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AZ CORP COMMISSION
DOCUMENT CONTROL

January 31, 2007

Ernest Johnson
Director, Utilities Division
Arizona Corporation Commission
1200 W. Washington St.
Phoenix, Arizona 85007

Arizona Corporation Commission
DOCKETED

JAN 31 2007

DOCKETED BY

Re: ARIZONA PUBLIC SERVICE COMPANY TEN-YEAR PLAN
DOCKET NO. E-00000D-05-0040

Dear Mr. Johnson:

In compliance with A.R.S. § 40-360.02 and pursuant to Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001), enclosed please find Arizona Public Service Company's ("APS" or "Company") 2007-2016 Ten-Year Plan for major transmission facilities, along with associated system ratings.

The 2007-2016 Ten-Year Plan describes planned transmission lines of 115 kV or higher that APS may construct over the next 10 years. This Ten-Year Plan includes approximately 228 miles of new 500 kV transmission lines, 109 miles of new 230 kV transmission lines, and 18 new bulk transformers. The APS investment needed to construct these projects is currently estimated to exceed $1 billion. When completed, these projects are expected to add approximately 2000 MW of additional Extra-High Voltage scheduling capacity, as well as 4170 MW of import capability into the Metropolitan Phoenix Area and 310 MW of import into Yuma.

These new transmission projects, coupled with additional distribution and sub-transmission investments, will support reliable power delivery in both APS' service area and in the western United States. The Ten-Year Plan as well as other APS reliability-related infrastructure investments, however, are premised on a number of assumptions including the regulatory treatment of such investments by the Commission and the Federal Energy Regulatory Commission ("FERC"), other state and federal policies affecting transmission, and, of course, APS' ability to finance large investments of this nature on commercially-reasonable terms.

Please contact me if you have any questions or desire additional information concerning this filing.

Sincerely,

Barbara A. Klemstine

Cc: Docket Control (Original, plus 13 copies)
Laurie Woddall, Assistant Attorney General
Brian Bozzo, Compliance & Enforcement

Enclosures

ARIZONA PUBLIC SERVICE COMPANY
2007–2016
TEN-YEAR PLAN

Prepared for the

Arizona Corporation Commission

January 2007

ARIZONA PUBLIC SERVICE COMPANY
2007 - 2016
TEN-YEAR PLAN

CONTENTS

ARIZONA PUBLIC SERVICE COMPANY
2007–2016
TEN-YEAR PLAN

GENERAL INFORMATION

Pursuant to A.R.S. § 40-360.02, Arizona Public Service Company ("APS") submits its 2007-2016 Ten-Year Plan. Additionally, pursuant to Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001) concerning the first Biennial Transmission Assessment, APS is including with this filing its Transmission Planning Process and Guidelines and maps showing system ratings on APS' transmission system. The Transmission Planning Process and Guidelines outline generally APS' internal planning for its high voltage and extra-high voltage transmission system, including a discussion of APS' planning methodology, planning assumptions, and its guidelines for system performance. The system ratings maps show emergency and continuous system ratings on APS' extra-high voltage system, and on its Metro, Northern, and Southern 230kV systems.

This 2007–2016 Ten-Year Plan describes planned transmission lines of 115kV or higher voltage that APS may construct, or participate in, over the next ten-year period. Pursuant to A.R.S. § 40-360(10), underground facilities are not included. There are approximately 228 miles of 500kV transmission lines, 109 miles of 230kV transmission lines, and 18 bulk transformers contained in the projects in this Ten-Year Plan filing. The total investment for the APS projects and the anticipated APS portion of the participation projects as they are modeled in this filing is estimated to be approximately $1 billion and the projects will add an expected 2000 MW of additional EHV scheduling capability. Also, over the next ten years the import capability into the Phoenix area will increase by 4170 MW, while the import capability into the Yuma area will

increase by 310 MW. The following table shows a breakdown of the projects contained in this Ten-Year Plan.

	Projects in Ten-Year Plan
500kV transmission lines	228 miles
230kV transmission lines	109 miles
Bulk Transformers	18
Total Investment	$1 billion
EHV Scheduling Capability	+2000 MW (+28 %)[1]
Total Phoenix Area Import	+4170 MW (+31 %)[1]
Yuma Area Import	+310 MW (+61 %)[1]

[1] Based on 2006 values.

Also, some of the previously reported facilities that have been completed, canceled, or deferred beyond the upcoming ten-year period are not included. The projects at the end of this Ten-Year Plan that have in-service dates of To Be Determined (TBD) are projects that have been identified, but are either still outside of the ten-year planning window or their in-service dates have not yet been established. They have been included in this filing for informational purposes. A summary of changes from last year's plan is provided below, along with a list of projects that have been added to this year's Ten-Year Plan. Also, a section is included that briefly describes any projects that are still in the feasibility planning phase.

For the convenience of the reader, APS has included system maps showing the electrical connections and in-service dates for all overhead transmission projects planned by APS for Arizona, the Phoenix Metropolitan Area, and the Yuma Area. Written descriptions of each proposed transmission project are provided on subsequent pages in the currently expected chronological order of each project. The line routings shown on the system maps and the descriptions of each transmission line are intended to be general, showing electrical connections and not specific routings, and are subject to revision. Specific routing is recommended by the Arizona Power Plant and Transmission Line Siting Committee and ultimately approved by the

Commission when issuing a Certificate of Environmental Compatibility and through subsequent right-of-way acquisition. Pursuant to A.R.S. § 40-360.02, this filing also includes technical study results for the projects identified. The technical study results show project needs which are generally based on either security (contingency performance), adequacy (generator interconnection or increasing transfer capability) or both.

APS participates in numerous regional planning organizations and in the WestConnect organization. Through membership and participation in these organizations the needs of multiple entities, and the region as a whole, can be identified and studied. This allows for the potential of maximizing the effectiveness and utilization of new projects. Regional organizations that APS is a member of include the Western Electricity Coordinating Council (WECC), the Southwest Area Transmission Planning (SWAT), and the Southwest Transmission Expansion Plan (STEP). The plans included in this filing are the result of these coordinated planning efforts. APS is open to other entities participating in any existing or future planned projects.

APS believes that the projects identified in this 2007-2016 Ten-Year Plan, with their associated in-service dates, will ensure that APS' transmission system meets all applicable reliability criteria. Changes in regulatory requirements or underlying assumptions such as load forecasts, generation or transmission expansions, economic issues, and other utilities' plans, may substantially impact this Ten-Year Plan and could result in changes to anticipated in-service dates or project scopes. Additionally, future federal and regional mandates may impact this Ten-Year Plan specifically and the transmission planning process in general. This Ten-Year Plan is tentative information only and, pursuant to A.R.S. § 40-360.02(F), is subject to change without notice at the discretion of APS, based on land usage, growth pattern changes, regulatory or legal developments, or for other reasons.

Changes from 2006-2015 Ten-Year Plan

The following is a list of projects that were changed or removed from the Ten-Year plan filed last year, along with a brief description of why the change was made.

- TS9 – Pinnacle Peak 500kV line and TS5 – TS9 500kV line

  The 2006-2015 Ten-Year Plan showed the Raceway 500kV substation as one of the terminations of each line. In the 2007-2016 Ten-Year Plan, the Raceway 500kV substation has been renamed and referred to as the TS9 500kV substation due to the location of this 500kV substation being approximately one mile away from the Raceway 230kV substation.

