than WAPA will require an interconnection agreement and potentially, a transmission service contract with the transmission owner. Any transmission service costs are expected to be in addition to those presently incurred for use of WAPA's system.

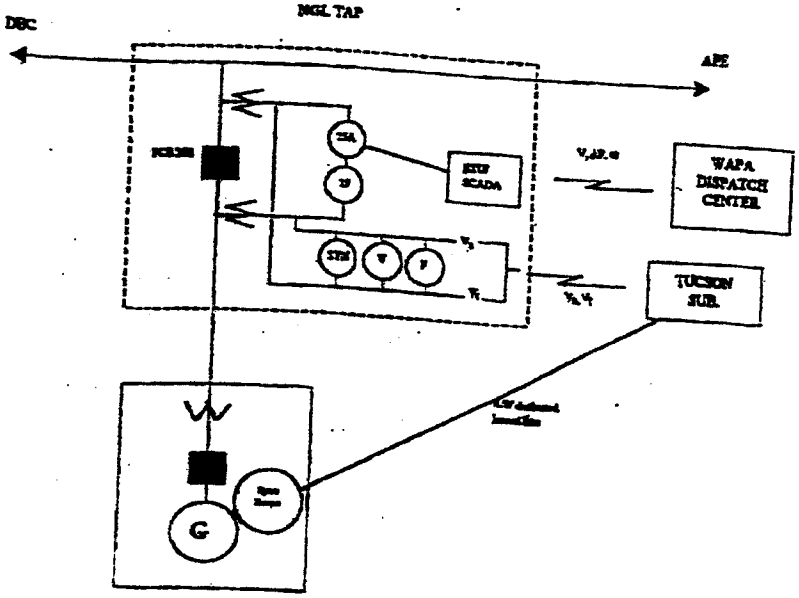
SELECTION OF PREFERRED PLAN

Citizens contracted with two consulting firms, Power Engineers and Dames & Moore, to assist in refining the cost estimates associated with each alternative, complete a more detailed description of the environmental characteristics associated with each alternative, and develop a proposed work plan outlining the steps required and a projected schedule for permitting, design and construction of a second transmission line. A Transmission Alternatives and Plan of Action Report ("Report") was filed with the Commission on April 15, 1999. The Report includes provisions for participation by the proposed local Community Action Committee in the planning efforts and coordination with other appropriate local, state, and federal agencies to develop the information necessary for applying for a Certificate of Environmental Compatibility from the Commission's Power Plant and Transmission Line Siting Committee.

ATTACHMENT I

INSTALLATION OF SYNCHRONIZING SYSTEM AT NOGALES TAP

The meeting at Nogales Tap between Western Area Power Administration ("WAPA") and Citizens Utilities Company (CUC) on December 16, 1998, resulted with an agreement to adopt a synchronizing scheme that will eliminate outages on CUC distribution system when transferring loads from CUC generators to WAPA 115-kV system. The scheme, shown in the diagram below, involves the procurement and installation of Beckwith auto-synchronizer, sync-check relay, and transducer, as well as synchroscope, voltmeters and frequency meters at Nogales Tap. In addition, CUC requires a synchroscope at Valencia power plant that will allow their operator to remotely monitor the voltages and sync condition at the Nogales Tap power circuit breaker (PCB 362).



Nogales Tap Auto-synchronizing Scheme

The Beckwith auto-synchronizer (M-0193) and transducer (M-0214) provide analog signals of incoming and running voltages, differential voltage, phase angle and slip to WAPA's dispatcher at Phoenix office via RTU/SCADA channels. With the SCADA data, the dispatcher will be able to coordinate with CUC operator in closing PCB 362 while the generators are on line. By providing telemetered voltages to CUC power plant, the plant operator will be able to observe the sync condition of line-side and generator-side voltages at Nogales Tap and act appropriately to facilitate breaker closing. In the event of telemetry failure, the local synchroscope at Nogales Tap will allow direct observation of the sync condition of voltages across the breaker by CUC personnel. Coordination with plant operator can be accomplished via mobile radio or cellular phone.

The subject relays have been delivered and installed. The Valencia power plant is presently capable of synchronizing to WAPA through the Nogales Tap by receiving real-time instructions from WAPA dispatch regarding machine speed.

The next stage of this project involves implementation of an actual synchroscope at the Valencia Power Plant, thereby eliminating the need to rely on WAPA dispatch to instruct the machine operators. The telemetry equipment needed for this part of the project has been ordered. Orders have also been placed to install phone lines that will be used as communication.

ATTACHMENT II

Project Name: Nogales Switching Station

Purpose and Need:

Citizens' load in Santa Cruz County is presently served through a radial 115-kV transmission line that connects to the transmission system of WAPA at an interconnection point near Tucson. When a electrical fault on WAPA's transmission line serving this tap point occurs, circuit breakers at the remote ends of WAPA's line open to clear the fault. Opening WAPA's line results in interruption of service to all of Citizens' customers in the county. During 1998 there were 10 outages of WAPA's line, three of which resulted in extended outages to Citizens' customers. This project will replace the existing facilities at the point of delivery with three transmission voltage circuit breakers that will automatically sectionalize WAPA's transmission line during faults and avoid outages to Citizens' customers caused by those faults.

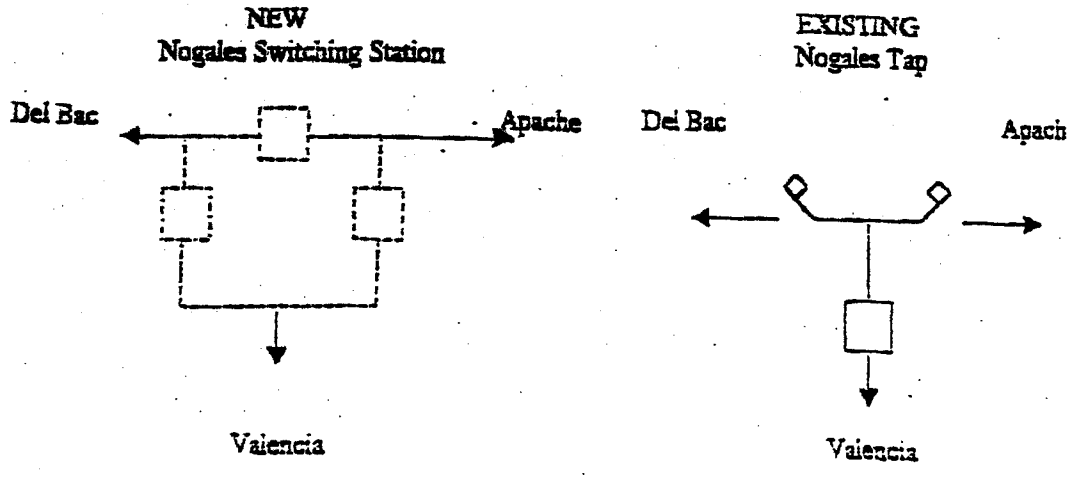
Scope:

Install three 115-kV circuit breakers and associated protective relaying, six bus switches, one motor operated line switch, bus work, a control building with supervisory control and data acquisition (SCADA) facilities and dual ported RTU and modify relaying and communications facilities at other affected substations (Del Bac, Adams Tap, Apache, and Vail).

Remove one 115-kV circuit breaker, three disconnect switches and associated bus work and station service equipment owned by Citizens. Remove two motor operated disconnect switches, metering and SCADA equipment owned by WAPA.

Schedule: In-Service Date: June 30, 1999.

Cost: $2,100,000



ATTACHMENT III

CITIZENS UTILITIES COMPANY
DOCKET NO. E-01032B-98-0621
STAFF'S FIRST SET OF DATA REQUESTS
JANUARY 28, 1999

WITNESS: RESAL A. CRAVEN

DATA REQUEST NO. RF-1:

In Docket No. E-01032A-98-0611, Citizens filed four Exhibits on January 25, 1999. In Exhibit 3, page 7, Citizens said that it was exploring the possibility of constructing a second 115 kV line to serve its customers in Santa Cruz County. A preferred route has been identified.

A. Please provide an Exhibit showing the location of this preferred route, any alternative routes, and indicate the substations where the line will terminate.

B. Please describe in detail any negotiations that have been held with other utilities for the routing and construction of this line.

RESPONSE:

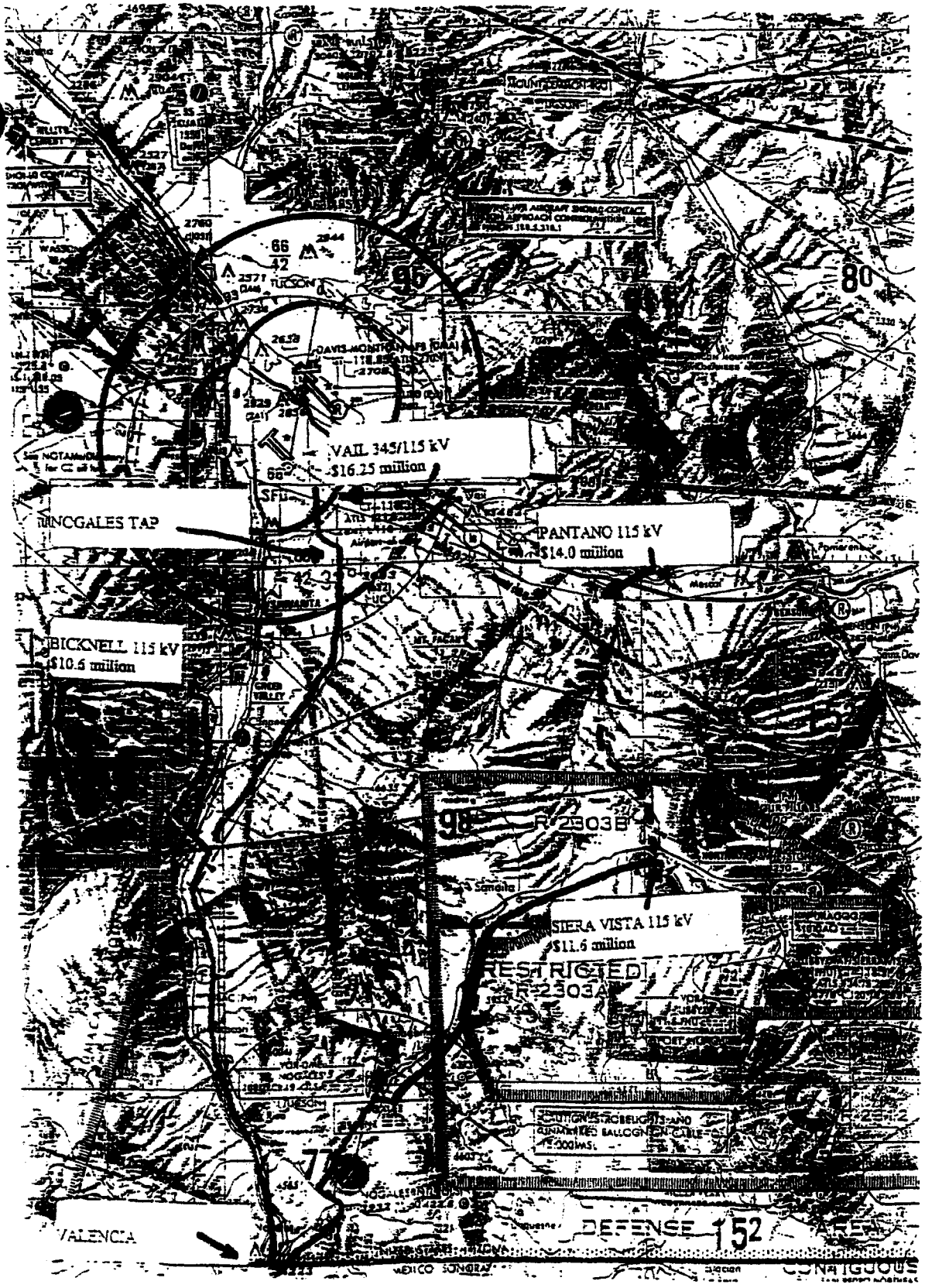
A. Attachment RF1A is a copy of a FAA Sectional Chart showing the general geographic area between Tucson and Nogales AZ. Four alternative routes for a second 115 kV transmission line are superimposed on the chart along with the names of the substations where the line would terminate. The southern terminus of the line is shown as Valencia Substation; however, due to congestion and space limitations the line may have to be terminated at another location. The exact termination has not been determined at this time. Preliminary power flow cases have been run for the Bicknell, Pantano, and Sierra Vista alternatives. Power flow cases have not been run for the Vail 345/115 kV alternative. Initial study results indicate that of these three alternatives, the Bicknell alternative may be the preferred alternative for technical, environmental and economic reasons. These are initial alternatives. Further technical and environmental studies may identify additional alternatives.

CITIZENS UTILITIES COMPANY
DOCKET NO. E-01032B-98-0621
STAFF'S FIRST SET OF DATA REQUESTS
JANUARY 28, 1999

WITNESS: RESAL A. CRAVEN

RESPONSE TO RF-1 CONTINUED:

B. Detailed negotiations have not been held with any other utilities at this point. Arizona Electric Power Cooperative ("AEPCO"), and Tucson Electric Power Company ("TEP") have been contacted regarding their interest in pursuing technical studies and exploring contractual considerations for an interconnection with Citizens. AEPCO has completed initial power flow cases analyzing ties to Bicknell, Pantano and Sierra Vista. The same study data has been provided to TEP. Initial discussions with TEP personnel indicate that TEP can not provide transmission service to Citizens over it's 230 or 138 kV systems because of bonding restrictions on the use of those facilities. Service over their 345kV system does not have those restrictions; however, TEP has not completed power flow cases for any potential interconnection.



CITIZENS UTILITIES COMPANY
DOCKET NO. E-01032B-98-0621
STAFF'S FIRST SET OF DATA REQUESTS
JANUARY 28, 1999

WITNESS: RESAL A. CRAVEN

DATA REQUEST NO. RF-2:

In the previously mentioned docket, a modified Exhibit 1 was filed on January 26, 1999. This modified Exhibit indicates that Citizens would construct the second transmission line in 2003.

A. Please describe how the year 2003 was selected as the in-service date for this line.

B. What is the earliest possible in-service date for this line?

C. What could prevent Citizens from installing this line prior to 2003?

RESPONSE:

A. The year 2003 was proposed as the in-service date based on the author's experience in completing planing and environmental studies, permitting, right of way acquisition, line and substation design and construction for such a line. A five-year lead time to complete those required activities for an approximately 50-60 mile, 115 kV transmission line is considered to be a realistic, achievable time frame.

B. The earliest possible in-service date would be approximately 36 months from now or February, 2002, assuming early agreement with another utility on the location of the interconnection, expedited approval of a Certificate of Environmental Compatibility and no requirement for condemnation of land owners to secure right-of-way.

C. Unwillingness of other utilities to cooperate in transmission planning studies and enter into interconnection agreements; A protracted Environmental Assessment/CEC process; route changes or protracted condemnation procedures during right of way procurement efforts or; lack of availability of materials for line and station construction.

ATTACHMENT IV

CITIZENS UTILITY COMPANY

POLE AND CABLE REPLACEMENTS SANTA CRUZ ELECTRIC DISTRICT 1999-2003

	Pole Replacements					
	# of Poles	1999	2000	2001	2002	2003
1 Nogales West area	75	300,000	0	0	0	0
2 Nogales West north area	75	90,000	30,000	30,000	30,000	30,000
3 Reconductor Mariposa Industrial Park	75	90,000	75,000	0	0	0
4 Downtown Southeast	300	360,000	120,000	120,000	120,000	120,000
5 Downtown Northwest	300	360,000	120,000	120,000	120,000	120,000
6 Downtown Southwest	500	474,000	200,000	200,000	200,000	200,000
7 Downtown Northeast	300	360,000	120,000	120,000	120,000	120,000
8 Beatus Estates	150	180,000	60,000	60,000	60,000	60,000
9 Valle Verde	150	180,000	60,000	60,000	60,000	60,000
10 Chula Vista	50	60,000	20,000	20,000	20,000	20,000
11 Activate Circuit 6242	100	180,000	60,000	60,000	60,000	60,000
12 Circuit 6241	50	60,000	20,000	20,000	20,000	20,000
13 Meadow Hills North	75	90,000	30,000	30,000	30,000	30,000
14 Meadow Hills South	75	90,000	30,000	30,000	30,000	30,000
15 Transmission Line	20	320,000				
16 Highway 82	250	275,000	120,000	120,000	120,000	120,000
17 Old Tucson Road	10	25,000				
18 Rio Rico Highway Crossings		126,000				
19 Rio Rico Industrial Park	25	100,000				
20 Flux Canyon area	500	600,000	200,000	200,000	200,000	200,000
	3,080	$4,320,000	$1,265,000	$1,190,000	$1,190,000	$1,190,000

		Cable Replacements					
		Total (ft.)	1999	2000	2001	2002	2003
1	Mariposa Manor	7,677	61,416	61,416	61,416	61,416	61,416
2	Monte Carlo	12,040	96,320	96,320	96,320	96,320	96,320
3	Rio Rico U-3	28,160	225,280	225,280	225,280	225,280	225,280
4	Preston Trailer Park	3,633	29,064	29,064	29,064	29,064	29,064
5	Tubac Country Club	6,900	55,200	55,200	55,200	55,200	55,200
6	Tubac Valley Country Club	4,300	34,400	34,400	34,400	34,400	34,400
7	Palo Parado	13,530	108,240	108,240	108,240	108,240	108,240
8	Empty Saddle Estates	8,180	65,440	65,440	65,440	65,440	65,440
9	Mt Hopkins	52,800	457,400	422,400	422,400	422,400	422,400
10	Meadow Hills	15,840	126,720	126,720	126,720	126,720	126,720
11	Canyon Del Oro/Vista Del Cielo	4,500	36,000	36,000	36,000	36,000	36,000
12	Rio Rico Resort	1,828	14,624	14,624	14,624	14,624	14,624
		159,388	$1,310,104	$1,275,104	$1,275,104	$1,275,104	$1,275,104

Underground Cable Replacements

No.	Project	Estimated Cost
1	Mariposa Manor	61,416
2	Monte Carlo	48,160
3	Rio Rico U-3	327,560
4	Preston Trailer Park	29,064
5	Tubac Country Club	55,200
6	Tubac Valley Country Club	34,400
7	Palo Parado	54,120
8	Empty Saddle Estates	65,440
9	Mt Hopkins	457,400
10	Meadow Hills	126,720
11	Canyon Del Oro/Vista Del Cielo	36,000
12	Rio Rico Resort	14,624
		1,310,104

O/H Projects

No.	Project	Estimated Cost
1	Nogales West area	300,000
2	Nogales West north area	90,000
3	Reconductor Mariposa Industrial P	90,000
4	Downtown Southeast	360,000
5	Downtown Northwest	360,000
6	Downtown Southwest	474,000
7	Downtown Northeast	360,000
8	Beatus Estates	180,000
9	Valle Verde	180,000
10	Chula Vista	60,000
11	Activate Circuit 6242	180,000
12	Circuit 6241	60,000
13	Meadow Hills North	90,000
14	Meadow Hills South	90,000
15	Transmission Line	320,000
16	Highway 82	275,000
17	Old Tucson Road	25,000
18	Rio Rico Highway Crossings	126,000
19	Rio Rico Industrial Park	100,000
20	Flux Canyon area	600,000
		4,320,000

Upgrade Projects

No.	Project	Estimated Cost
1	Telephone System	140,000
2	Capacitors	230,000
3	SEL Relays	150,000
4	Normal Capital Budget	2,190,000

5	Valencia Reclosers & Scada	650,000
6	Valencia Regulator Replacements	224,514
7	Sonoita Substation Regulators	224,514
8	Valencia Breakers	152,000
9	Valencia Regulators Switches	45,000
10	Valencia Busswork	50,000
11	Padmounted Switchgear	12,000
12	Single Phase Reclosers	75,000
13	Remote Monitors	35,000
14	115 kV Breakers	100,000
15	Dispatch Center	150,000
16	Control Air Upgrade	75,000
17	Vacuum Breakers	300,000
18	SCADA Remote in Control Room	30,000
		4,807,000

No.	Project	Estimated Cost
1	Nogales Tap Upgrade	2,100,000
2	Syncronizing Capability	100,000
		2,200,000

Total		12,637,104

Cable Replacements
Progress to Date

		Estimated Ft.	Actual Ft.
1	Mariposa Manor	1,535	-
2	Monte Carlo	2,408	2,454
3	Rio Rico U-3	5,632	14,157
4	Preston Trailer Park	727	-
5	Tubac Country Club	1,380	-
6	Tubac Valley Country Club	860	7,290
7	Palo Parado	2,706	-
8	Empty Saddle Estates	1,636	-
9	Mt Hopkins	11,435	-
10	Meadow Hills	3,168	-
11	Canyon Del Oro/Vista Del Cielo	900	1,840
12	Rio Rico Resort	366	-
		32,753	25,741

Pole Replacements
Progress to Date

		Estimated Number	Actual Number
1	Nogales West area	75	26
2	Nogales West north area	15	28
3	Reconductor Mariposa Industrial Park	1	1
4	Downtown Southeast	60	74
5	Downtown Northwest	60	115
6	Downtown Southwest	100	91
7	Downtown Northeast	60	20
8	Beatus Estates	-	-
9	Valle Verde	30	106
10	Chula Vista	2	-
11	Activate Circuit 6246	-	-
12	Circuit 6241	10	-
13	Meadow Hills North	15	-
14	Meadow Hills South	15	-
15	Transmission Line	2	-
16	Highway 82	60	148
17	Old Tucson Road	10	9
18	Flux Canyon area	100	-
19	Rio Rico Industrial Park	1	16
		616	634

1999 System Improvement

Santa Cruz District

SCADA system Improvements

Operator Station Installation at the Valencia Generation Station

Arizona Dispatch Center

Communications Equipment Improvements

Lucent System Upgrade

After Hours Answering System

Remote Outage Monitoring System

Gantt Chart

1999 System Improvement
Santa Cruz District

This document is an overview of the various improvement projects in the Santa Cruz Districts scheduled for completion in 1999. Each area is described in the subsequent sections and the capital cost associated with these improvements is detailed in the exhibits to this report.

Valencia Substation Improvements

Introduction

The Valencia substation is the oldest of the Santa Cruz district substations. The primary purpose for upgrading this station is to improve reliability of equipment, improve maintainability of the substation, improve operation of the present circuits, and allow for expansion of the facilities to accept a second transmission feed to the station.

Site Structure

The Valencia substation will be converted to a low profile substation adjacent to the existing facility. Power Engineers has been contracted to design the foundations and steel structures to upgrade the existing substation to a similar design as the Canez substation. Site work is scheduled to begin in mid-April and will be finished prior to arrival of the remainder of the substation equipment described further in this report.

15 kV Breakers

The distribution breakers from the Valencia substation will be upgraded to new breakers during the relocation of the existing circuits to the new facilities adjacent to the current station. This involves the installation of 11 new ABB Type R breakers. These breakers are identical to the units installed in the Cañez and Kantor substations, and will be the standard in the district to minimize spare parts requirements for maintenance. Eight of these breakers will be utilized for load feeders, and three will be utilized for substation bus ties and transformer isolation.

Voltage Regulation

Presently the circuits out of the Valencia station are regulated individually. This design has advantages in system maintenance but reduces the flexibility of looping circuits for maintenance purposes. The upgrade will remove the voltage regulators from each branch circuit and replace them with redundant units capable of full load requirements on the output bus of the main transformers. The existing

voltage regulators will be redeployed as necessary on long circuits requiring voltage regulation due to line losses.

Protective Relaying and Controls

The existing relaying and metering facilities will be upgraded from current electro mechanical design to new solid state ABB DPU-2000R and ABB TPU-2000 units. Each circuit and transformer will have this upgrade, which will improve protection, eliminate calibration drift, and provide monitoring on each circuit to the SCADA system.

Breaker Controls

The substation will have a new control building with new equipment controls and SCADA interface equipment. This control building will house the breaker controls, substation battery bank, and communication link to the SCADA system. The building and controls will be installed concurrently with the breaker installations.

Sonoita Substation Improvements

Introduction

Improvements in the Sonoita substation will increase Citizens' ability to back feed circuits in the event of damaged distribution lines. The breakers have been modernized as part of the Rio Rico Improvement project of 1997 – 1998. Another major improvement to this station is the introduction of sectionalizing capabilities to the 115-kV line.

Voltage Regulation

The Sonoita substation feeds most of southern Rio Rico area. The station has two 115-kV/13.5-kV main transformers. The station was designed for branch voltage regulation. As mentioned earlier, this reduces the flexibility in emergency and maintenance switching situations.

To eliminate this, the existing equipment must be upgraded to bus voltage regulation. The company has purchased two three-phase voltage regulators and will install these on the secondary bus in the Sonoita substation.

Controls and Substation Building

The control relays presently installed in the breaker cabinets will be relocated to an environmentally controlled building. In addition, a new battery bank and associated charger will be installed in this new building. This upgrade will improve battery life, reduce the possibility of environmental issues affecting the existing ABB relays, and provide a better communication link to the SCADA system.

Installation of 115-kV Sectionalization Equipment

When a fault occurs on the 115-kV line between the Sonoita and Valencia substations, the 115-kV breaker at the Nogales tap opens and power to all of the Santa Cruz County service area is interrupted. The addition of a 115-kV breaker at the Sonoita substation, with protective relaying looking in the direction of the Valencia substation, will provide a means to automatically remove and isolate a fault on the Sonoita to Valencia 115-kV line without loss of power to the Sonoita, Canez and Kantor substations. The generators at the Valencia substation can be brought on line to pick up the load on the Valencia substation while the Sonoita to Valencia 115-kV line is being repaired. The 115-kV breaker control circuitry at Sonoita will have synchronizing relays to allow the 115-kV breaker at Sonoita to close in on the Valencia generators once the 115-kV line is repaired.

If the 115-kV breaker at the Nogales tap trips, instead of the Sonoita 115-kV breaker, the fault must exist between the Nogales tap and the Sonoita substation. In order to restore service quickly to the Sonoita and Valencia substations, a second 115-kV breaker will be installed at Sonoita on the Nogales tap side of the 115-kV bus. This breaker can be opened by SCADA, which will isolate the Sonoita and Valencia substations from the faulted line north of the Sonoita substation. With the Sonoita and Valencia substations
isolated from the fault, generators at Valencia substation can provide power to the Sonoita and Valencia substations. The 115-kV breaker control circuitry at Sonoita will have synchronizing relays to allow the 115-kV breaker at Sonoita to close in on the Valencia generators once the 115-kV line is repaired.

Kantor Substation Improvements

Introduction

The improvements in the Kantor substation are aimed at reducing outage times in the event that the transmission line is lost between the Nogales tap and the Sonoita substation.

Installation of 115KV Sectionalization Equipment

The Kantor substation is a relatively new substation with design similar to the Canez substation. Kantor has fuses protecting the substation transformer rather than a 115-kV circuit switcher. A new 115-kV circuit switcher has been purchased for the Kantor substation. Once the 115-kV circuit switcher has been installed at the Kantor substation, it will be connected to the SCADA system in order to operate the circuit switcher remotely. The circuit switcher at the Kantor substation can then be opened by SCADA when the 115-kV line is out due to a fault north of the Sonoita substation. This will isolate the Kantor substation from the 115-kV faulted line. Kantor substation can then be energized from the Canez substation via a SCADA controlled recloser, which ties together Circuit 8203 out of the Canez substation and

Circuit 7201 out of the Kantor substation. Power Engineers is designing a plan for incorporating the circuit switcher into the Kantor substation.

Distribution Circuits Improvements

Introduction

The distribution system improvements are an acceleration of work that was begun in 1994. These projects include the replacement of poles and underground cable. In 1994, pole replacements were concentrated in the northern part of Santa Cruz County. Some of the overhead work involves splitting circuits that share poles, in one case it involves the activation of an additional circuit in Nogales. Underground cable replacements are targeted at reducing outage hours in areas that have experienced frequent outages.

Overhead Circuits

The pole replacements are mainly concentrated in the Nogales area. These poles have reached the end of their life cycle. Some of the pole replacements involve the relocation of circuits, as in the case of Circuits 6241 and 6246. Circuit 6241 feeds the west-side of Nogales (and feeds the hospital). Circuit 6241 shares a pole with Circuit 6246. By relocating a portion of 6241, Citizens can reduce the stress on the poles and eliminate potential outages due to structural failures. Activation of Circuit 6246 will allow Citizens to split the load on the west-side of Nogales, and increase the ability to back feed 6241 in the event of damage.

A major portion of the pole replacements will be done along Highway 82 and into the mountains in the Lochiel area. These poles are also at the end of their useful life cycle. Along with pole replacements, Citizens is utilizing a gas right of way to bring in a loop feed into the Lochiel area. This loop will allow Citizens to sectionalize and isolate damaged portions of line, thereby keeping the highest number of customers in service.

Underground Circuits

Underground cable replacements are concentrated in Rio Rico and Tubac. The Rio Rico Urban 3 area was installed in the early 1970's. This cable was directly buried and is ending its useful life cycle. A significant number of outages occur in this area. Smaller sections of cables need to be replaced in other subdivisions, but not as much as in the above two subdivisions.

A significant portion of the cable replacements involves the underground feed to the top of Mount Hopkins. This cable was installed by a contractor in the 1970's, and was also direct buried. This cable has numerous faults. When a fault occurs, locating the faulted section requires an entire crew. It should be noted that because this part of the county is so far from the rest of the service territory, if

there is an outage that requires the crew from Nogales, it takes a minimum of an hour for them to get there.

The major portion of the replacements in Nogales are in trailer parks. These parks also have cable that was direct buried and have numerous faults. The older sections of the Meadow Hills area has the same type of cable installation. Some faults have occurred in this area, and some cable has been replaced as well.

Generation System Improvements

Introduction

The Hitachi/General Electric Frame 5 Combustion turbines were retrofitted with new control systems during 1997. The new controls systems included advanced microprocessor based sequencing and governor controls. In addition, increased historical data recording was incorporated to facilitate troubleshooting and compliance reporting. The controls supplier provided a complete combustion controls system, ancillary equipment needed for gaseous and liquid fuel control, as well as water injection. The result of these upgrades was an approximately 30% increase in generator output ratings on peak. The capacity upgrade, when integrated with the current APS purchase power contract, realized over $500,000 of incremental capacity credits. This flowed through to customers as lower purchased power costs. The following is a list of the additional improvements that are scheduled or have been completed in 1999.

General Electric System Study

One of the areas needing further analysis following the outages last year was the difficulty of picking up load initially following a black start scenario. Testing of the controls systems have shown no apparent problems. It appears there is an issue of system voltage imbalance or stability during load restoration in an island mode. The company has contracted with the General Electric Company ("GE") to simulate this situation on the turbines and examine the voltage regulator response to high voltage transients. This study will focus on the impacts of system voltage support equipment on system voltage and frequency levels during restoration activities. In addition, GE will be providing technical assistance in replacing protective relays and voltage regulators on the units.

Voltage Regulator Replacement

One of the final control system improvements will be the installation of a new voltage regulator system on each of the turbines. The present systems will be replaced with solid state devices. This will improve regulator response and improve regulator maintainability and reliability.

DC Power System Improvements

The original generator power block design had a single source of DC power to the controls, as well as the inverter, which supplies vital AC power to the units. Vital AC power is used to drive the spark plugs, flame scanners, and fuel control equipment on the units during black start conditions. Following the outages in late 1998, the company installed a redundant battery bank, and DC/AC inverter. This modification adds 100% redundancy to the system. In addition to these additions, provisions were made for an emergency AC generator input to this vital system.

Air Blast Circuit Breaker Replacement

The company will be upgrading the generator breakers to vacuum breakers from the current air blast design. This improvement will eliminate the need for high-pressure compressed air systems for breaker operations. It will eliminate the possibility of breaker unavailability as a result of low air pressure and will allow for unlimited breaker operations with no recharge periods. This is a substantial improvement to the reliability of the generators.

Starting Ratchet Upgrade

The starting mechanism of a Hitachi/General Electric Frame 5 gas turbine has a hydraulic ratchet mechanism to break the turbine shaft free from friction and allow the starting diesel and clutch mechanism to accelerate the shaft to firing speed. This system is essential to reliable starting of the units. Although the current system is working effectively, it will be upgraded to remove compressed air from the system entirely. This should improve starting reliability and reduce the maintenance required to maintain the system.