- Raceway – Avery 230kV line, the Avery – TS6 – Pinnacle Peak 230kV line, and the TS9 – Pinnacle Peak 500kV line

  The 2006-2015 Ten-Year Plan showed the Raceway-Avery 230kV line and the Avery-TS6-Pinnacle Peak 230kV line projects as double circuit 230kV projects, with the second circuit being a 230kV Westwing-Pinnacle Peak line for SRP. The 2006-2015 Ten-Year Plan also showed the Raceway (TS9)-Pinnacle Peak 500kV line as a single circuit 500kV line. With recent siting and planning efforts, these projects are proposed to be combined with the final project being a 500/230kV double circuit. There will be one 500kV line from a future TS9 500kV substation to the APS Pinnacle Peak substation, which will be expanded to include a 500kV bus and one 230kV line from Raceway to Avery to TS6 to Pinnacle Peak. Also, the 2006-2015 Ten-Year Plan showed the in-service date for the TS6 230kV substation as 2010. The latest planning studies show that the in-service date for the substation can be delayed until 2011.

- TS5-Buckeye 230kV line

  The 2006-2015 Ten-Year Plan referred to the future 230kV lines that will be needed to the west of the White Tank Mountains as conceptual projects due to the preliminary nature of those plans and the dynamic situation with the future development that is expected to occur in the area. Due to the continued work with stakeholders in the area and the timing and nature of the future developments, planning efforts regarding the need for additional electrical facilities have become more active. For the 2007-2016 Ten-Year Plan the preliminary project descriptions for one of those transmission lines is being included with a TBD date. The project included in this plan is the TS5-Buckeye 230kV line.

- Desert Basin – Pinal South 230kV line

  The Santa Rosa-Pinal South 230kV line project was listed in the 2006-2015 Ten-Year Plan as a conceptual project. With SRP's announced proposal of a Desert Basin-Pinal South 230kV line the Santa Rosa-Pinal South 230kV line will be replaced with the Desert Basin-Pinal South 230kV line. The Desert Basin-Pinal South 230kV line project will be a 230kV line that will, for the majority of the routing of the line, be constructed on the same towers as the South East Valley 500kV line between approximately where the line will cross Thornton Road and the future Pinal South substation. The 230kV line will interconnect into the Desert Basin 230kV substation heading north and west. The timing for this project is currently scheduled for 2011. SRP is the project manager for the Desert Basin-Pinal South 230kV line project.

New Projects in the 2007-2016 Ten-Year Plan

The following is a list of projects that are in the 2007-2016 Ten-Year Plan that were not in the 2006-2015 Ten-Year Plan.

- Sundance – Pinal South 230kV line

  This project will be a 230kV line that will be built between APS' Sundance generating station and the future Pinal South 230kV substation. The timing for this project, which corresponds with the timing of the Desert Basin-Pinal South 230kV project, is currently listed as 2011.

Conceptual Projects in the Feasibility Planning Phase

The following projects, described below for informational purposes, are still in a preliminary planning phase.

- TransWest Express Project

  In 2005, APS announced that it would explore the building of transmission from Wyoming to northern Arizona. APS indicated that the TransWest Express Project was being studied as a means to provide Arizona and other western states increased access to electricity generated from coal, wind and other resources in Wyoming. During 2006, APS studied the technical and environmental feasibility of the TransWest Express Project. This feasibility study was conducted with input and feedback on interim results from interested stakeholders. The feasibility study examined three AC alternatives, one DC alternative, and one AC/DC hybrid alternative.

  Through the technical transmission analysis, APS developed cost estimates, estimated system losses, and estimated system capacity for each of the five

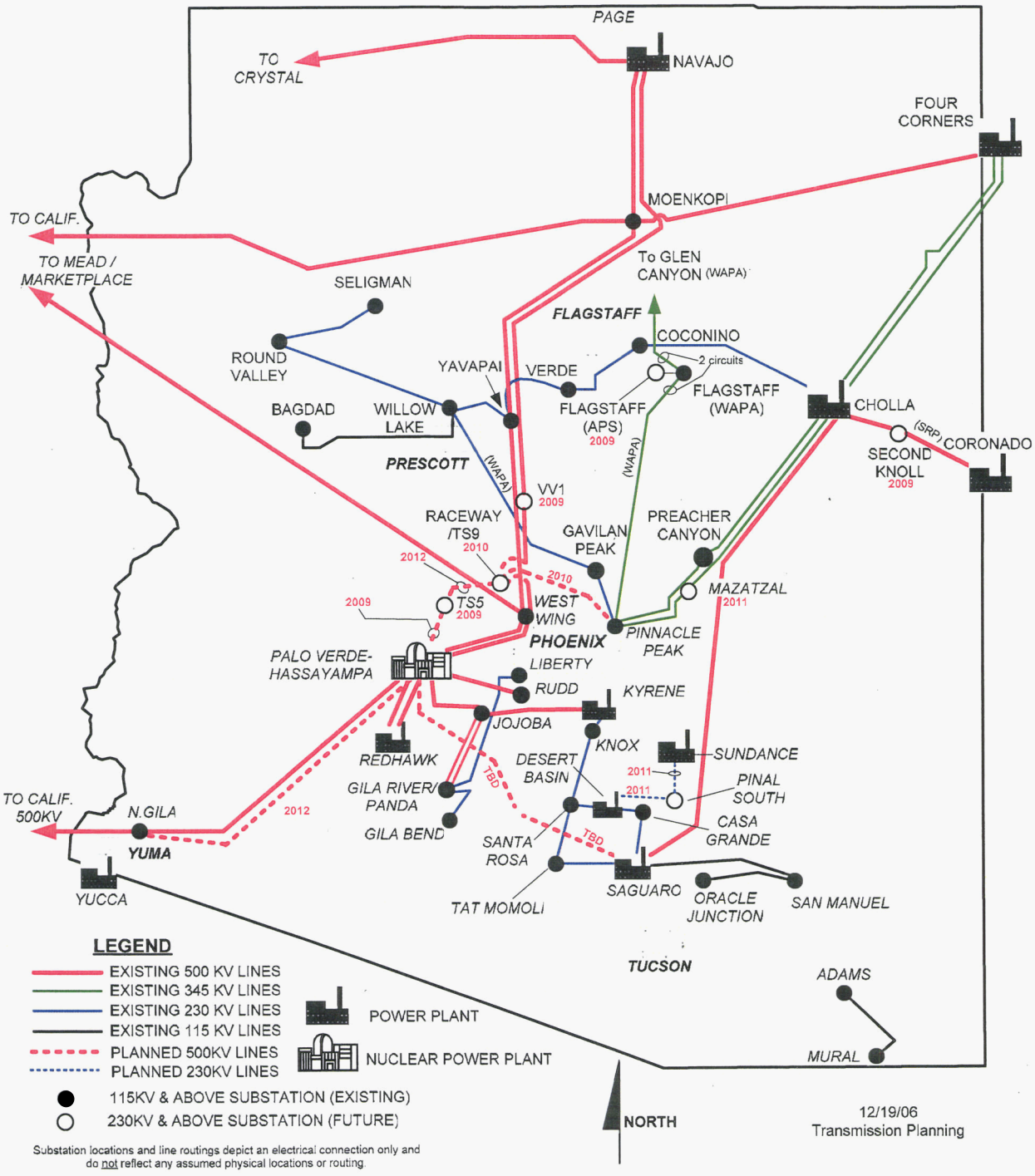
alternatives. The permitting analysis consisted of the preparation of a jurisdictional inventory and identification of high level environmental opportunities and issues for each of the five alternatives. APS has performed an internal economic analysis of the TransWest Express Project, including an evaluation of Wyoming resources compared to resource and transmission alternatives in Arizona. The results of the feasibility analysis show that all five alternatives are technically viable. The economic analysis supports the DC or AC/DC hybrid alternatives. Multiple permitting opportunities have been identified.