Protective Relaying Improvement

Citizens is negotiating with a contractor to replace the electro mechanical relays presently in service on the combustion turbines. The new relays will consist of modern microprocessor based relays. These state-of-the-art relays do not suffer from a drift in calibration, which plagues mechanical devices, which will provide greater reliability over time. They also have many other features that the existing electromechanical units do not, such as event and operations reporting, input and output contacts for alarms and events sequencing, and SCADA. The cost for the installation of these microprocessor-based units is expected to be approximately $42,000.

SCADA system Improvements

Operator Station Installation at the Valencia Generations Station

Citizens is in the process of installing a SCADA operating console in Valencia Generating Station. The terminal will have full functionality before the monsoon

season of 1999. This console will be a backup to the main dispatch center, which will be located in Kingman and is scheduled for completion in the fall. The generation station will be manned approximately 16-20 hrs per day. This improvement will add a backup to the primary dispatch center and will provide coordination during outage restoration that requires running the Valencia units.

Arizona Dispatch Center

Citizens has made a commitment to implement a 24-hour dispatch center for electric operations by the fall of 1999. This dispatch center will be based in Kingman, and will ultimately cover all three Arizona electric operations (Nogales, Kingman, and Havasu). The dispatch center will serve several functions, including: expediting outage restoration, providing engineering reports, and serving as a control center for switching operations. Initially, this system will be linked to the existing SCADA in Nogales, and will provide monitoring for portions of Kingman. The SCADA installation will be a multi-year project, ultimately covering Kingman and Havasu Districts, in addition to the Santa Cruz District. Santa Cruz substations are presently tied to the Nogales SCADA, and will be accessible from the dispatch center in 1999.

For the interim, prior to fall of 1999, a remote SCADA terminal will be placed in a Citizens electric property in Hawaii. This property, Kauai Electric, has 24-hour staffing, whom will be able to notify on-call supervisors in Nogales in the event of an after hours breaker operation. This is scheduled to be implemented by the end of May 1999.

Communications Equipment Improvements

Lucent System Upgrade

On February 25th, 1999, a new state-of-the-art Lucent phone system was installed in the Citizens Nogales administrative office. This system replaced an older system, which did not adequately meet customer needs during periods of peak phone traffic. Customers had voiced complaints about the difficulty of obtaining information during outage conditions. The new Lucent system enables Citizens to handle a substantially greater number of simultaneous incoming calls by employing advanced call vectoring techniques, and by having an increased number of ports.

The new system includes a sophisticated Call Center and voice messaging, which can readily be updated with outage information that will keep customers better informed during outage situations. This Call Center also has reporting functions to help Citizens to better manage its call handling.

Citizens also has increased the number of stations that are able to log in and out of the Call Center, thereby increasing the number of operators available during an outage.

After Hours Answering System

On January 15th, 1999, Citizens Arizona Energy changed its emergency after hours answering services for Kingman Electric, Havasu Electric, and Santa Cruz Gas & Electric. The new answering service employed by Citizens is Kachina Telecommunications, located in Green Valley. This answering service has several advantages the previous provider did not. The system offered by Kachina Telecommunication allows customers to leave voice mail, listen to outage updates, as well as speak to a live operator. Kachina Telecommunications also has bilingual staff, which helps to meet the needs of customers in Southern Arizona.

Remote Outage Monitoring System

An Outage Location System ("OLS") is to be installed across the entire Santa Cruz electric system based on DCI Sentry technology from Design Concepts International. The purpose of the OLS is to provide early notification and approximate location for electrical outages to enable prompt and focused dispatch of crews for power restoration. The key component to OLS is the DCI Sentry device installed in customer meters (or internally in customers' home/business) and tied into customers' telephones. The Sentry devices are programmed to call into a Master Station computer to report electric outages meeting prescribed conditions (e.g. longer than 1 minute). The unique identifier on each Sentry device allows the Master Station to pinpoint the location of the device. By strategically locating Sentry devices throughout the distribution system, data on approximate location and extent of outages becomes available within minutes of occurrence.

EXHIBIT 1

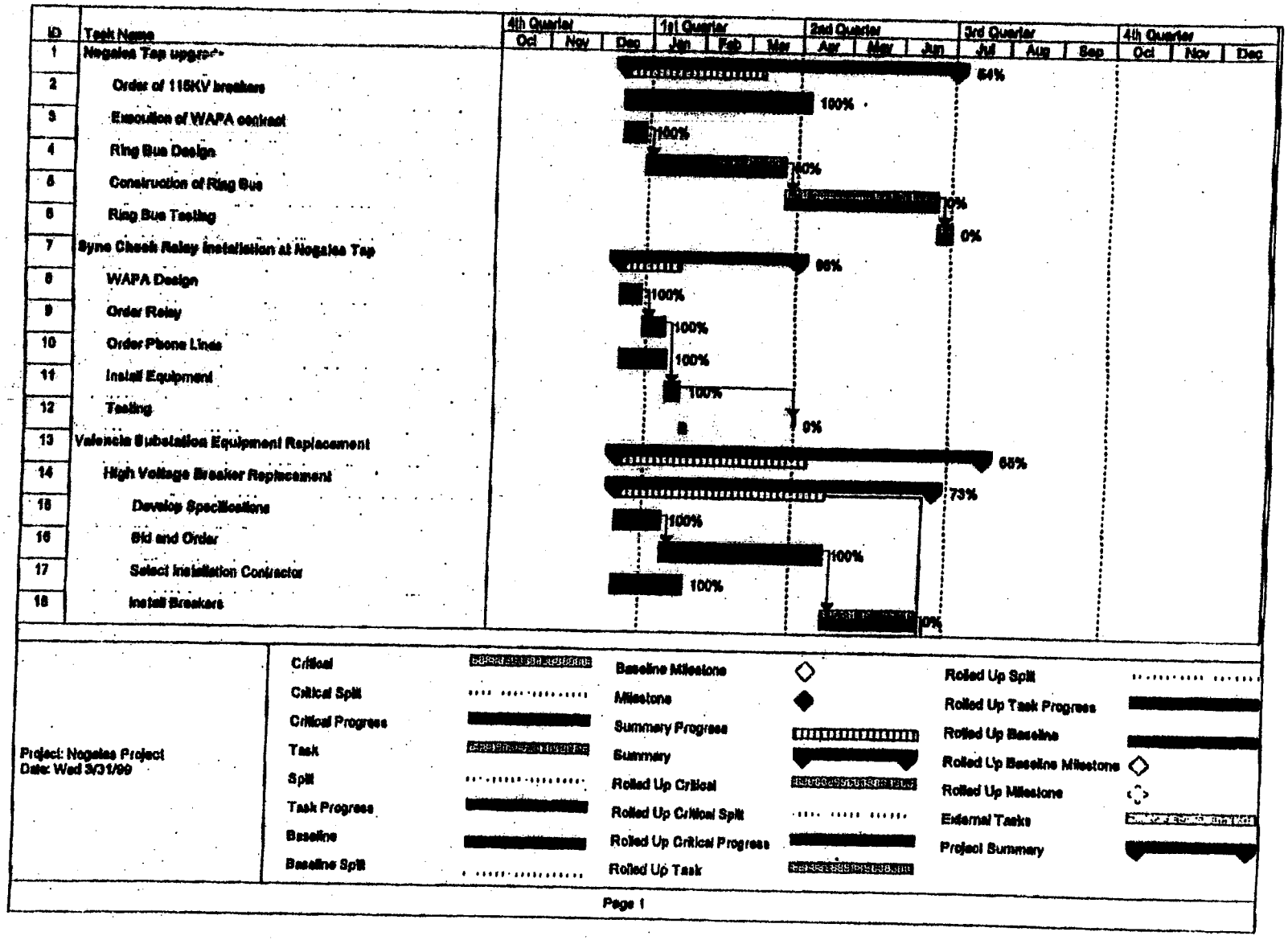
1999 Capital Expenditure Schedule

Santa Cruz Electric District
1999 Capital Expenditures

Valencia Substation Improvements		$ 575,000.00
Sonoita Substation Improvements		$ 450,000.00
Kantor Substation Improvements		$ 50,000.00
Nogales Tap Synchronizing Equipment		$ 100,000.00
Nogales Tap Switching Station		$ 2,100,000.00
Distribution Improvements	*****	
Overhead		$ 4,320,000.00
Underground		$ 1,310,104.00
Generation System Improvements		
Electric System Study		$ 60,000.00
Voltage regulator upgrade		$ 100,000.00
DC system power improvements		$ 240,000.00
Gen. Breaker replacement		$ 300,000.00
Starting Ratchet upgrades		$ 45,000.00
SCADA Installations		
Valencia Station Console		$ 60,000.00
Az. Dispatch Center		$ 250,000.00
Communications System Upgrade		
Lucent System Installation		$ 170,000.00
Remote Outage Monitoring System		$ 50,000.00
Capital Outlays associated with continued		$ 2,190,000.00
Total		$ 12,370,104.00

EXHIBIT 2

Gantt Chart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Oct
Nov
Dec
1st Quarter
Jan
Feb
Mar
2nd Quarter
Apr
May
Jun
3rd Quarter
Jul
Aug
Sep
4th Quarter
Oct
Nov
Dec
1 Negales Tap upgrade
2 Order of 115KV breakers
3 Execution of WAPA contract
4 Ring Bus Design
5 Construction of Ring Bus
6 Ring Bus Testing
7 Syne Check Relay Installation at Nogales Tap
8 WAPA Design
9 Order Relay
10 Order Phone Lines
11 Install Equipment
12 Testing
13 Valencia Substation Equipment Replacement
14 High Voltage Breaker Replacement
15 Develop Specifications
16 Bid and Order
17 Select Installation Contractor
18 Install Breakers
64%
100%
100%
100%
0%
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100%
100%
100%
0%
65%
73%
100%
100%
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Date: Wed 3/31/99
Critical
Critical Split
Critical Progress
Task
Split
Task Progress
Baseline
Baseline Split
Baseline Milestone
Milestone
Summary Progress
Summary
Rolled Up Critical
Rolled Up Critical Split
Rolled Up Critical Progress
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Rolled Up Split
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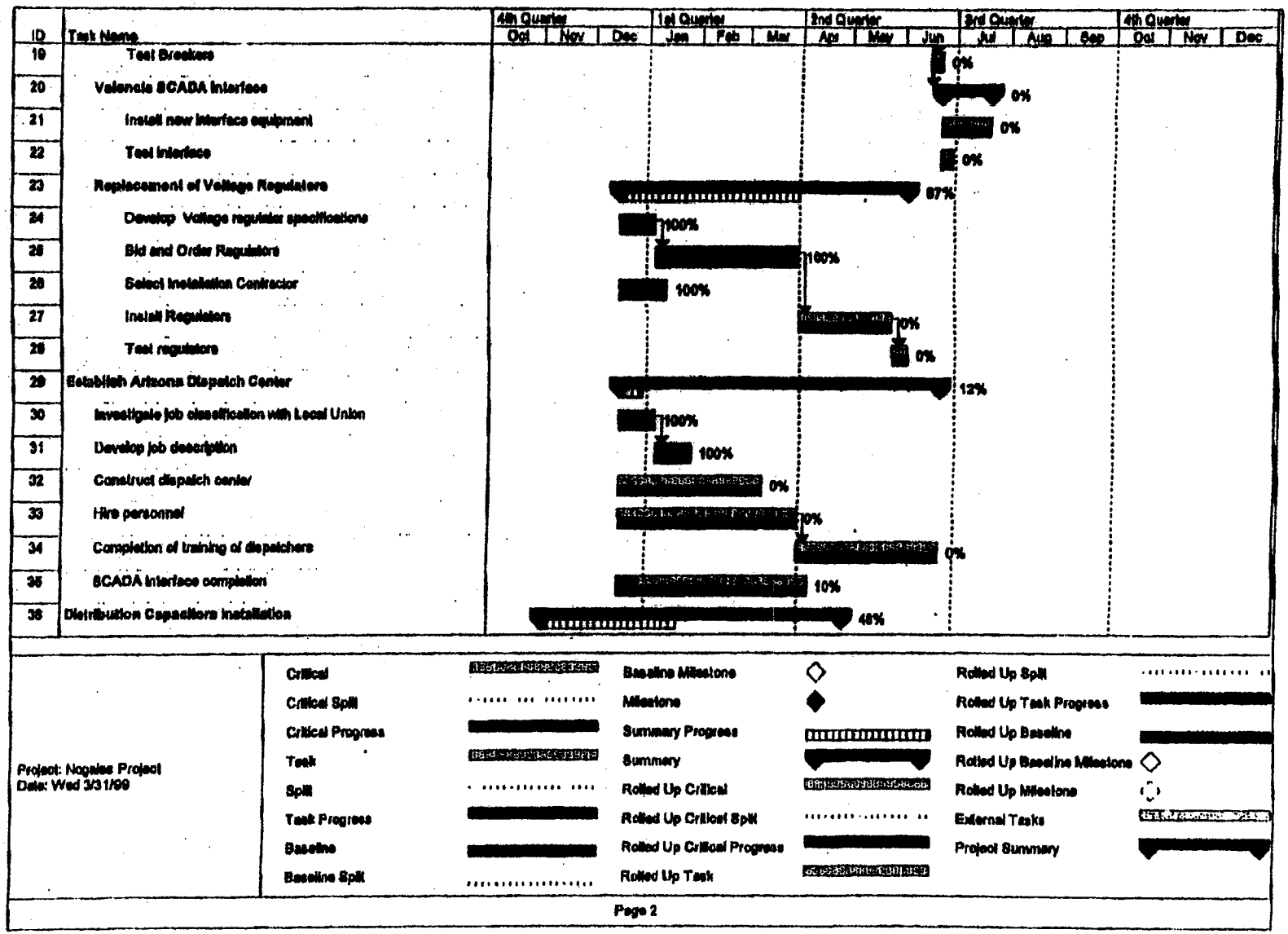
Rolled Up Baseline Milestone
Rolled Up Milestone
External Tasks
Project Summary
Page 1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Oct
Nov
Dec
1st Quarter
Jan
Feb
Mar
2nd Quarter
Apr
May
Jun
3rd Quarter
Jul
Aug
Sep
4th Quarter
Oct
Nov
Dec
19 Test Breakers
20 Valencia SCADA Interface
21 Install new interface equipment
22 Test Interface
23 Replacement of Voltage Regulators
24 Develop Voltage regulator specifications
25 Bid and Order Regulators
26 Select Installation Contractor
27 Install Regulators
28 Test regulators
29 Establish Arizona Dispatch Center
30 Investigate job classification with Local Union
31 Develop job description
32 Construct dispatch center
33 Hire personnel
34 Completion of training of dispatchers
35 SCADA Interface completion
36 Distribution Capacitors Installation
0%
0%
0%
0%
87%
100%
100%
100%
0%
0%
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100%
100%
0%
0%
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Date: Wed 3/31/99
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Critical Split
Critical Progress
Task
Split
Task Progress
Baseline
Baseline Split
Baseline Milestone
Milestone
Summary Progress
Summary
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Rolled Up Critical Split
Rolled Up Critical Progress
Rolled Up Task
Rolled Up Split
Rolled Up Task Progress
Rolled Up Baseline
Rolled Up Baseline Milestone
Rolled Up Milestone
External Tasks
Project Summary

BEFORE THE ARIZONA CORPORATION COMMISSION

Arizona Corporation Commission
DOCKETED
JUL 13 1999
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AZ CORP COMMISSION
DOCUMENT CONTROL

CARL J. KUNASEK
CHAIRMAN
JIM IRVIN
COMMISSIONER
WILLIAM A. MUNDELL
COMMISSIONER

IN THE MATTER OF THE JOINT NOTICE OF INTENT OF CITIZENS UTILITIES COMPANY, CITIZENS TELECOMMUNICATIONS OF THE WHITE MOUNTAINS, NAVAJO COMMUNICATIONS COMPANY, INC., CITIZENS UTILITIES RURAL COMPANY, INC., CITIZENS TELECOMMUNICATIONS COMPANY, SUN CITY SEWER COMPANY, SUN CITY WATER COMPANY, SUN CITY WEST UTILITIES COMPANY, CITIZENS WATER SERVICE COMPANY OF ARIZONA, CITIZENS WATER RESOURCES COMPANY OF ARIZONA, TUBAC VALLEY WATER COMPANY, INC., AND ELECTRIC LIGHTWAVE, INC. TO ORGANIZE A PUBLIC UTILITY HOLDING COMPANY AND FOR RELATED APPROVALS OR WAIVERS PURSUANT TO R14-2-801, *ET SEQ.*

DOCKET NO. E-01032A-98-0611
T-03214A-98-0611
T-02115B-98-0611
T-01954B-98-0611
T-02755A-98-0611
SW-2276A-98-0611
W-01656A-98-0611
WS-02334A-98-0611
W-03454A-98-0611
W-03455A-98-0611
W-01595A-98-0611
T-03054A-98-0611

CITIZENS' COST-BENEFIT ANALYSIS OF TRANSMISSION-LINE ALTERNATIVES AND PLANNED CONSTRUCTION SCHEDULE

Citizens Utilities Company is filing its cost-benefit analysis of transmission-line alternatives and a planned construction schedule for the preferred alternative. This filing supplements Citizens' previous filings on April 15, 1999, and May 7, 1999.