The next phase of the project, which is projected to take up to five years, is permitting and siting. APS presently is negotiating a Phase 2 agreement with potential partners that would establish the financial responsibility for Phase 2 and option rights for participation in future phases of the project. The Phase 3 construction phase is estimated to take up to three years, which results in the earliest project in-service date being 2015. Additional information on the feasibility study and stakeholder process can be found on the TransWest Express Project website at: https://transwest.azpsoasis.com/.

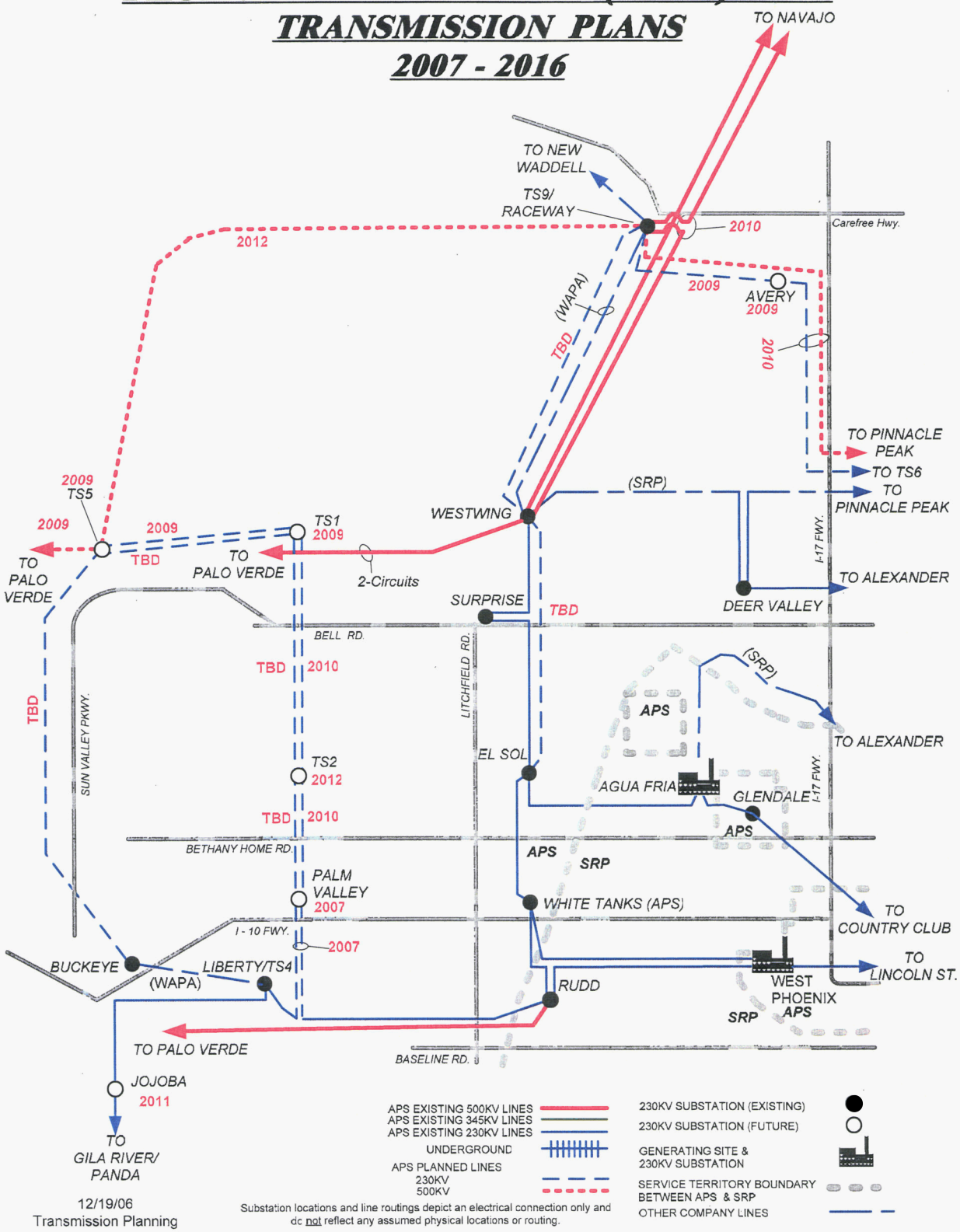
- Cholla – Phoenix Metropolitan Area 500kV line

  This project will be a 500kV line that will be built between APS' Cholla 500kV substation and the Phoenix Metropolitan area and is being studied as a means to provide access to Cholla area resources for APS. The scope and timing for this project is still under study.

APS EHV & OUTER DIVISION 115/230 KV TRANSMISSION PLANS 2007 - 2016



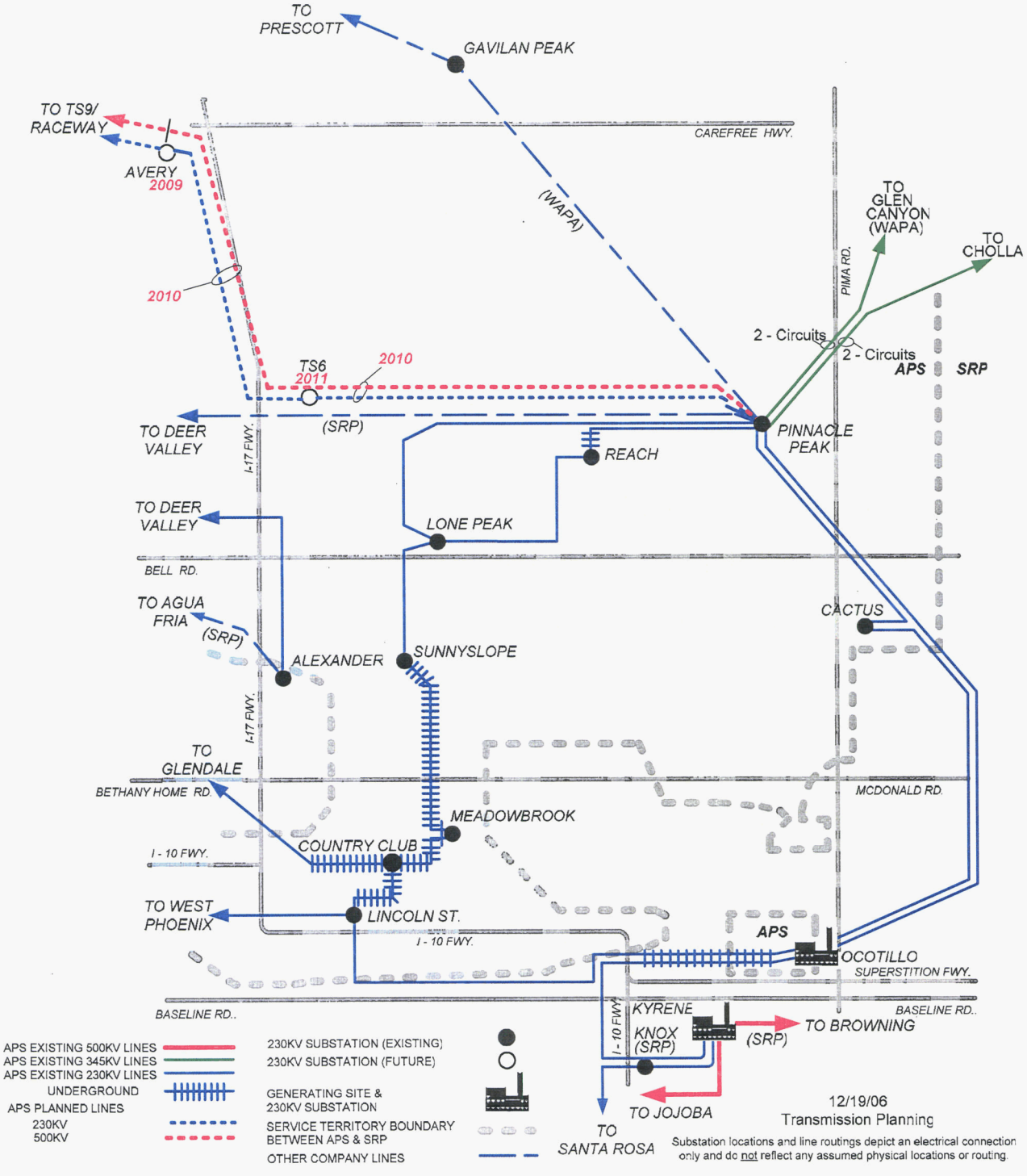
PHOENIX METROPOLITAN (WEST) AREA TRANSMISSION PLANS 2007 - 2016



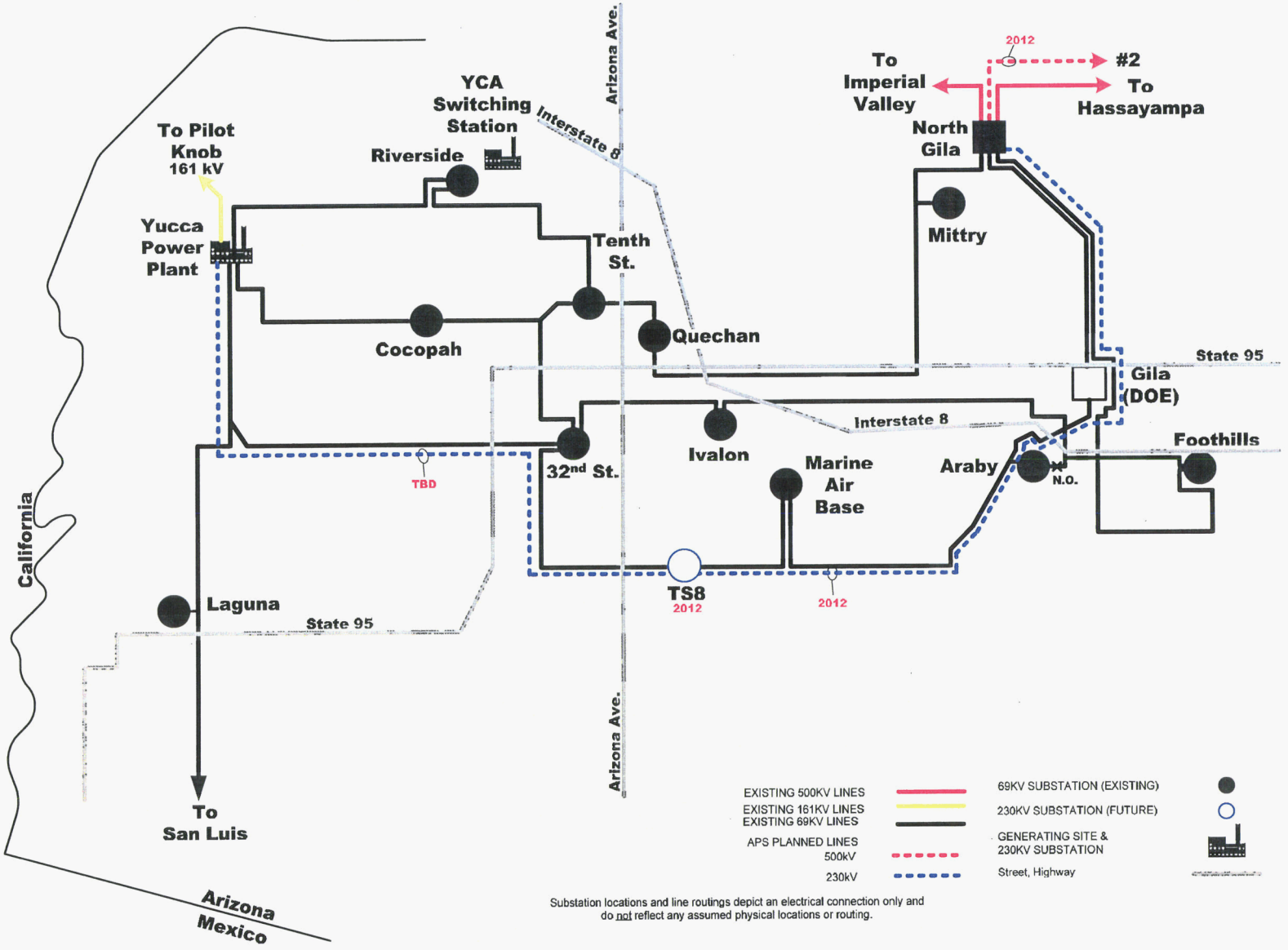
12/19/06
Transmission Planning

Substation locations and line routings depict an electrical connection only and dc not reflect any assumed physical locations or routing.

PHOENIX METROPOLITAN (EAST) AREA TRANSMISSION PLANS 2007 - 2016



Yuma Area Transmission Plans 2007- 2016



Substation locations and line routings depict an electrical connection only and do not reflect any assumed physical locations or routing.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2007

Line Designation	Rudd – Palm Valley – TS4 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Rudd-Liberty 230kV transmission line near the intersection of Broadway Road and Perryville Road; within Sec. 28, T1N, R1W.
(d) Intermediate Point	Palm Valley 230/69kV substation to be constructed in 2007 near the corner of Camelback Rd. and Cotton Ln.; Sec. 24, T2N, R2W.
(e) Point of Termination	A new TS4 230kV substation located just south of the WAPA Liberty substation, Sec. 19, T1N, R2W.
(f) Length	Approximately 7 miles of double-circuit 230kV.
Routing	North from the existing Rudd-Liberty 230kV transmission line approximately 7 miles to the Palm Valley substation and returning south, back to the existing line. Also, the termination of the line will be moved from the Liberty substation to the TS4 substation.
Purpose	This project will provide a source for the Palm Valley 230/69kV substation and 69kV substations planned in the western and southwestern Phoenix Metropolitan area to accommodate the growing need for electric energy in the area. Increased reliability and quality of service will result for customers served by the 230/69kV substation.
Date	
(a) Construction Start	2002 (The component that was already certificated in Case No. 115, Decision No. 64473, Rudd-Liberty was in-service for the summer of 2003.) Construction for the double-circuit to Palm Valley will start in 2007.
(b) Estimated In Service	2007