Exhibit A summarizes the results of the cost-benefit analysis. Eight criteria, each desirable, were used to evaluate each of the four transmission-route alternatives that were previously identified:

1. Least Environmental Impact
2. Lowest Technical Complexity
3. Easiest Construction Access
4. Least Private Right of Way Acquisition

5. Least Visual Impact
6. Greatest Load-Serving Capacity
7. Best Service Reliability
8. Lowest Installed Cost

Selection of these factors and their application were based upon preliminary power flow case results performed at Citizens' request by Arizona Electric Power Cooperative, presently available environmental and land use information included in the April 1999 report titled "Santa Cruz Electric Division Transmission Alternatives and Plan of Action" (previously provided in response to Staff Data request), cost estimates and facility loading capacity data included in this report, and Citizens' and its consultant's engineering judgment.

Each of the criteria was then weighted by its importance. For example, the "Best Service Reliability" criterion was considered to be most important, so that it was weighted at "ten" on a ten-point scale. At the other extreme, "Lowest Technical Complexity" was judged to be least significant and weighted at "two" on a ten-point scale.

The next step in the evaluation was to rank each of the four transmission-line alternatives on each criterion from one to four. Four was the highest possible ranking; one was the lowest. The rankings were based upon the information previously provided to the Commission in this docket.

Each criterion ranking was then multiplied by its respective weighting to obtain a score for each transmission-line alternative on each criterion. For example, the Bicknell-Valencia route was ranked as "four" on the "Least Environmental Impact" criterion, which was weighted at "nine." As a result, this alternative scored "36" in this category.

The final step was to total the nine scores for each criterion for each of the four transmission line alternatives. **The Bicknell-Valencia route was the clear choice, ranking at "219," which nearly doubled the score of its closest rival, the Pantano-Valencia route.**

Exhibit B is a map that shows each of the four routes.

Exhibit C is a Gantt chart that schedules each major component needed to construct the Bicknell-Valencia transmission line. **It indicates completion of the line by December 2003.** Of course, certain of the assumptions in the forecast are educated guesses, at best. Permitting could actually consume a significantly different amount of time, as could site-acquisition. Only time will tell.

Exhibit D provides cost support for each of the four alternatives. Exhibit E shows one-line diagrams for facilities that would need to be constructed for each alternative.

Exhibit F details a load-flow analysis for the preferred Bicknell-Valencia route. The first page of the exhibit is a one-line operating diagram. The analysis following the one-line diagram provides an engineering assessment of the maximum load-serving capability of the existing radial transmission line and the maximum load-serving capability with a second 115-kV transmission line from Bicknell Substation to Valencia Substation. This analysis assumes the existing interconnected transmission system is capable of maintaining nominal voltage levels at the load levels indicated in the report.

Exhibit G describes the Citizens Advisory Council that will work with Citizens and the Commission Staff to evaluate future construction undertaken for the benefit of Citizens' Santa Cruz County electric customers. Finally, Exhibit H provides resumes for each of the participants in the cost-benefit analysis.

Citizens believes that this filing satisfies its requirement in the Commission's June 29, 1999, Order in Docket No. E-01032B-98-0621 (Decision No. 61793), that Citizens "shall provide a planned service date and cost benefit analysis for the cost of system components of the second transmission line included in its Plan of Action, as directed by Decision No. 68183, in the 'Separation Docket.'" Citizens welcomes the Staff's responsive review and analysis.

RESPECTFULLY SUBMITTED on July 12, 1999.

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Associate General Counsel
Citizens Utilities Company
2901 N. Central Avenue, Suite 1660
Phoenix, Arizona 85012

Original and ten copies filed this
12th day of July, 1999, with:

Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

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this 12th day of July, 1999, to:

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By: Joann Zychlewicz

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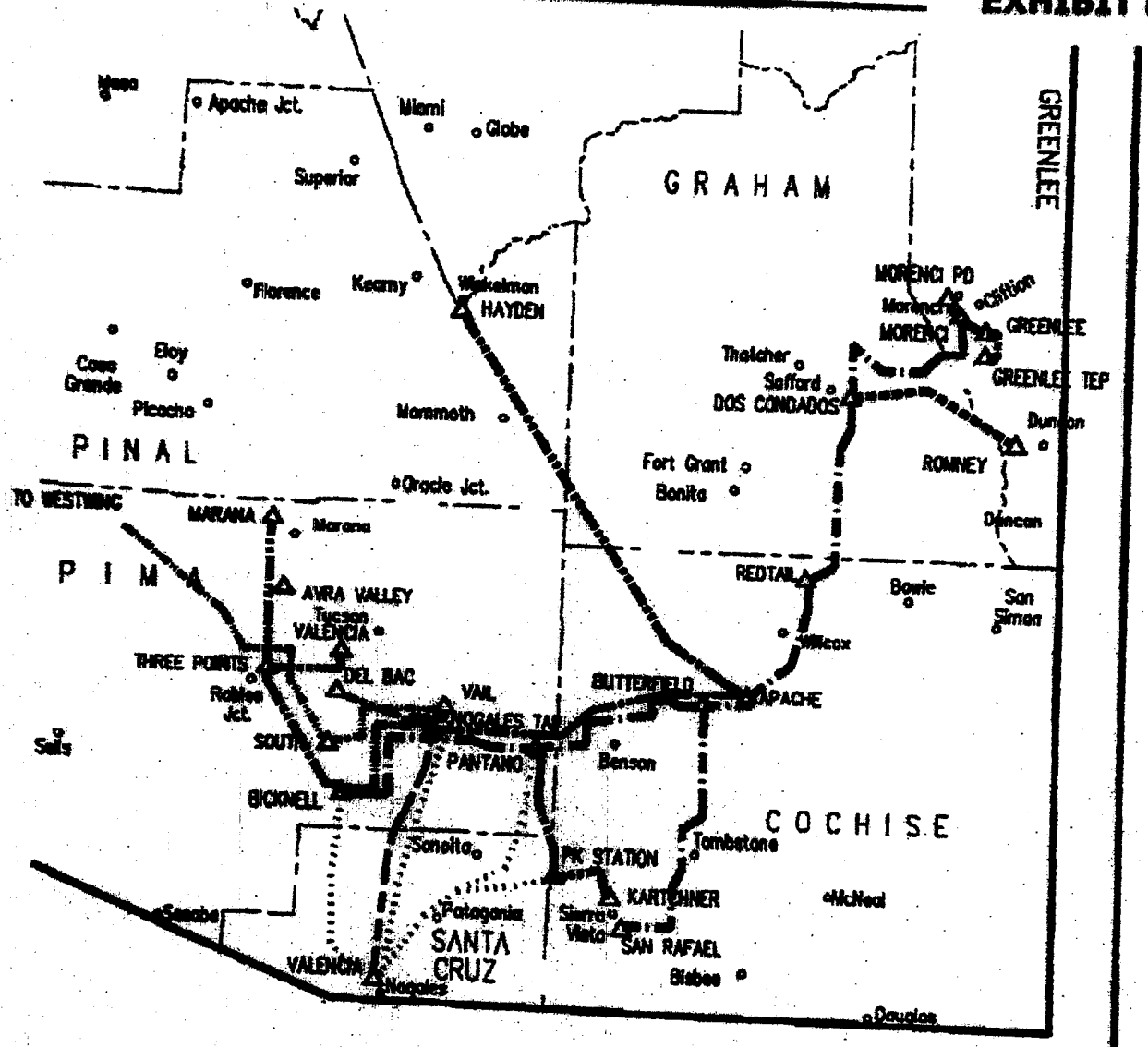
EXHIBIT A

NOGALES SECOND TRANSMISION LINE COMPARISON OF ALTERNATIVES
PRELIMINARY RANKING OF BENEFITS (Highest Weighted Score indicates preferred alternative)

Transmission Alternative >		Wgt.	Bicknell - Valencia 115 kV	Pantano - Valencia 115 kV	Kartchner - Valencia 115 kV	Vail - Valencia 115 kV
Transformer Required			None	None	None	345/115 kV
Installed Cost			21,600	23,000	20,900	27,000
Decision Criteria V						
Least Environmental Impact	Score	9	4	2	1	3
	Wgt'd Score		36	18	9	27
Lowest Technical Complexity	Score	2	4	2	4	1
	Wgt'd Score		8	4	8	2
Easiest Construction Access	Score	3	4	1	3	2
	Wgt'd Score		12	3	9	6
Least Private ROW	Score	6	4	2	1	3
	Wgt'd Score		24	12	6	18
Least Visual Impact	Score	9	4	2	1	3
	Wgt'd Score		36	18	9	27
Greatest Load Serving Capacity	Score	9	4	3	2	1
	Wgt'd Score		36	27	18	9
Best Service Reliability	Score	10	4	3	1	2
	Weight					
	Wgt'd Score		40	30	10	20
Lowest Installed Cost	Score	9	3	2	4	1
	Weight					
	Wgt'd Score		27	18	36	9
Totals	**Raw Score**		**31**	**17**	**17**	**16**
	Weighted Score		**219**	**130**	**105**	**118**

EXHIBIT B



N

AEPCO SOUTHERN TRANSMISSION

- 345KV LINE
- 230KV LINE
- 115KV LINE
- 69KV LINE
- △ SUBSTATION

CITIZENS

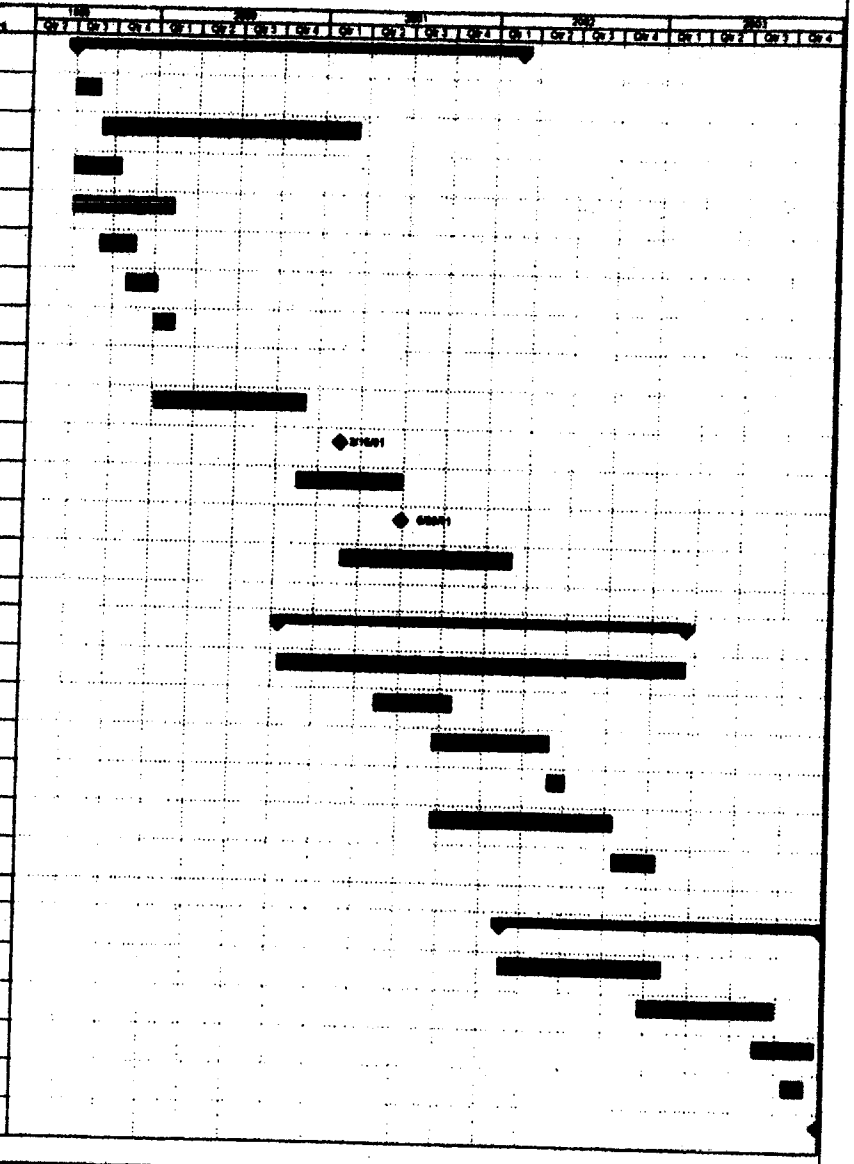
- 115KV LINE
- △ SUBSTATION
- NEW 115KV LINE ALTERNATES
- WESTERN 115KV LINE

* MODIFIED FROM AN AEPCO DRAWING

EXHIBIT C

Santa Cruz Electric Division - Transmission Alternatives
Citizens Utilities Co.
Project Schedule

ID	Activity Description	Duration	Start	Finish	Predecessors
1	**PHASE I - Planning and Permitting**	**883 days**	**Thu 7/1/99**	**Mon 3/25/02**	
2	Initiate Public Involvement Program	42 days	Thu 7/1/99	Fri 8/27/99	
3	Preliminary Engineering	399 days	Thu 9/2/99	Tue 3/13/01	
4	Regional Study and Alternatives Identification	77 days	Thu 7/1/99	Fri 10/15/99	
5	Scoping/ Public and Agency Participation	160 days	Thu 7/1/99	Wed 2/9/00	
6	Inventory	57 days	Thu 9/2/99	Fri 11/19/99	
7	Impact Assessment	50 days	Mon 11/1/99	Fri 1/7/00	
8	Route Selection	32 days	Mon 1/3/00	Tue 2/15/00	
9	**Environmental Report Preparation**	**388 days**	**Fri 1/7/00**	**Thu 6/28/01**	
10	Environmental Report Preparation	236 days	Fri 1/7/00	Fri 12/1/00	
11	Agency Decision Notice/Record - NEPA Compliance	1 day	Fri 2/16/01	Fri 2/16/01	
12	Certificate of Environmental Compatibility (CEC)	160 days	Fri 11/17/00	Thu 6/28/01	
13	Issuance of CEC	1 day	Thu 6/28/01	Thu 6/28/01	
14	**Pre-Construction Surveys**	**282 days**	**Fri 2/23/01**	**Mon 3/25/02**	
15					
16	**PHASE II - Design**	**629 days**	**Mon 10/16/00**	**Thu 3/13/03**	
17	Land Services and Right-of-Way Acquisition	629 days	Mon 10/16/00	Thu 3/13/03	
18	Survey and Geotechnical	119 days	Tue 5/15/01	Fri 10/26/01	
19	Line Design	182 days	Mon 9/17/01	Tue 5/28/02	
20	Structure Staking	28 days	Tue 5/28/02	Thu 7/4/02	
21	Substation Physical and Electrical Design	285 days	Mon 9/17/01	Fri 10/18/02	
22	Contractor Selection	65 days	Mon 10/21/02	Fri 1/17/03	
23					
24	**PHASE III - Construction**	**487 days**	**Mon 2/18/02**	**Tue 12/30/03**	
25	Procurement	251 days	Mon 2/18/02	Mon 2/3/03	
26	Construction	201 days	Fri 12/20/02	Fri 9/26/03	
27	Inspection	90 days	Mon 8/18/03	Fri 12/19/03	
28	Commissioning	32 days	Fri 10/17/03	Mon 12/1/03	
29	Energization	1 day	Tue 12/30/03	Tue 12/30/03	28



Santa Cruz Electric Division
Citizens Utilities Co.