Certificate of Environmental Compatibility issued 2/12/02 (Case No. 115, Decision No. 64473, Southwest Valley Project). Revised on 4/9/02, Decision No. 64704. This CEC is for the 230kV line, Rudd-Liberty, running east and west on the same poles as the Palo Verde-Rudd 500kV line. The portion of line running from the existing Rudd-Liberty line to the Palm Valley substation and for the TS4 substation was sited as part of the West Valley South 230kV Transmission Line Project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646, West Valley South 230kV Transmission Line Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Second Knoll loop-in of Coronado-Cholla 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	240 MVA.
(c) Point of Origin	Coronado-Cholla 500kV line; Sec. 9, T14N, R21E.
(d) Intermediate Point	None.
(e) Point of Termination	Second Knoll 500/69kV substation to be built in 2009; Sec. 9, T14N, R21E.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing line corridor to the Second Knoll substation.
Routing	The Second Knoll substation will be built adjacent to the Coronado-Cholla 500kV line, therefore limiting the distance to not exceed two spans.
Purpose	This project will serve projected need for electric energy in Show Low and the surrounding communities. The project will improve reliability and continuity of service for the growing communities in the area.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	345/69kV interconnection at WAPA's Flagstaff 345kV bus.
Size	
(a) Voltage	345kV AC.
(b) Capacity	200 MVA.
(c) Point of Origin	WAPA's Flagstaff 345kV substation; Sec. 24, T21N, R9E.
(d) Intermediate Point	None.
(e) Point of Termination	A new 69kV substation to be built in 2009 adjacent to WAPA's Flagstaff substation; Sec. 24, T21N, R9E.
(f) Length	Not to exceed two spans.
Routing	A 345/69kV transformer will interconnect into WAPA's Flagstaff substation.
Purpose	This project will serve projected need for electric energy in APS' northern service area. The project will improve reliability and continuity of service for the growing communities in northern Arizona.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	VV1 loop-in of Navajo-Westwing 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	240 MVA.
(c) Point of Origin	Navajo-Westwing 500kV line, near the crossing of the Navajo-Westwing 500kV line with APS' Willow Lake-Childs 69kV line; location to be determined.
(d) Intermediate Point	None.
(e) Point of Termination	VV1 500/69kV substation to be built in 2009 near the crossing of the Navajo-Westwing 500kV line with APS' Willow Lake-Childs 69kV line; location to be determined.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing Navajo-Westwing line corridor to the VV1 substation.
Routing	The VV1 substation will be built adjacent to the Navajo-Westwing 500kV line, therefore limiting the distance to not exceed two spans.
Purpose	This project will serve projected electrical needs and provide support to the existing subtransmission system in the Verde Valley and Prescott areas.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Palo Verde-TS5 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde switchyard or a new switchyard at Arlington Valley Energy facility.
(d) Intermediate Point	Proposed Harquahala Junction switchyard.
(e) Point of Termination	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(f) Length	Approximately 45 miles of single-circuit line.
Routing	Generally leaving the Palo Verde Hub vicinity following the Palo Verde-Devers #1 and the Hassayampa-Harquahala 500kV lines until crossing the CAP canal. Then following the canal to the new TS5 substation.
Purpose	This line will serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub. This is a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2007
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 8/17/05 (Case No. 128, Decision No. 68063, Palo Verde Hub to TS5 500kV Transmission project). APS, as project manager, holds the CEC.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	TS5-TS1 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	TS1 230/69kV substation to be constructed in 2009; Sec. 20, T4N, R2W.
(f) Length	Approximately 15 miles of double-circuit 230kV line.
Routing	East from TS5 substation along the CAP canal to approximately 243rd Ave., south to the existing 500kV transmission line corridor, and then east along the corridor to the TS1 substation.
Purpose	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2009 and the in-service date for the second circuit will be evaluated in future planning studies.
Date	
(a) Construction Start	2007
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 5/5/05 (Case No. 127, Decision No. 67828, West Valley North 230kV Transmission Line project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2009

Line Designation	Raceway-Avery 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Raceway substation located along the Westwing-New Waddell 230kV line, approximately 3 miles south of the New Waddell Dam; Sec. 4, T5N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	A new Avery substation near Dove Valley Road and 39th Avenue; Sec. 15, T5N, R2E.
(f) Length	Approximately 10 miles.
Routing	South from Raceway substation approximately 1 mile, paralleling existing transmission lines, then east approximately 9 miles to the new Avery substation.
Purpose	This line will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the area's growing communities such as Anthem, Desert Hills and New River.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2009

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	Pinnacle Peak-TS6-Avery 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	1200 MVA.
(c) Point of Origin	Pinnacle Peak substation; Sec. 10, T4N, R4E.
(d) Intermediate Point	TS6 substation to be constructed in 2011; Sec. 8, T4N, R3E.
(e) Point of Termination	Avery substation to be constructed in 2009 near Dove Valley Road and 39th Avenue; Sec. 15, T5N, R2E.
(f) Length	Approximately 16 miles.
Routing	Along the existing 230kV right-of-way, west 10 miles from Pinnacle Peak substation to approximately Interstate 17, generally parallel to and south of Happy Valley Road; then north 5 miles, generally parallel to Interstate 17, to Dove Valley Road, then west to the new Avery substation.
Purpose	This project will serve projected need for electric energy in the area immediately north of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for the growing communities in the areas of Anthem, Desert Hills, New River, and north Phoenix.
Date	
(a) Construction Start	2004
(b) Estimated In Service	2010

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	Palm Valley-TS2-TS1 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palm Valley 230/69kV substation to be constructed in 2007 near the corner of Camelback Rd. and Cotton Ln.; Sec. 24, T2N, R2W.
(d) Intermediate Point	TS2 230/69kV substation to be constructed in 2012; Sec. 25, T3N, R2W.
(e) Point of Termination	TS1 230/69kV substation to be constructed in 2009; Sec. 20, T4N, R2W.
(f) Length	Approximately 12 miles of double-circuit 230kV line.
Routing	North from the Palm Valley substation, generally following the Loop 303, to the TS1 substation passing the location of the future TS2 substation which is currently projected to be in-service in 2012.
Purpose	This project is required to serve the increasing need for electric energy in the western Phoenix Metropolitan area, providing more capability to import power into the Phoenix Metropolitan area along with improved reliability and continuity of service for growing communities such as El Mirage, Surprise, Youngtown, and Buckeye. The first circuit is scheduled to be in-service for the summer of 2010 and the in-service date for the second circuit will be evaluated in future planning studies.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2010

The Palm Valley-TS2 230kV line portion was sited as part of the West Valley South 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 12/24/03 (Case No. 122, Decision No. 66646). The TS1-TS2 230kV line portion was sited as part of the West Valley North 230kV Transmission Line project and a Certificate of Environmental Compatibility was issued 5/5/05 (Case No. 127, Decision No. 67828).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	TS9 – Pinnacle Peak 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS9 500kV substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway 230kV substation; approximately Sec. 33, T6N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	Pinnacle Peak 500kV substation to be constructed in 2010 near the location of the existing Pinnacle Peak 345/230kV substation; Sec. 10, T4N, R4E.
(f) Length	Approximately 26 miles of single-circuit line.
Routing	East from TS9 500kV substation to a new Pinnacle Peak 500kV substation.
Purpose	This line is a result of joint planning through the SWAT forum. The project is needed to increase the import capability to the Phoenix Metropolitan area and strengthen the transmission system on the east side of the Phoenix Metropolitan valley. This will be a joint participation project with APS as the project manager. The loop-in of a Navajo-Westwing 500kV transmission line into the Raceway 500kV substation will be part of this project.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2010

Arizona Corporation Commission decision on the Certificate of Environmental Compatibility for the TS9-Pinnacle Peak 500kV line is expected in first quarter of 2007 (Case No.131, TS9-Pinnacle Peak 500/230kV Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2010

Line Designation	TS9 to Raceway 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS9 substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway substation; approximately Sec. 33, T6N, R1E.
(d) Intermediate Point	None.
(e) Point of Termination	Raceway substation; Sec. 4, T5N, R1E.
(f) Length	Approximately 1 mile of 230kV lines from the 500/230kV transformers at the TS9 substation to the Raceway substation.
Routing	The 230kV line would run south from the TS9 substation to the Raceway substation.
Purpose	The TS9 substation will be located north of the existing Raceway substation due to physical/geographic constraints. The 500/230kV transformers will be located at the TS9 500kV substation, therefore a 230kV line is needed between the 500/230kV transformers and the Raceway substation.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2010

Arizona Corporation Commission decision on the Certificate of Environmental Compatibility for the TS9 500kV to Raceway 230kV line is expected in first quarter of 2007 (Case No.131, TS9-Pinnacle Peak 500/230kV Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Jojoba loop-in of TS4-Panda 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	188 MVA.
(c) Point of Origin	TS4-Panda 230kV line near the existing Jojoba 500kV switchyard; Sec. 25, T2S, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	Jojoba 230/69kV substation to be built in 2011, adjacent to the existing Jojoba 500kV switchyard; Sec. 25, T2S, R4W.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing line corridor to the Jojoba 230/69kV substation.
Routing	Jojoba 230/69kV substation will be adjacent to the TS4-Panda 230kV line so it will not exceed two spans.
Purpose	This substation will be needed to serve projected need for electric energy for the growing communities in the areas of Buckeye, Goodyear, and Gila Bend.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2011

Certificate of Environmental Compatibility issued 10/16/00 (Case No. 102, Decision No. 62960, Gila River Transmission Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Mazatzal loop-in of Cholla-Pinnacle Peak 345kV line.
Size	
(a) Voltage	345kV AC.
(b) Capacity	200 MVA.
(c) Point of Origin	Cholla-Pinnacle Peak 345kV line; near Sec. 3, T8N, R10E.
(d) Intermediate Point	None.
(e) Point of Termination	Mazatzal 345/69kV substation; approximately Sec. 3, T8N, R10E.
(f) Length	Two single-circuit lines, not to exceed two spans, from the existing Cholla-Pinnacle Peak line corridor to the Mazatzal substation.
Routing	The Mazatzal substation will be built adjacent to the Cholla-Pinnacle Peak 345kV line so it will not exceed two spans.
Purpose	This substation will serve projected need for electric energy in the area of Payson and the surrounding communities. Additionally, improved reliability and continuity of service will result for the growing communities in the Payson area.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2011

It is not anticipated that a Certificate of Environmental Compatibility will be needed for this project.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Desert Basin – Pinal South 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Desert Basin substation; Sec 13, T6S, R5E.
(d) Intermediate Point	None.
(e) Point of Termination	Future Pinal South substation; Sec 6, T7S, R8E.
(f) Length	Approximately 21 miles of 230kV line.
Routing	The line will head generally south and east from the Desert Basin substation to a point on the certificated alignment of the 500kV Southeast Valley line in the vicinity of Cornman and Thornton Roads. Then the 230kV line would be on the same structures as the approved 500kV South East Valley line, for approximately 15 miles, to the future Pinal South substation in Coolidge, AZ.
Purpose	This line will serve increasing loads in Pinal County and will improve reliability and continuity of service for the rapidly growing communities in Pinal County. This project, in conjunction with the Sundance-Pinal South 230kV project will increase APS' ability to deliver energy from the Sundance Generation facility over APS' transmission system. It will also allow the existing remedial action scheme (RAS) implemented for the Desert Basin Generating Station to be removed. SRP is the project manager.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2011

Authority for the 230kV portion of the line that will be strung on the 500kV structures was granted in the Certificate of Environmental Compatibility issued in 2005, Case No. 126, Decision Nos. 68093 and 68291 and subsequently confirmed after filing for compliance in Condition 23 of the Certificate of Environmental Compatibility awarded in Case No. 126 in Decision No. 69183 . SRP is expected to file the Certificate of Environmental Compatibility for the portion of the line between the Desert Basin substation and the Southeast Valley 500kV alignment in the first quarter of 2007.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2011

Line Designation	Sundance – Pinal South 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Sundance substation; Sec 2, T6S, R7E.
(d) Intermediate Point	None.
(e) Point of Termination	Future Pinal South substation; Sec 6, T7S, R8E.
(f) Length	Approximately 5 miles of 230kV line.
Routing	Routing for this line has not been determined. Will generally head south from the Sundance substation into the future Pinal South substation.
Purpose	This line will serve increasing loads in Pinal County and will improve the reliability and continuity of service for the rapidly growing communities in the area. This project, in conjunction with the Desert Basin-Pinal South 230kV project, will increase APS' ability to deliver energy from the Sundance Generation facility over APS' transmission system.
Date	
(a) Construction Start	2009
(b) Estimated In Service	2011

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	TS5 – TS9 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS5 500/230kV substation to be constructed in 2009; Sec. 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	TS9 500kV substation to be constructed in 2010 adjacent to the Navajo-Westwing 500kV line and approximately 1 mile from the existing Raceway 230kV substation; approximately Sec. 33, T6N, R1E.
(f) Length	Approximately 40 miles of single-circuit line.
Routing	North from TS5 substation and then in a northeasterly direction to the TS9 substation.
Purpose	This line will be needed to serve projected need for electric energy in the area immediately north and west of the Phoenix Metropolitan area. It will increase the import capability to the Phoenix Metropolitan area as well as increase the export capability from the Palo Verde hub and provide support for multiple Westwing 500/230kV transformer outages. This will be a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	Palo Verde switchyard (or vicinity)-North Gila 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde switchyard or vicinity.
(d) Intermediate Point	None.
(e) Point of Termination	North Gila 500/69kV substation or another substation adjacent to the North Gila location; Sec. 11, T8S, R22N.
(f) Length	Approximately 117 miles of single-circuit line.
Routing	West and south from the Palo Verde Hub area to the Yuma area.
Purpose	As a new transmission path to the Yuma area, this 500kV line will provide transmission capacity required to supplement limited transmission and generation resources in the Yuma area. This is a joint participation project with APS as the project manager.
Date	
(a) Construction Start	2008
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility is expected to be filed in 2007.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

2012

Line Designation	North Gila – TS8 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	North Gila 230kV substation to be constructed in 2012; Sec 11, T8S, R22W.
(d) Intermediate Point	None.
(e) Point of Termination	TS8 230kV substation to be constructed in 2012; location to be determined.
(f) Length	Approximately 15 miles of 230kV line on double-circuit poles.
Routing	The routing for this line has not yet been determined.
Purpose	This project is required to serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.
Date	
(a) Construction Start	2010
(b) Estimated In Service	2012

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	TS5 – Buckeye 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	TS5 230kV substation to be constructed in 2009; Sec 29, T4N, R4W.
(d) Intermediate Point	None.
(e) Point of Termination	Buckeye 230kV substation; Sec 7, T1N, R3W.
(f) Length	Approximately 20 miles of 230kV line on double-circuit structures.
Routing	The routing for this line has not yet been determined.
Purpose	This project will serve the increasing need for electric energy in the west and northwest portions of the Phoenix Metropolitan area. Additionally, improved reliability and continuity of service will result for this fast growing portion of Maricopa County.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Yucca – TS8 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Yucca 230kV substation that would be constructed in the future; Sec 11, T8S, R22W.
(d) Intermediate Point	None.
(e) Point of Termination	TS8 230kV substation to be constructed in 2012; location to be determined.
(f) Length	Approximately 13 miles of 230kV line on double-circuit poles.
Routing	The routing for this line has not yet been determined.
Purpose	This project would serve the increasing need for electric energy in the city of Yuma. Additionally, improved reliability and continuity of service will result for the fast growing Yuma County.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

An application for a Certificate of Environmental Compatibility has not yet been filed.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Westwing-El Sol 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Westwing substation; Sec. 12, T4N, R1W.
(d) Intermediate Point	None.
(e) Point of Termination	El Sol substation; Sec. 30, T3N, R1E.
(f) Length	Approximately 11 miles of single-circuit line.
Routing	Per Certificate.
Purpose	This line will increase system capacity to serve growing demand for electric energy in the Phoenix Metropolitan area, while maintaining system reliability and integrity for delivery of bulk power from Westwing south into the APS Phoenix Metropolitan area 230kV transmission system.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 7/26/73 (Case No. 9, docket No. U-1345). Note that this Certificate authorizes two double-circuit lines. Construction of the first double-circuit line was completed in March 1975. Construction of the second line, planned to be built with double-circuit capability but initially operated with a single circuit, is described above.