Task Split Progress Milestone Summary

Figure 1

EXHIBIT D

ESTIMATES OF PROBABLE COST

Cost estimates have been prepared for each of the four alternate source alternatives (Vail, Bicknell, Pantano substations and PK Switching Station).

Cost associated with each alternative are based on the following:

1. Transmission line $165,000 per mile (single-pole steel structures with 795 ACSR conductor). A terrain factor was added to line segments where construction was deemed more difficult. For example a line segment with a terrain factor of 1.2 would be estimated at $198,000 per mile ($165,000 X 1.2 $198,000).
2. Three breaker ring bus $2,000,000 each (based on the recent Nogales Tap three breaker ring bus installation)
3. 115kV breaker installation $212,000 (in existing breaker bay position)
4. 115kV breaker installation $375,000 (breaker bay position added to existing substation)

Vail Intertie

The Vail Substation will require the addition of a 345-115kV transformer, a 115kV breaker, switches, and relaying.

345/115kV at Vail Substation	$ 4,000,000
Termination facilities at Valencia Power Plant	$ 2,000,000
Subtotal	$ 6,000,000
57.2 miles of 115kV Transmission Line	$10,300,000
Right of way costs	$ 6,500,000
Environmental	$ 1,500,000
Subtotal	$18,300,000
Contingency and overhead (15%)	$ 2,700,000
Subtotal	$21,000,000
TOTAL	$27,000,000

Bicknell Intertie

The Bicknell Substation will require the addition of a new breaker bay position, a 115kV breaker, switches, and relaying.

Bicknell Substation	$ 375,000
Termination facilities at Valencia Power Plant	$ 2,000,000
Subtotal	$ 2,375,000
48.3 miles of 115kV Transmission Line	$ 8,800,000
Right of way costs	$ 6,400,000
Environmental	$ 1,500,000
Subtotal	$16,700,000
Contingency and overhead (15%)	$ 2,500,000
Subtotal	$19,200,000
TOTAL	$21,600,000

Pantano Intertie

The Pantano Substation will require the addition of a new breaker in an existing bay position, switches, and relaying.

Pantano Substation	$ 212,000
Termination facilities at Valencia Power Plant	$ 2,000,000
Subtotal	$ 2,212,000
59.9 miles of 115kV Transmission Line	$11,200,000
Right of way costs	$ 5,400,000
Environmental	$ 1,500,000
Subtotal	$18,100,000
Contingency and overhead (15%)	$ 2,700,000
Subtotal	$20,800,000
TOTAL	$23,000,000

PK Switching Station Intertie

The PK Switching Station will be a new three breaker ring arrangement tying into the existing 115kV line between Pantano and Kartchner substations.

PK Switching Station	$ 2,000,000
Termination facilities at Valencia Power Plant	$ 2,000,000
Subtotal	$ 4,000,000
42.1 miles of 115kV Transmission Line	$ 8,100,000
Right of way costs	$ 5,100,000
Environmental	$ 1,500,000
Subtotal	$14,700,000
Contingency and overhead (15%)	$ 2,200,000
Subtotal	$16,900,000
TOTAL	$20,900,000

Line Alternatives - Santa Cruz District
Prepared by POWER Engineers

COST ESTIMATE SUMMARY

Alternatives	Links	Length Miles	Terrain Factor	Construction Cost $	R/W Factor	R/W Cost $	Total Cost $
Vail	1A	4.3	1.0	709,500	1.0	260,606	970,106
	1B	20.5	1.0	3,382,500	1.0	1,242,424	4,624,924
	2	4.6	1.0	759,000	1.0	278,788	1,037,788
	3	2.7	1.0	445,500	1.0	163,636	609,136
	4	24.5	1.2	4,851,000	3.0	4,454,545	9,305,545
	5	0.6	1.4	138,600	4.0	145,455	284,055
Total		**57.2**		**10,286,100**		**6,545,454**	**16,831,554**
Bicknell	6	2.3	1.0	379,500	1.0	139,394	518,894
	7	4.2	1.0	693,000	1.0	254,545	947,545
	12	2.7	1.0	445,500	1.0	163,636	609,136
	13	6.7	1.0	1,105,500	2.0	812,121	1,917,621
	2	4.6	1.0	759,000	1.0	278,788	1,037,788
	3	2.7	1.0	445,500	1.0	163,636	609,136
	4	24.5	1.2	4,851,000	3.0	4,454,545	9,305,545
	5	0.6	1.4	138,600	4.0	145,455	284,055
Total		**48.3**		**8,817,600**		**6,412,120**	**15,229,720**
Pantano	20	9.4	1.0	1,551,000	0.5	284,848	1,835,848
	24	9.2	1.1	1,669,800	0.5	278,788	1,948,588
	26	11.0	1.1	1,996,500	0.5	333,333	2,329,833
	22	2.8	1.1	508,200	2.0	339,394	847,594
	23	27.5	1.2	5,445,000	2.5	4,166,667	9,611,667
Total		**59.9**		**11,170,500**		**5,403,030**	**16,573,530**
PK Station	27	14.6	1.1	2,649,900	1.0	884,848	3,534,748
	23	27.5	1.2	5,445,000	2.5	4,166,667	9,611,667
Total		**42.1**		**8,094,900**		**5,051,515**	**13,146,415**

T/L Cost/Mile	165,000	1999 Costs=	165,000
R/W Cost Acre	5,000	Escalation	1
Acre/SqFt	43,560		165,000
R/W Width	100	Overheads	1
Ft/Mile	5,280		165,000

COST ESTIMATE SUMMARY

Description 345-115kV Substation	Material	Labor		Total
		Hrs.	Cost	Cost
EQUIPMENT	$2,023,000	1,202	$ 72,120	$2,095,120
STRUCTURES	$ 135,594	412	$ 24,720	$ 160,314
FOUNDATIONS	$ 73,500	1,470	$ 88,200	$ 161,700
CABLE & CONDUIT	$ 39,650	703	$ 42,195	$ 81,845
SITE WORK & GROUNDING	$ 156,000	2,515	$ 150,900	$ 306,900
CONTROL HOUSE & RELAYING	$ 191,000	168	$ 10,080	$ 201,080
TESTING & ENERGIZATION	$ 5,000	320	$ 19,200	$ 24,200
SUBTOTALS	$2,623,744	6,790	$ 407,415	$3,031,159

Engineering	7.5%	$ 227,337
Construction Management	6.0%	$ 181,870
Contingency	20.0%	$ 606,232
TOTAL ESTIMATED COST 345-115kV SUB.		$4,046,597
Rounded to nearest 1000		$4,047,000

Equipment costs include:	Per Unit	Total
Substation Transformer - one (1)	$1,000,000	$1,000,000
345kV Breakers - three (3)	$215,000	$645,000
115kV Breaker - one (1)	$60,000	$60,000

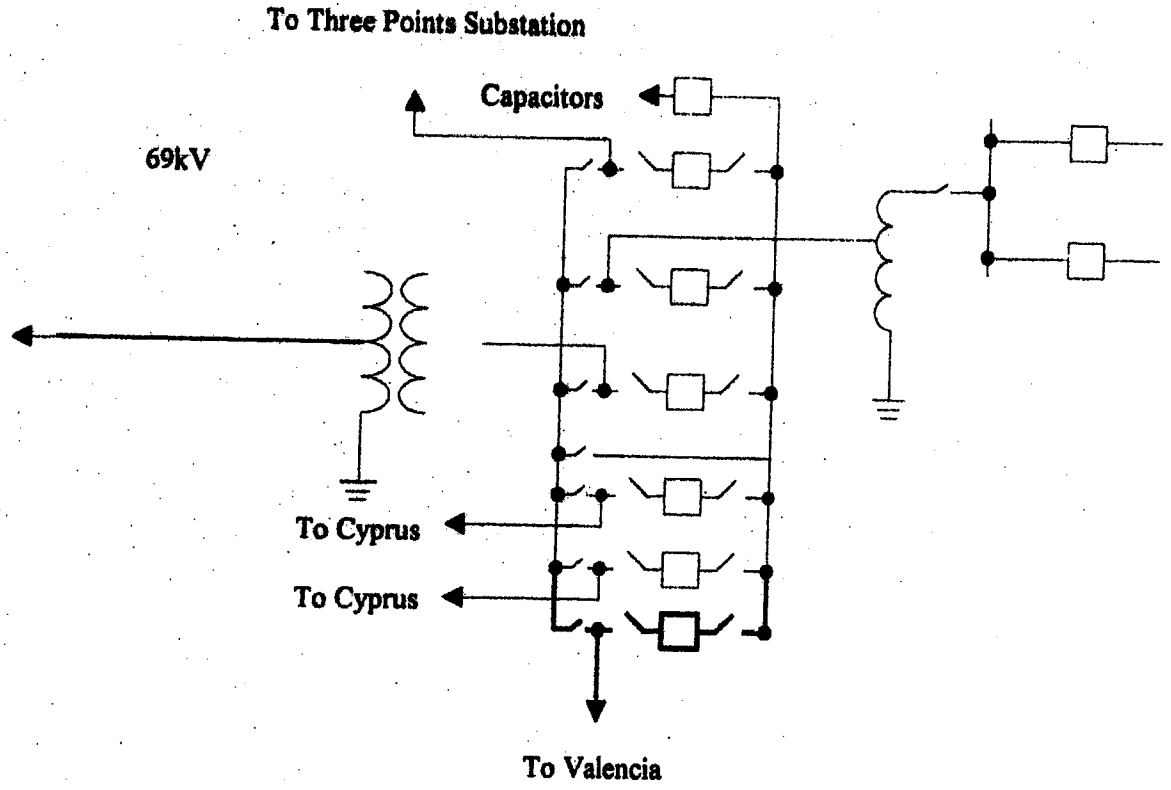
COST ESTIMATE SUMMARY

Description - 115KV Breaker Bay Position Installation	LABOR	MATERIAL	TOTAL
EQUIPMENT (outdoor)	$23,280	$113,460	$136,740
STRUCTURES (tubular steel)	$9,360	$10,875	$20,235
FOUNDATIONS	$13,920	$14,365	$28,285
CABLE & CONDUIT	$4,800	$3,070	$7,870
CONTROL HOUSE	$1,800	$40,000	$41,800
SITE IMPROVEMENTS	$4,140	$6,500	$10,640
TESTING & ENERGIZATION	$6,230	$5,950	$12,180
SUBTOTAL	$63,530	$194,220	$257,750
CONTRACTOR MOB/DEMOB			$10,000
CONSTR. MANAGEMENT [redacted]			$19,331
ENGINEERING [redacted]			$25,775
SUBTOTAL			$312,856
CONTINGENCY [redacted]			$62,571
TOTAL ESTIMATED PROBABLE COST			$375,428

COST ESTIMATE SUMMARY

Description - 115kV Breaker Bay Position Installation	LABOR	MATERIAL	TOTAL
EQUIPMENT (outdoor)	$3,600	$78,400	$82,000
STRUCTURES (tubular steel)	$720	$1,125	$1,845
FOUNDATIONS	$1,680	$1,105	$2,785
CABLE & CONDUIT	$4,800	$3,070	$7,870
CONTROL HOUSE	$1,800	$40,000	$41,800
SITE IMPROVEMENTS	$600	$1,000	$1,600
TESTING & ENERGIZATION	$2,590	$1,250	$3,840
SUBTOTAL	$15,790	$125,950	$141,740
CONTRACTOR MOB/DEMOB			$10,000
CONSTR. MANAGEMENT [redacted]			$10,631
ENGINEERING [redacted]			$14,174
SUBTOTAL			$176,545
CONTINGENCY [redacted]			$35,309
TOTAL ESTIMATED PROBABLE COST			$211,853

EXHIBIT E



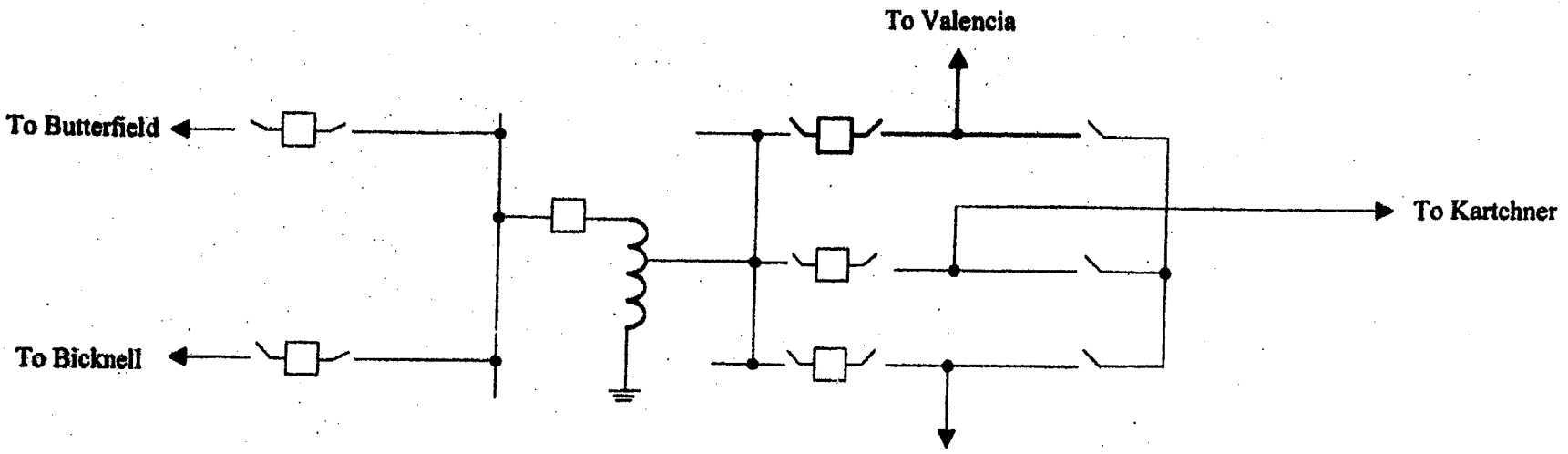
Existing
Proposed
Future

DATE 7/09/99 MW

Bicknell Substation
Proposed Arrangement

DRAWING NO.

Figure 1



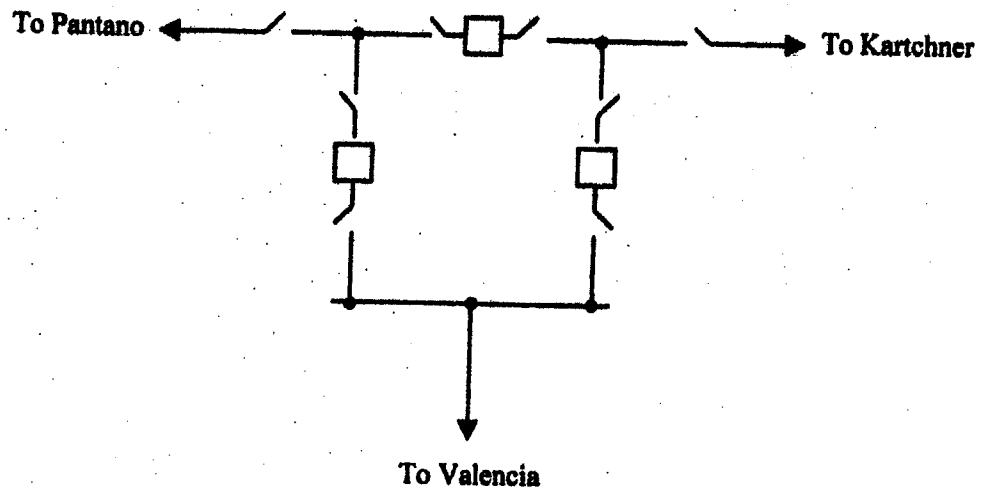
Existing
Proposed
Future

DATE: 7/09/99 MW

Pantano Substation
Proposed Arrangement

DRAWING NO

Figure 1



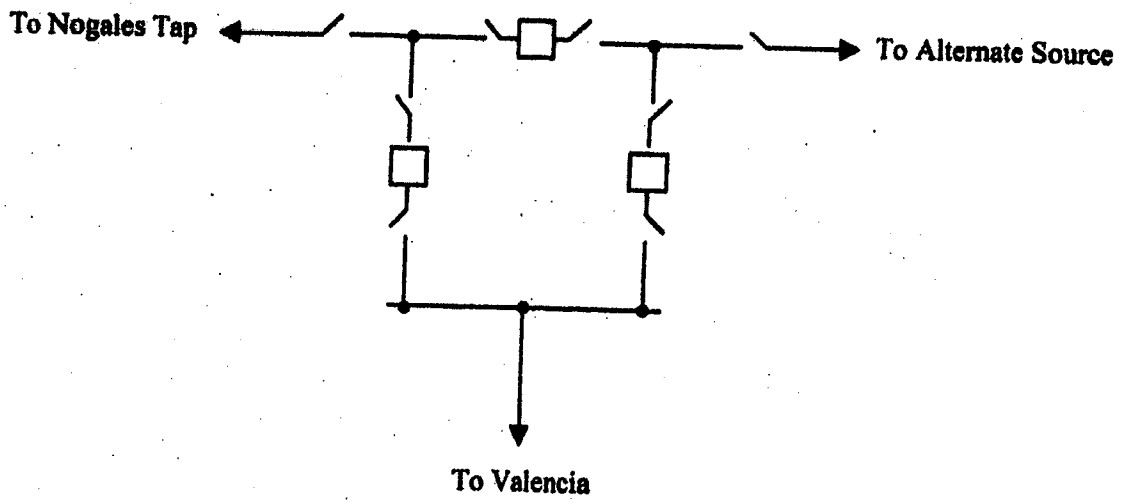
Existing
Proposed
Future

DATE: 7/09/99 MW

PK Switching Station
Proposed Arrangement

DRAWING NO.

Figure 1



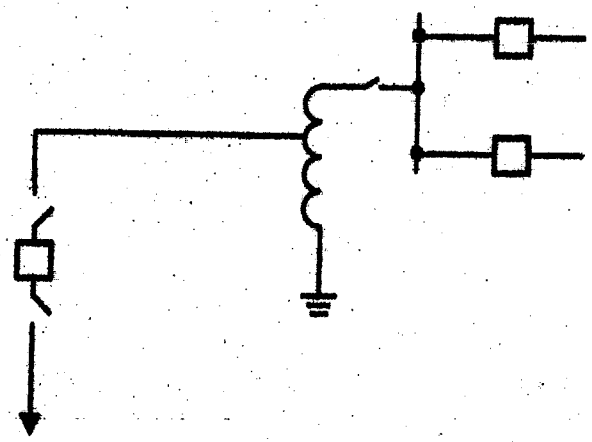
Existing
Proposed
Future

DATE: 7/09/99 MW

Valencia Substation 115kV
Proposed Arrangement

DRAWING NO.

Figure 1



Existing
Proposed
Future

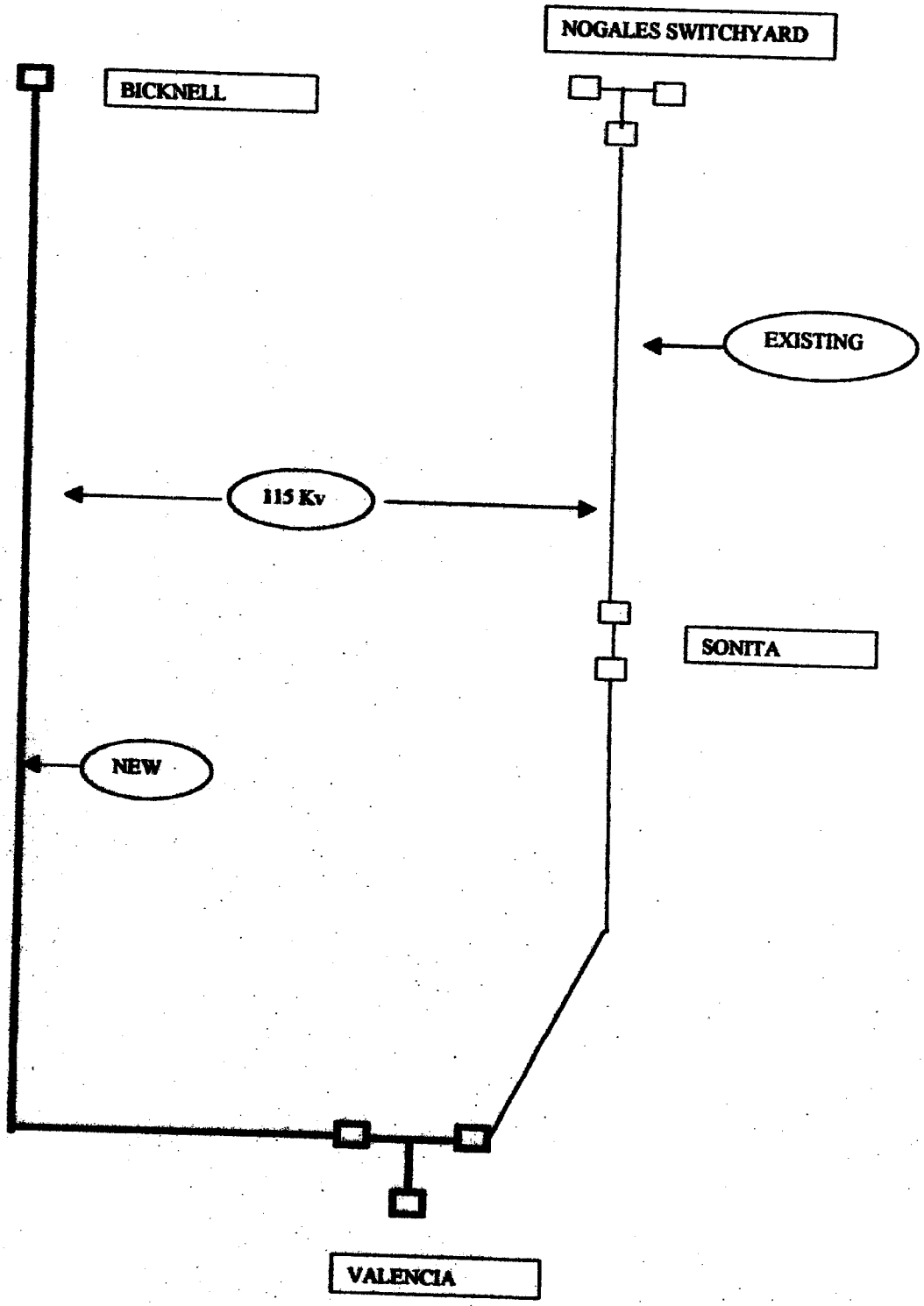
DATE: 7/09/99 MW

Vail Substation
Proposed Arrangement

DRAWING NO.

Figure 1

EXHIBIT F



CITIZENS UTILITIES COMPANY

NOGALES SECOND 115 Kv
TRANSMISSION LINE

One-Line Operating Diagram (PROPOSED)

7/12/99 RAC

LOAD FORECAST

The peak demand load forecast at Nogales Tap based on "normal weather" is:

Summer Season	Peak MW
1999	46.7
2000	48.0
2001	49.9
2002	51.6
2003	52.4
2004	54.5
2005	55.7
2006	56.9
2007	58.2
2008	59.5
2009	60.7

PRELIMINARY LOAD FLOW ANALYSIS

The existing 115kV transmission system from Nogales Tap to Kantor, Canez, Sonoita, and Valencia substations was modeled to determine the maximum load serving capability. Then an alternative source was connected at Valencia Substation and additional load flow cases were run with the 115kV transmission system in a looped configuration. Next more load flow cases were run with the existing system served only from the alternative source.

The 115kV line from the alternate source to Valencia Substation was modeled as 50 miles in length with 795 ACSR conductor. The various transmission line routes from Vail Substation, Bicknell Substation, Pantano Substation, and PK Switching Station range in length from approximately 40 to 60 miles. Therefore, for this preliminary analysis a line length of 50 miles was used.

The load flow cases were run with the following assumptions and criteria:

1) The source voltage at Nogales Tap and the Alternate Source were both assumed to be 1.00 per unit.
2) The load at Kantor, Canez, Sonoita, and Valencia substations was assumed to be at a power factor of 1.00.
3) Normal Operation (all lines in service) - The minimum acceptable voltage level was 0.95 to 1.05 per unit at the Kantor, Canez, Sonoita, or Valencia substations 115kV bus. Transmission conductors 80 percent (80%) of thermal rating. Equipment 100 percent (100%)of continuous current rating.

4) Single Contingency Operation (one line out of service) – The minimum acceptable voltage level was 0.90 to 1.10 per unit at the Kantor, Canez, Sonoita, or Valencia 115kV bus. Transmission conductors 100 percent (100%) of thermal rating. Equipment 100 percent (100%) of continuous current rating.

The following is a summary for each load flow case run to determine the maximum load that could be served in the Santa Cruz district provided both Nogales Tap and the Alternate Source would be able to maintain a 1.00 per unit voltage level.

Case 1: Existing System
Nogales Tap is serving a load of 46.7MW.

- The minimum voltage level is 0.97 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR to Valencia Substation at 41%.
- The maximum loaded transformer is at Valencia Substation at 67% of the 20MVA rating.

Case 2: Existing System with load increased until a minimum voltage level is met.
Nogales Tap is serving a load of 60.0MW.

- The minimum voltage level is 0.95 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR to Valencia Substation at 53%.
- The maximum loaded transformer is at Valencia Substation at 85% of the 20MVA rating.

Case 2A: Existing System with load increased until a minimum voltage level is met for a single contingency outage.
Nogales Tap is serving a load of 94.6MW.

- The minimum voltage level is 0.90 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR to Valencia Substation at 84%.
- The maximum loaded transformer is at Valencia Substation at 128% of the 20MVA rating.

Case 3: Looped System (Nogales Tap and Alternate Source)
Nogales Tap and the Alternate Source are serving a load of 68.7MW.

- The minimum voltage level is 0.98 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 559.5 AAAC from Nogales Tap at 26%.
- The maximum loaded transformer is at Valencia Substation at 100% of the 20MVA rating.

Case 3A: Looped System (Nogales Tap and Alternate Source)
Nogales Tap and the Alternate Source are serving a load of 132.2MW.

- The minimum voltage level is 0.95 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 559.5 AAAC from Nogales Tap at 50%.
- The maximum loaded transformer is at Valencia Substation at 188% of the 20MVA rating.

Case 4: Alternate Source with system open north of Kantor Substation
The Alternate Source is serving a load of 70.0MW.

- The minimum voltage level is 0.96 at the Kantor Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR from Valencia Substation at 43%.
- The maximum loaded transformer is at Valencia Substation at 100% of the 20MVA rating.

Case 4A: Alternate Source with system open north of Kantor Substation
The Alternate Source is serving a load of 75.0MW.

- The minimum voltage level is 0.95 at the Kantor Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR from Valencia Substation at 46%.
- The maximum loaded transformer is at Valencia Substation at 107% of the 20MVA rating.

Case 4B: Alternate Source with system open north of Kantor Substation
The Alternate Source is serving a load of 107.7MW.

- The minimum voltage level is 0.90 at the Kantor Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR from Valencia Substation at 66%.
- The maximum loaded transformer is at Valencia Substation at 146% of the 20MVA rating.

Case 5: Alternate Source with system open north of Sonoita Substation
The Alternate Source is serving a load of 57.2MW.

- The minimum voltage level is 0.97 at the Sonoita Substation 115kV bus.
- The maximum loaded transmission line conductor is the 795 ACSR from the Alternate Source at 32%.
- The maximum loaded transformer is at Valencia Substation at 100% of the 20MVA rating.

Case 5A: Alternate Source with system open north of Sonoita Substation
The Alternate Source is serving a load of 72.8MW.

- The minimum voltage level is 0.95 at the Sonoita Substation 115kV bus.
- The maximum loaded transmission line conductor is the 795 ACSR from the Alternate Source at 41%.
- The maximum loaded transformer is at Valencia Substation at 126% of the 20MVA rating.

Case 5B: Alternate Source with system open north of Sonoita Substation
The Alternate Source is serving a load of 106.7MW.

- The minimum voltage level is 0.90 at the Sonoita Substation 115kV bus.
- The maximum loaded transmission line conductor is the 795 ACSR from the Alternate Source at 60%.
- The maximum loaded transformer is at Valencia Substation at 175% of the 20MVA rating.

Case 6A: Case 3A with the new line 954 ACSR
Looped System (Nogales Tap and Alternate Source)
Nogales Tap and the Alternate Source are serving a load of 137.8MW.

- The minimum voltage level is 0.95 at the Valencia Substation 115kV bus.
- The maximum loaded transmission line conductor is the 559.5 AAAC from Nogales Tap at 52%.
- The maximum loaded transformer is at Valencia Substation at 196% of the 20MVA rating.

Case 6B: Case 4A with the new line 954 ACSR
Alternate Source with system open north of Kantor Substation
The Alternate Source is serving a load of 81.2MW.

- The minimum voltage level is 0.95 at the Kantor Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR from Valencia Substation at 49%.
- The maximum loaded transformer is at Valencia Substation at 115% of the 20MVA rating.

Case 6C: Case 4B with the new line 954 ACSR
Alternate Source with system open north of Kantor Substation
The Alternate Source is serving a load of 114.7MW.

- The minimum voltage level is 0.90 at the Kantor Substation 115kV bus.
- The maximum loaded transmission line conductor is the 4/0 ACSR from Valencia Substation at 70%.
- The maximum loaded transformer is at Valencia Substation at 156% of the 20MVA rating.

Case 6D: Case 5A with the new line 954 ACSR
Alternate Source with system open north of Sonoita Substation
The Alternate Source is serving a load of 79.3MW.

- The minimum voltage level is 0.95 at the Sonoita Substation 115kV bus.
- The maximum loaded transmission line conductor is the 954 ACSR from the Alternate Source at 39%.
- The maximum loaded transformer is at Valencia Substation at 137% of the 20MVA rating.

Case 6E: Case 5B with the new line 954 ACSR
Alternate Source with system open north of Sonoita Substation
The Alternate Source is serving a load of 113.8MW.

- The minimum voltage level is 0.90 at the Sonoita Substation 115kV bus.
- The maximum loaded transmission line conductor is the 954 ACSR from the Alternate Source at 57%.
- The maximum loaded transformer is at Valencia Substation at 187% of the 20MVA rating.

Case	Description	Load Level (MW)	Minimum Per Unit 115kV Voltage	Maximum Percentage Conductor Loading	Maximum Percentage Transformer Loading
1	Existing System	46.7	0.97 at Valencia 115kV Bus	41% - 4/0 ACSR	67% at Valencia Sub.
2	Case 1 with increased load	60.0	0.95 at Valencia 115kV Bus	53% - 4/0 ACSR	85% at Valencia Sub.
2A	Case 1 with increased load	94.6	0.90 at Valencia 115kV Bus	84% - 4/0 ACSR	128% at Valencia Sub.
3	Looped System	68.7	0.98 at Valencia 115kV Bus	26% - 559.5 AAAC	100% at Valencia Sub.
3A	Case 3 with increased load	132.2	0.95 at Valencia 115kV Bus	50% - 559.5 AAAC	188% at Valencia Sub.
4	Looped System open north of Kantor Substation	70.0	0.96 at Kantor 115kV Bus	43% - 4/0 ACSR	100% at Valencia Sub.
4A	Case 4 with increased load	75.0	0.95 at Kantor 115kV Bus	46% - 4/0 ACSR	107% at Valencia Sub.
4B	Case 4 with increased load	107.7	0.90 at Kantor 115kV Bus	66% - 4/0 ACSR	146% at Valencia Sub.
5	Looped System open north of Sonoita Substation	57.2	0.97 at Sonoita 115kV Bus	32% - 795 ACSR	100% at Valencia Sub.
5A	Case 5 with increased load	72.8	0.95 at Sonoita 115kV Bus	41% - 795 ACSR	126% at Valencia Sub.
5B	Case 5 with increased load	106.7	0.90 at Sonoita 115kV Bus	60% - 795 ACSR	175% at Valencia Sub.
6A	Case 3A with 954 ACSR and increased load	137.8	0.95 at Valencia 115kV Bus	52% - 559.5 AAAC	196% at Valencia Sub.
6B	Case 4A with 954 ACSR and increased load	81.2	0.95 at Kantor 115kV Bus	49% - 4/0 ACSR	115% at Valencia Sub.
6C	Case 4B with 954 ACSR and increased load	114.7	0.90 at Kantor 115kV Bus	70% - 4/0 ACSR	156% at Valencia Sub.
6D	Case 5A with 954 ACSR and increased load	79.3	0.95 at Sonoita 115kV Bus	39% - 954 ACSR	137% at Valencia Sub.
6E	Case 5B with 954 ACSR and increased load	113.8	0.90 at Sonoita 115kV Bus	57% - 954 ACSR	187% at Valencia Sub.