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Westwing – Raceway 230kV line.
Size	
(a) Voltage	230kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Westwing substation; Sec 12, T4N, R1W.
(d) Intermediate Point	None.
(e) Point of Termination	Raceway 230kV substation located along the Westwing-New Waddell 230kV line, approximately 3 miles south of the Waddell Dam; Sec. 4, T5N, R1E.
(f) Length	Approximately 7 miles of 230kV line on double-circuit poles.
Routing	Northeast from Westwing substation paralleling existing transmission lines to the Raceway 230kV substation.
Purpose	This line will serve increasing loads in the far north and northwest parts of the Phoenix Metropolitan area and provide contingency support for multiple Westwing 500/230kV transformer outages. The in-service date for the first circuit will continue to be evaluated in future planning studies by APS and the in-service date for the second circuit will be evaluated in future planning studies by SRP.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 6/18/03 (Case No. 120, Decision No. 64473, North Valley 230kV Transmission Line Project).

Arizona Public Service Company
2007 – 2016
Ten-Year Plan
Planned Transmission Description

TBD

Line Designation	Palo Verde - Saguaro 500kV line.
Size	
(a) Voltage	525kV AC.
(b) Capacity	To be determined.
(c) Point of Origin	Palo Verde Switchyard; Sec. 34, T1N, R6W.
(d) Intermediate Point	None.
(e) Point of Termination	Saguaro substation; Sec. 14, T10S, R10E.
(f) Length	Approximately 130 miles of new line to be built on single-circuit poles or towers. Some sections may be built on double-circuit structures.
Routing	South and east from the Palo Verde switchyard, paralleling existing transmission lines for part of the route. The approved corridor is defined in the CEC identified below.
Purpose	This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system and permit increased power delivery throughout the state. It is anticipated the line will be a joint participation project.
Date	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 01/23/1976 (Case No. 24, Decision No. 46802).

A subsidiary of Pinnacle West Capital Corporation

TRANSMISSION PLANNING PROCESS AND GUIDELINES

APS Transmission Planning

January 2006

TRANSMISSION PLANNING PROCESS AND GUIDELINES

III. PLANNING ASSUMPTIONS

I. INTRODUCTION AND PURPOSE

The Transmission Planning Process and Guidelines (Guidelines) are used by Arizona Public Service Company (APS) to assist in planning its Extra High Voltage (EHV) transmission system (345kV and 500kV) and High Voltage transmission system (230kV and 115kV). In addition to these Guidelines, APS follows the Western Electricity Coordinating Council's (WECC) regional planning reliability criteria for system disturbance and performance levels. These WECC Reliability Criteria are (1) WECC/NERC Reliability Criteria for Transmission System Planning and (2) Minimum Operating Reliability Criteria, which can be found in their entirety on the WECC website; (http://www.wecc.biz/documents/library/procedures/CriteriaMaster.pdf). These Guidelines are for internal use by APS and may be changed or modified. Thus, others should not use these Guidelines without consultation with APS.

II. PLANNING METHODOLOGY

A. General

APS uses a deterministic approach for transmission system planning. Under this approach, system performance should meet certain specific criteria under normal conditions (all lines in-service) and for any single contingency condition (any one element out-of-service). In general, an adequately planned transmission system will:

- Provide an acceptable level of service that is cost-effective for normal and single contingency operating conditions.
- Maintain service to all firm loads for any single contingency outage; except for radial loads.
- Not result in overloaded equipment or unacceptable voltage conditions for single contingency outages.
- Not result in cascading for single or double contingency outages.
- Provide for the proper balance between the transmission import capability and local generation requirements for an import limited load area.

Although APS uses a deterministic approach for transmission system planning, the WECC reliability planning criteria provides for exceptions based upon a probalistic approach. APS uses these probabilistic criteria when/where appropriate in the transmission planning process. Historical system reliability performance is analyzed on a periodic basis and the results are used in the design of planned facilities.

These planning methodologies, assumptions, and guidelines are used as the basis for the development of future transmission facilities. Additionally, consideration of potential alternatives to transmission facilities (such as distributed generation or new technologies) is evaluated on a case-specific basis.

As new planning tools and/or information become available revisions or additions to these guidelines will be made as appropriate.

B. Transmission Planning Process

APS' transmission planning process consists of an assessment of the following needs:

- Provide adequate transmission to access sufficient resources in-order to reliably and economically serve loads.
- Support APS' local transmission and sub-transmission systems.
- Provide for interconnection for new resources.
- Accommodate requests for long-term transmission access.

During this process, consideration is given to load growth patterns, other system changes affected by right-of-way, facilities siting constraints, routing of future transportation corridors, and joint planning with neighboring utilities and governmental entities.

1. EHV Transmission Planning Process

APS' EHV transmission system, which consists of 500kV and 345kV, has primarily been developed to provide transmission to bring the output of large base-loaded generators to load centers, such as Phoenix. Need for new EHV facilities may result from any of the bullet items described above. APS' annual planning process includes an assessment of APS' transmission

capability to ensure that sufficient resources can be accessed to reliably and economically serve loads. In addition, biennial RMR studies are performed to ensure that proper balance between the transmission import capability and local generation requirements for an import limited load area are maintained.

2. 230kV Transmission Planning Process

APS' 230kV transmission system has primarily been developed to provide transmission to distribute power from the EHV bulk power substations and local generators to the distribution system and loads throughout the load areas.

Planning for the 230kV system assesses the need for new 230/69kV substations to support local sub-transmission and distribution system growth and the reliability performance of the existing 230kV system. This process takes into account the future land use plans that were developed by government agencies, Landis aerial photo maps, master plans that were provided by private developers, and APS' long-range forecasted load densities per square mile for residential, commercial, and industrial loads.

3. Transmission Facilities Required for Generation/Resource Additions

New transmission facilities may also be required in conjunction with generation resources due to (1) a "merchant" request by an Independent Power Producer (IPP) for generator interconnection to the APS system, (2) a "merchant" request for point-to-point transmission service from the generator (receipt point) to the designated delivery point, or (3) designation of new resources or re-designation of existing units to serve APS network load (including removal of an older units' native load designation). These studies/processes are performed pursuant to the APS Open Access Transmission Tariff (OATT).

C. Ten Year Transmission System Plans

Each year APS uses the planning process described in section B to update the Ten-Year Transmission System Plan. The APS Ten Year Transmission System Plan identifies all new transmission facilities, 115kV and above, and all

facility replacements/upgrades required over the next ten years to reliably and economically serve the load.

D. Regional Coordinated Planning

1. Western Electricity Coordinating Council (WECC)

APS is a member of the Western Electricity Coordinating Council. The focus of the WECC is on promoting the reliability of the interconnected bulk electric system. The WECC provides the means for:

- Developing regional planning and operating criteria.
- Coordinating future plans.
- Compiling regional data banks for use by the member systems and the WECC in conducting technical studies.
- Assessing and coordinating operating procedures and solutions to regional problems.
- Establishing an open forum with interested non-project participants to review the plan of service for a project.

APS works with WECC to adhere to these planning practices.

2. Sub-Regional Planning Groups

Southwest Area Transmission Planning (SWAT), Southwest Transmission Expansion Plan (STEP), Seams Steering Group – Western Interconnection (SSG-WI), and other sub-regional planning groups provide a forum for entities within a region, and any other interested parties, to determine and study the needs of the region as a whole. It also provides a forum for specific projects to be exposed to potential partners and allows for joint studies and participation from interested parties.