LOOPED SYSTEM OPERATION

Looped system operation with the existing Nogales Tap and an Alternate Source is expected to be operated as follows:

1. The loop will be normally closed.
2. There will be breakers north and south of Sonoita, in Sonoita Substation.
3. There will be breakers north and south of Valencia, in Valencia Substation.
4. In the event a transmission fault occurs north of Sonoita, the Sonoita and Nogales Switchyard breakers will open. Canez and Kantor will be picked up through the distribution system.
5. In the event of a transmission fault between Sonoita and Valencia, Valencia and Sonoita will open. No load will be lost.
6. In the even of a transmission fault between Valencia and the new intertie, Valencia and the new intertie will open. No load will be lost.

EXHIBIT G

Santa Cruz Electric Division

CITIZENS ADVISORY COUNCIL

The City of Nogales and Citizens created a Citizens Advisory Council ("CAC") made up of a representative from Citizens Utilities, a representative from the City and other members representing various customer constituencies. The members of the Advisory Council are:

Ernesto Ojeda, Citizens Energy Services

Rene Piña, Nogales-Santa Cruz Chamber of Commerce

Bryan Leopold, Rio Rico Property Owners Association

John Destefano, Rio Rico Property Owners Association

Robert Rojas, Santa Cruz County Supervisor

Robert Damon, Santa Cruz County Supervisor

Don Moschetti, Santa Cruz Valley Citizens Council

Wray Dudley, Santa Cruz Valley Citizens Council

Kathleen Vandervoet, Fresh Produce Association of the Americas

Jerry Barnett, Customer At Large

Robert Jones, Nogales Unified School District

Raul Lopez, Santa Cruz County Board of Realtors

Reg Lopez, Arizona Corporation Commission

The CAC meets regularly (as agreed by its members) to discuss electric and gas service issues, upcoming Commission filings and other topics of mutual interest such as electric deregulation and demand-side management. The CAC also assists Citizens in evaluating alternatives for long-term electric reliability in Santa Cruz County, such as a second transmission line, and in providing public input to identify preferred construction alternative(s) to Citizens and the Commission. The Commission Staff is encouraged to participate as a full member.

EXHIBIT H

Santa Cruz Electric Division

TRANSMISSION PROJECT DEVELOPMENT TEAM

Resal A. Craven, P.E.

Director of Engineering
Citizens Utilities Company

Mr. Craven is a graduate of North Carolina State University with a BS degree in Electrical Engineering with a specialty in electric power systems. He is a registered professional engineer, a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and past chairman of the Eastern North Carolina Section of the IEEE.

Mr. Craven has been employed by Citizens Utilities Company since January 1993 and presently is the Director of Engineering for the Arizona Electric Division. He has previously held positions as Division Engineer for the Mohave Electric Division, Director of Engineering and Power Supply, and Director of Engineering and Planning for Citizens' Energy Sector.

Prior to joining Citizens he held positions as Transmission Field Engineer with Florida Power & Light Company and numerous engineering and engineering management positions with Carolina Power & Light Company. At CP&L he served as the Division Engineer responsible for all distribution field engineering and substation siting in CP&L's Central Division, comprising 7,000 miles of line and 150 substations serving 120,000 customers. During his career he has also served as Manager of System Planning and Director of Engineering with Tri-State Generation & Transmission Association and Director of System Planning and Director of Power System Services with Cajun Electric Power Cooperative.

During his career Mr. Craven has held engineering and engineering management positions with investor-owned utilities in Florida, North Carolina and Arizona and with generation and transmission cooperatives in Colorado and Louisiana. He has served as a member of numerous industry committees including the EEI T&D Committee, the WSCC Planning Coordination Committee, the South West Power Pool Planning Committee and the South Western Power Administration Planning Committee. His experience includes design engineering for distribution structures, distribution system protection studies, construction specifications for equipment and structures, distribution and transmission planning, resource planning, environmental permitting, management of substation and transmission line design engineers and project management for construction of facilities ranging from distribution voltage conversions to multi-million dollar bulk power projects requiring transmission lines and substation facilities at voltages up to 345 kV. He has served as an expert witness in federal and district court cases and at the Louisiana Public Service Commission and Federal Energy Regulatory Commission.

Santa Cruz Electric Division

Tyge Legier, P.E.

T&D Engineer
Citizens Utilities Company

Mr. Legier has a BS degree in Electrical and Electronics Engineering with a minor in Mathematics from California State University, Sacramento. He is a registered professional engineer in Hawaii and Arizona. He has been employed by Citizens Utilities Company for over ten years.

Mr. Legier is presently employed as the Transmission & Distribution Engineer for the Arizona Energy Division, where he operates as a special project engineer supporting Citizens' electrical properties in the State of Arizona. Mr. Legier moved to Arizona one year ago from Citizens' Kauai Electric operation, where he was the Transmission & Distribution Operations Superintendent. In that position his responsibilities included producing coordination studies (using Aspen OneLiner), issuing relay settings, supervising relay testing, and supervising SCADA operations. Relays used by this division include Schweitzer SEL-321s and ABB DPU-2000s. Mr. Legier has held a variety of supervisory positions with Citizens. During the aftermath of Hurricane Iniki, he was instrumental in the emergency system restoration project.

Santa Cruz Electric Division

Jimmy D. Rogers, P.E.

District Engineer
Citizens Utilities Company

Mr. Rogers is a Registered Professional Electrical Engineer and has been employed with Citizens Utilities Company since December of 1998.

Prior to joining Citizens Utilities Company, Mr. Rogers has served in the positions of Manager of Electrical Engineering for Simons Engineering, Director of Electrical Engineering for Acorn Engineering, Chief Electrical Engineer for Redpath Engineering and Power Manager for the San Carlos Irrigation Project.

Mr. Rogers expertise is in electrical power systems transmission and distribution. Throughout his 20 year career in power systems, Mr. Rogers has worked in the areas of transmission and distribution line design, protective relaying, substation design and Supervisory Control and Data Acquisition (SCADA).

In addition to system design, Mr. Rogers has experience in project and construction management. As a project manager, he has been responsible for the design and construction of several projects in the $50,000,000 range.

Santa Cruz Electric Division

Michael S. Siegel, AICP — **Senior Environmental Planner/ Project Manager**
Dames & Moore

Mr. Siegel is a graduate of the University of California in Los Angeles and has a Master's Degree in City and Regional Planning from the Illinois Institute of Technology. Mr. Siegel has 20 years of professional experience as a land use analyst, planner, and project manager in both the public and private sectors. Since joining Dames & Moore in 1985, he has conducted environmental impact, regional planning, and facility siting studies in the West and Southwest. Projects have ranged in size from an environmental assessment for a single site to multi-state, environmental impact statements. Mr. Siegel has performed siting and environmental studies for compliance with local, state, and federal regulations.

Mr. Siegel was the Dames & Moore Project Manager for the Kingman-Havasu 230kV transmission line project, which included a regional corridor siting study and environmental assessment of 235 miles of alternative corridors and substations between Kingman and Lake Havasu City, Arizona. Mr. Siegel provided expert testimony before the Power Plant and Transmission Line Siting Committee as required for approval by the Corporation Commission. The Decision Record and Finding of No Significant Impact (FONSI) were issued in January 1997 and the Certificate of Environmental Compatibility was approved in May 1997.

Santa Cruz Electric Division

Michael E. Walbert, P.E.

Project Manager
POWER Engineers, Inc.

Mr. Walbert is a graduate of Montana State University with a BS degree in Electrical Engineering with an emphasis on electrical power systems. He is a registered professional engineer with over 14 years of engineering experience.

Mr. Walbert has been employed by POWER Engineers since July 1989. He has been Project Manager or Project Engineer on a number of multi-discipline projects that included system studies, transmission or distribution line design, substation design and SCADA systems. In addition, he has performed several types of electrical system studies and analyses. These include comprehensive power flow studies for electrical utilities; transmission and distribution protective equipment coordination; testing, troubleshooting, and analysis of transmission and distribution systems; and fault and protection analyses. Mr. Walbert has also prepared construction work plans, long-range plans, loss analyses, motor starting analyses and cost estimates.

Prior to joining POWER Engineers he was assistant to the manager of engineering at Wyoming Municipal Power Agency (WMPA) performing duties that related primarily to supplying electric power to member municipalities. WMPA consists of eight municipalities in the State of Wyoming. Responsibilities involved invoicing, budget development, conservation and renewable energy programs, data collection, economic analysis, generation scheduling, load forecasting, metering projects, rate analysis, and safety and training programs.

Exhibit 2

Integration Task List

Task	Status
Interconnect TEP's trunk radio system with UES radio system	Complete
Direct substation trouble calls in Santa Cruz to TEP's control room	Complete
Direct outage notifications (transmission, subtransmission and circuit lock outs) to TEP's control room and incorporate into TEP's outage notification procedure	Will complete in February 2004
Relocate UES Santa Cruz SCADA terminal to TEP's control room	Complete
Place Santa Cruz substations on TEP's SCADA system	Material ordered and received, engineering drawings are being generated
Place Valencia turbine controls on TEP's SCADA system to enable remote start from TEP's control room	Under investigation
Transfer WAPA transmission contract administration to TEP's Transmission Planning and Contract Administration Department	Complete
Develop outage operating procedures between WAPA and TEP operations departments for North Havasu substation	Complete
Incorporate UES electric transmission system into Central Arizona Transmission Study work group studies	Complete
Convert transmission and distribution maps (Santa Cruz) to Geographic Information Systems (GIS) and utilize TEP's Outage	Contract signed for data conversion

Management System (Outage prediction and management)	
Construct 46kV subtransmission tie to Kantor substation and verify how two county bond restrictions would be managed	Working on state land right of way
Investigate current operating procedure for operation of Valencia turbines during storm season. Based on TEP's experience with black start testing. This procedure may need modifications	Under Investigation
Install capacitors to increase voltage support in Santa Cruz area	Engineering design nearing completion, material procurement to follow
Incorporate Direct Access language in UES Open Access Transmission Tariff	Under investigation
Develop Microwave communications link between TEP's South substation and Nogales to improve corporate and SCADA communications and possible radio system improvements	Under investigation
Incorporate UES incoming calls into TEP Call center	Complete

Exhibit 3

SWITCHING PROCEDURE FOR LOSS OF 115 kV line to Nogales

Outage Restoration Plan
Santa Cruz District

UniSourceEnergy
SERVICES

Scenario 1: Loss of transmission line north of the Nogales Tap

Step	Procedure	Time	Cum. Time	Who	Location
1	Start Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Operator	Control Room
2	WAPA remotely opens breakers 1162 & 1262 at the Nogales Tap	0:05	0:05	Dispatcher	WAPA Dispatch
3	Remotely opens breakers at Sonoita, Kantor, Cañez	0:10	0:15	TEP Dispatcher	SCADA
4	Manually opens breakers at Valencia substation	0:05	0:20	Lineman	Valencia
5	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st	0:15	0:20	Automatic	Control Room
	Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
6	Manually close circuit 6241 – circuit 6241 restored – Valencia	0:03	0:21	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
7	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:24	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
8	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:27	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
9	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:30	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
10	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:33	Lineman	Valencia
	Parallel 3rd turbine at Valencia Plant Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz	0:03	0:36	Operator	Control Room
11	Remotely close circuit 6207 – circuit 6207 restored – Sonoita	0:04	0:37	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
12	Remotely close circuit 6204 – circuit 6204 restored – Sonoita	0:04	0:41	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room

13	Remotely close circuit 6203 – circuit 6203 restored – Sonoita	0:04	0:44	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
14	Remotely close circuit 6206 – circuit 6206 restored – Sonoita	0:04	0:49	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
15	Remotely close circuit 6205 – circuit 6205 restored – Sonoita	0:04	0:53	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
16	Remotely close circuit 8201 – circuit 8201 restored – Cañez	0:04	0:57	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
17	Remotely close circuit 8202 – circuit 8202 restored – Cañez	0:04	0:61	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
18	Remotely close circuit 8203 – circuit 8203 restored – Cañez	0:04	0:65	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
19	Remotely close circuit 7201 – circuit 7201 restored – Kantor	0:04	0:69	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
20	Remotely close circuit 7202 – circuit 7202 restored – Kantor	0:04	1:03	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
21	Remotely close circuit 7203 – circuit 7203 restored – Kantor	0:04	1:07	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Scenario 2: Loss of transmission line between Sonoita and Valencia substation

Step	Procedure	Time	Cum. Time	Who	Location
1	Start Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Operator	Control Room
2	Manually opens both circuit switchers at Valencia Substation, lock & tag	0:03	0:03	Lineman	Valencia
3	Manually opens 115 kV switch facing Nogales, lock & tag	0:25	0:28	Lineman	Sonoita
4	WAPA remotely closes breaker 1162 & 1262 at the Nogales Tap – Service restored to northern county area.	0:02	0:30	Dispatcher	WAPA Dispatch
5	Manually opens breakers at Valencia substation	0:05	0:08	Lineman	Valencia
6	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st	0:15	0:15	Automatic	Control Room
7	Manually increase frequency on both turbines to 60.5 Hz			Instrument Electrician	Control Room
	Manually close circuit 6241 – circuit 6241 restored – Valencia	0:01	0:16	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
8	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:19	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
9	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:22	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
10	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:25	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
11	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:28	Lineman	Valencia
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Scenario 3: Loss of transmission line north of Sonoita Substation

Step	Procedure	Time	Cum. Time	Who	Location
1	Start Valencia Turbines in accordance with Black Start Procedure	0:00	0:00	Operator	Control Room
	Call WAPA Dispatch and put an HLO order on breaker 1162 & 1262	0:01	0:01	Power Supervisor	Control Room
2	Remotely opens breakers at Sonoita, Kantor, Cañez	0:10	0:10	TEP Dispatcher	SCADA
3	Manually opens breakers at Valencia substation	0:05	0:10	Lineman	Valencia
4	Manually open both circuit switchers at the Valencia Substation	0:03	0:15	Lineman	Valencia
5	Opens 115 kV switch on the north side of Sonoita (lock and tag)	0:25	0:25	Lineman	Sonoita
	1st Valencia turbine closes on dead bus – 2nd turbine synchronizes with 1st			Operator	Control Room
6	Manually increase frequency on both turbines to 60.5 Hz	0:05	0:18	Operator	Control Room
	Manually close circuit 6241 – circuit 6241 restored – Valencia			Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
7	Manually close circuit 6245 – circuit 6245 restored – Valencia	0:03	0:21	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
8	Manually close circuit 6242 – circuit 6242 restored – Valencia	0:03	0:24	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
9	Manually close circuit 6244 – circuit 6244 restored – Valencia	0:03	0:27	Lineman	Valencia
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
10	Manually close circuit 6243 – circuit 6243 restored – Valencia	0:03	0:30	Lineman	Valencia
	Parallel 3rd turbine at Valencia Plant Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
	Manually close both circuit switchers at the Valencia Substation	0:03	0:33	Lineman	Valencia
11	Remotely close circuit 6207 – circuit 6207 restored – Sonoita	0:03	0:36	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
12	Remotely close circuit 6204 – circuit 6204 restored – Sonoita	0:03	0:39	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
13	Remotely close circuit 6203 – circuit 6203 restored – Sonoita	0:03	0:42	TEP Dispatcher	SCADA

	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
14	Remotely close circuit 6206 – circuit 6206 restored – Sonoita	0:03	0:45	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
15	Remotely close circuit 6205 – circuit 6205 restored – Sonoita	0:03	0:48	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
16	Manually open circuit switcher on high side of transformer at Cañez Substation	0:03	0:30	Lineman	Cañez
17	Manually open switch KT115-3 at Kantor Substation	0:05	0:50	Lineman	Kantor
18	Manually close group operated switch (distribution) south of the Cañez substation on Pendelton Road on circuit 8201 – circuit 8201 restored through circuit 6204– Cañez bus energized. Pole #7995	0:03	0:40	Lineman	Switch on Pendelton
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
19	Remotely close circuit 8202 – circuit 8202 restored – Cañez	0:03	0:43	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
20	Remotely close circuit 8203 – circuit 8203 restored – Cañez	0:03	0:46	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
21	Manually close recloser at four winds ranch on circuit 7201 – circuit 7201 restored through circuit 8203 - Kantor bus energized	0:03	0:50	Lineman	4 Winds Ranch
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
22	Remotely close circuit 7202 – circuit 7202 restored – Kantor	0:03	0:53	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Manually increase frequency on both turbines to 60.5 Hz			Operator	Control Room
23	Remotely close circuit 7203 – circuit 7203 restored – Kantor	0:03	0:56	TEP Dispatcher	SCADA
	Balance loads between Valencia turbines Switch one Turbine to Isoch mode			Operator	Control Room

Exhibit 2

Integration Task List

Task	Status
Interconnect TEP's trunk radio system with UES radio system	Complete
Direct substation trouble calls in Santa Cruz to TEP's control room	Complete
Direct outage notifications (transmission, subtransmission and circuit lock outs) to TEP's control room and incorporate into TEP's outage notification procedure	Will complete in February 2004
Relocate UES Santa Cruz SCADA terminal to TEP's control room	Complete
Place Santa Cruz substations on TEP's SCADA system	Material ordered and received, engineering drawings are being generated
Place Valencia turbine controls on TEP's SCADA system to enable remote start from TEP's control room	Under investigation
Transfer WAPA transmission contract administration to TEP's Transmission Planning and Contract Administration Department	Complete
Develop outage operating procedures between WAPA and TEP operations departments for North Havasu substation	Complete
Incorporate UES electric transmission system into Central Arizona Transmission Study work group studies	Complete
Convert transmission and distribution maps (Santa Cruz) to Geographic Information Systems (GIS) and utilize TEP's Outage	Contract signed for data conversion

Management System (Outage prediction and management)	
Construct 46kV subtransmission tie to Kantor substation and verify how two county bond restrictions would be managed	Working on state land right of way
Investigate current operating procedure for operation of Valencia turbines during storm season. Based on TEP's experience with black start testing. This procedure may need modifications	Under Investigation
Install capacitors to increase voltage support in Santa Cruz area	Engineering design nearing completion, material procurement to follow
Incorporate Direct Access language in UES Open Access Transmission Tariff	Under investigation
Develop Microwave communications link between TEP's South substation and Nogales to improve corporate and SCADA communications and possible radio system improvements	Under investigation
Incorporate UES incoming calls into TEP Call center	Complete

Exhibit 4
UES Load Forecast

Year	Actual	TEP Forecast	TEP High Forecast	RAC 2 Normal	RAC 2 hot
1999 Actual	50.4				
2000 Actual	52.6				
2001 Actual	51.5				
2002 Actual	58.0				
2003 Actual	59.1	59.1			
2004 Fcst		61.4	64.4	62.0	67.0
2005 Fcst		63.6	66.8	64.0	69.0
2006 Fcst		65.8	69.0	66.0	72.0
2007 Fcst		67.9	71.3	68.0	74.0
2008 Fcst		70.1	73.5	70.5	76.0
2009 Fcst		72.2	75.8	73.0	78.0
2010 Fcst		74.5	78.2	74.0	80.0
2011 Fcst		76.8	80.6		
2012 Fcst		79.2	83.1		
2013 Fcst		81.6	85.7		
2014 Fcst		84.1	88.3		
2015 Fcst		86.7	91.0		

TEP Load forecast for Nogales

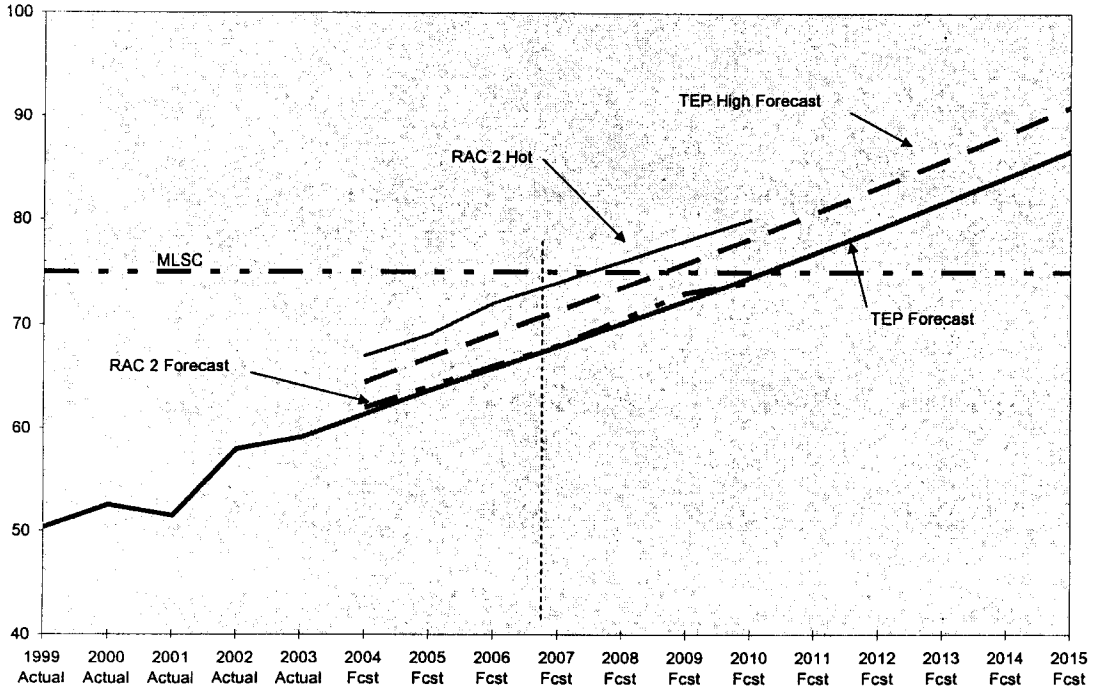


Exhibit 5
RMR analysis

UniSourceEnergy SERVICES

RELIABILITY REQUIRED MUST-RUN GENERATION

UNS ELECTRIC (SANTA CRUZ) SYSTEM

FOR THE YEARS 2005, 2008, 2012

PREPARED FOR THE ARIZONA CORPORATION COMMISSION

TEP
Transmission System Planning

February 9, 2004

Introduction

The Santa Cruz County UNS Electric system is currently a radial system interconnected to the Western Area Power Administration 115 kV transmission system. From the interconnection point at Nogales Tap near Tucson, the UNS Electric 115 kV system proceeds down to Kantor substation – then Canez, Sonoita, and Valencia substations in that order (see exhibit 1).

Approximately 50% of UNS Electric load is located at Valencia substation and 25% at Sonoita substation. Hence, 75% of the total UNS Electric load is located on the last 8.5 miles of the system. Due to the long section of 115 kV from Nogales Tap and the lengthy 115 kV ties ultimately connecting the Saguaro and Apache generating stations to Nogales Tap, the bulk of the UNS Electric load is located at the weakest point on the system.

Because of the weak nature of the 115 kV transmission network, low voltage becomes an issue at higher loads. Presently, this problem has been mitigated by dispatching local gas turbine generators located at Valencia substation during peak load periods. These turbines not only supply some power locally which helps reduce loading on the 115 kV network, but they also enhance voltage support by contributing a modest amount of reactive power (VARs).

When the gas turbines are used to support the system in this manner, they are acting as Reliability Must-Run (RMR) generation. The purpose of this study is to quantify the necessity and effectiveness of the RMR aspect of this generation.

Study Power Flow Case Assumptions

The existing Santa Cruz UNS Electric system was explicitly modeled within the 2005 RMR case that was jointly prepared by TEP, APS, SRP, SWTC, and WAPA. Since the system changes made by outside entities during the entire 2005 – 2012 study period were located a considerable distance from the UNS Electric system, an assumption was made that such changes would have little impact to the UNS Electric system and therefore the 2005 case was used throughout. Additionally, 5.0 MVAR 13.2 kV substation capacitor banks were added on the distribution side of each load-serving transformer in each substation. This reflects planned improvements scheduled to be implemented by summer of 2004.

UNS Electric system load was assumed to be distributed in the following manner:

Substation loads with 0.95 p.f. lagging	
Substation	Percentage of total
Kantor	12.5%
Canez	12.5%
Sonoita	25%
Valencia	50%

The Valencia gas turbines were rated as follows in the case:

Turbine	Maximum Power Output[1]	Maximum Reactive Output[2]
Valencia turbine #1	14 MW	8 MVAR
Valencia turbine #2	16 MW	8 MVAR
Valencia turbine #3	16 MW	8 MVAR

1 Based upon GE testing work performed in 1999
2 Estimate based upon total MVA rating and max. power output of each generator

The forecasted peak demand for the three study years is:

Santa Cruz UNS Electric Peak Demand [1]	
Year	Demand
2005	63.6 MW
2008	70.1 MW
2012	79.2 MW

1 UNS Electric prepared by TEP forecasting dept. 2004

Results

The Santa Cruz county UNS Electric system was studied with two basic configurations. The first configuration was the existing system. The second configuration was the existing system with the addition of a 115 kV connection from Valencia substation to the future Gateway substation.

Pre-Gateway

For N-0 (no contingencies) the Simultaneous Import Limit (SIL) was calculated to be 65 MW. At this load, substation voltage regulators reach the top of their range and substation distribution voltage begins to go sub-nominal. It was assumed that a substation feeder voltage of 1.0 pu would translate into 0.95 pu at the remote end of feeders – the minimum permissible customer voltage.

With all three Valencia turbines dispatched at maximum, the Maximum Load-Serving Capability (MLSC) for an N-0 condition was determined to be 75 MW. The limiting factor in this case was the Valencia distribution transformers. The MLSC increases to approximately 100 MW for an N-0 condition assuming the transformer overloads can be mitigated. This could potentially be accomplished by replacing the transformers, or busing the two transformers together on the low side and installing a paralleling tap-synchronization device on the voltage regulators.

N-1 scenarios were not considered for this configuration since the system is radial prior to the Gateway interconnection. Any contingency will result in at least partial loss of load; however, load restoration plans are in place. The plans include dispatching the Valencia turbines and will be modified to include closing in an emergency 46 kV connection between the southern TEP system and Kantor substation once that connection is established.

Post-Gateway

With the Gateway station and Gateway – Valencia line in service, the Santa Cruz UNS Electric system becomes a looped system. Consequently, RMR analysis can be performed considering N-1 (single-contingency) scenarios.

Assuming all Valencia turbines off, the maximum load that can be served (SIL) was calculated to be 50 MW. The limiting factor is a delta voltage violation (5% or greater) on at least one bus due to loss of the Gateway – Valencia 115 kV line.

When all three Valencia turbines are fully dispatched, the maximum load that can be served (MLSC) was calculated to be 75 MW. The limiting factor was overloading on the Valencia distribution transformers. If this overloading is discounted as previously discussed, the limit becomes 90 MW. The limit for this latter scenario is a delta voltage violation for loss of the Gateway – Valencia line.

Once the Santa Cruz UNS Electric system becomes looped, the critical outage becomes loss of the Gateway – Valencia 115 kV line. To mitigate the effects of the outage, a completely redundant circuit from Gateway to Valencia was added for study purposes.
With that circuit in place, the SIL rose to 80 MW. Again, the Valencia distribution transformers were the limiting factor. Discounting the transformer overloads, the SIL rose to 95 MW. The limiting factor this time was a delta

voltage violation for loss of the Valencia – Sonoita 115 kV line. By 2012 the load has grown to the point that Sonoita, Canez, and Kantor experience a significant voltage drop because the relatively weak 115 kV WAPA system cannot maintain voltage for loss of Valencia – Sonoita. Additionally, RMR generation is ineffective because it is on the wrong side of the disturbance. Building a Gateway – Sonoita 115 kV line instead of a 2nd Gateway – Valencia 115 kV line might improve this situation and is something that TEP will study in 2004.

Based upon the limits and assumptions discussed above the following table summarizes the results:

Year	# of Gateway-Valencia ckts.	Forecast Peak	SIL	MLSC	RMR Generation at Peak
2005	1	63.6 MW	50 MW	75 MW	14 MW
2008	1	70.1 MW	50 MW	75 MW	20 MW
2012	1	79.2 MW	50 MW	75 MW	30 MW
2012	2	79.2 MW	80 MW	95 MW[1]	0 MW

1 Assumes Valencia transformer overloads eliminated

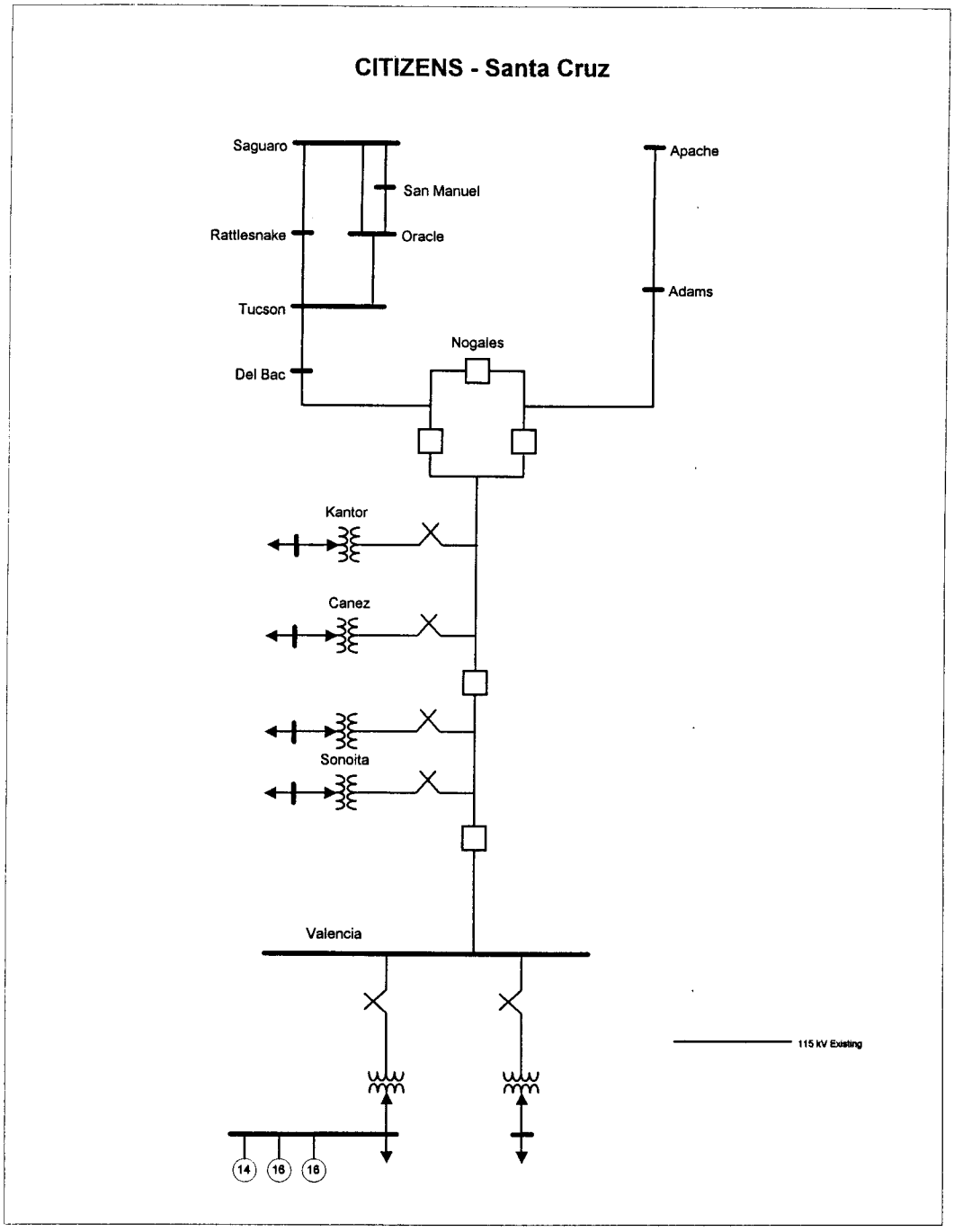

CITIZENS - Santa Cruz
Saguaro
San Manuel
Rattlesnake
Oracle
Tucson
Del Bac
Apache
Adams
Nogales
Kantor
Canez
Sonoita
Valencia
14
16
16
115 kV Existing

Exhibit 1