3. Joint Studies

In many instances, transmission projects can serve the needs of several utilities and/or IPPs. To this end, joint study efforts may be undertaken. Such joint study efforts endeavor to develop a plan that will meet the needs and desires of all individual companies involved.

E. Generation Schedules

For planning purposes, economic dispatches of network resources are determined for APS' system peak load in the following manner:

a. Determine base generation available and schedule these units at maximum output.
b. Determine resources purchased from other utilities, IPPs, or power marketing agencies.
c. Determine APS' spinning reserve requirements.
d. Schedule intermediate generation (oil/gas steam units) such that the spinning reserve requirements, in section (c) above, are met.
e. Determine the amount of peaking generation (combustion turbine units) required to supply the remaining system peak load.

Phoenix area network resources are dispatched based on economics and any existing import limitations. When possible, spinning reserve will be carried on higher cost Phoenix area network generating units.

Generation output schedules for interconnected utilities and IPPs are based upon consultation with the neighboring utilities and IPPs or as modeled in the latest data in WECC coordinated study cases.

F. Load Projections

APS substation load projections are based on the APS Corporate Load Forecast. Substation load projections for neighboring interconnected utilities or power agencies operating in the WECC area are based on the latest data in WECC coordinated study cases. Heavy summer loads are used for the Ten-Year Transmission System Plans.

G. Alternative Evaluations

1. General

In evaluating several alternative plans, comparisons of power flows, transient stability tests, and fault levels are made first. After the alternatives are found that meet the system performance criteria in each of these three

areas comparisons may be made of the losses, transfer capability, impact on system operations, and reliability of each of the plans. Finally, the costs of facility additions (capital cost items), costs of losses, and relative costs of transfer capabilities are determined. A brief discussion of each of these considerations follows.

2. Power Flow Analyses

Power flows of base case (all lines in-service) and single contingency conditions are tested and should conform to the system performance criteria set forth in Section IV of these Guidelines. Double or multiple contingencies are examined, but in general, no facilities are planned for such conditions. Normal system voltages, voltage deviations, and voltage extreme limitations are based upon operating experience resulting in acceptable voltage levels to the consumer. Power flow limits are based upon the thermal ratings and/or sag limitations of conductors or equipment, as applicable.

3. Transient Stability Studies

Stability guidelines are established to maintain system stability for single contingency, three-phase fault conditions. Double or multiple contingencies are examined, but in general, no facilities are planned for such conditions.

4. Short Circuit Studies

Three-phase and single-phase-to-ground fault studies are performed to ensure the adequacy of system protection equipment to clear and isolate faults.

5. Reactive Power Margin Analyses

Reactive Power Margin analyses are performed when steady-state analyses indicate possible insufficient voltage stability margins. V-Q curve analyses are used to determine post-transient voltage stability.

6. Losses Analyses

A comparison of individual element and overall transmission system losses are made for each alternative plan being studied. The losses computed in the power flow program consist of the I^2R losses of lines and transformers and the core losses in transformers, where represented.

7. Transfer Capability Studies

In evaluating the relative merits of one or more EHV transmission plans, both simultaneous and non-simultaneous transfer capability studies are performed to determine the magnitude of transfer capabilities between areas or load centers.

8. Subsynchronous Resonance (SSR)

SSR phenomenon result from the use of series capacitors in the network where the tuned electrical network exchanges energy with a turbine generator at one or more of the natural frequencies of the mechanical system. SSR countermeasures are applied to prevent damage to machines as a result of transient current or sustained oscillations following a system disturbance. SSR studies are not used directly in the planning process. SSR countermeasures are determined after the transmission plans are finalized.

9. FACTS (Flexible AC Transmission System)

FACTS essentially involves the controlling of series capacitor impedances. A series capacitor bank can be controlled by thyristors to do the following:

a) change its effective impedance to control the power flow
b) to make dynamic changes in its impedance in-order to provide damping of oscillations

FACTS will be evaluated as a means of power flow control and/or to provide damping to dynamic oscillations where a need is identified and it is economically justified.

10. Economic Evaluation

In general, an economic evaluation of alternative plans consists of a cumulative present worth or equivalent annual cost comparison of capital costs.

III. PLANNING ASSUMPTIONS

A. General

1. Loads

   Loads used for the APS system originate from the latest APS Corporate Load Forecast. In most cases, the corrected power factor of APS loads is 99.5% at 69kV substations.

2. Generation and Other Resources

   Generation dispatch is based on firm power and/or transmission wheeling contracts including network resources designations.

3. Normal Voltage Levels

   a. Nominal EHV design voltages are 500kV, 345kV, 230kV, and 115kV.

   b. Nominal EHV operating voltages are 535kV, 348kV, 239kV, and 119kV.

4. Sources of Databases

   WECC Heavy Summer base cases are the sources of the databases. Loop flow (unscheduled flow), of a reasonable amount and direction, will be allowed for use in planning studies.

5. Voltage Control Devices

   Devices which can control voltages are shunt capacitors, shunt reactors, tap-changing-under-load (TCUL) and fixed-tap transformers, static VAR compensators, and machine VAR capabilities. If future voltage control devices are necessary, these devices will be evaluated based upon economics and the equipment's ability to obtain an adequate voltage profile on the EHV and HV systems.

6. Phase Shifters

   In general, where phase shifters are used, schedules are held across the phase shifter in base case power flows and the phase shifter tap remains fixed in the outage cases.

7. Conductor Sizes

   Existing transmission voltages utilized by APS are 230kV, 345kV, and 500kV. It is presently planned that the 345kV transmission system will not be expanded, thus all future APS EHV lines will be 500kV or 230kV. Planned

500kV lines will initially be modeled using tri-bundled 1780 kCM ACSR conductor (Chukar). Preferred construction for 230kV lines consists of 2156 kCM ACSS conductor on steel poles.

8. 69kV System Modeling

230kV facility outages may result in problems to the underlying 69kV system due to the interconnection of those systems. For this reason, power flow cases include a detailed 69kV system representation. Solutions to any problems encountered on the 69kV system are coordinated with the subtransmission planning engineers.

9. Substation Transformers

a. 500kV and 345kV Substations

Bulk substation transformer banks may be made up of one three-phase or three single-phase transformers, depending upon bank size and economics. For larger banks where single-phase transformers are used, a fourth (spare) single-phase transformer will be used in a jack-bus arrangement to improve reliability and facilitate connection of the spare in the event of an outage of one of the single-phase transformers. TCUL will be considered in the high voltage windings, generally with a range of plus or minus 10%. High voltage ratings will be 500kV or 345kV class and low voltage windings will be 230kV, 115kV, or 69kV class.

b. 230kV Substations

For high-density load areas, both 230/69kV and 69/12.5kV transformers can be utilized. 230/69kV transformers will be rated at 113/150/188 MVA with a 65°C temperature rise, unless otherwise specified. 69/12.5kV transformers will be rated at 25/33/41 MVA with a 65°C temperature rise, unless otherwise specified.

With all elements in service, a transformer may be loaded up to its top Forced Oil Air (FOA) rating without sustaining any loss of service life. For a single contingency outage (loss of one transformer) the remaining transformer or transformers may be loaded up to 20% above their top FOA rating, unless heat test data indicate a different overload capability. The

loss of service life sustained will depend on the transformer pre-loading and the outage duration. Tap setting adjustment capabilities on 230/69kV transformers will be ±5% from the nominal voltage setting (230/69kV) at 2½% increments.

10. Switchyard Arrangements

a. 500kV and 345kV Substations

Existing 345kV switchyard arrangements use breaker-and-one-half, main-and-transfer, or modified paired-element circuit breaker switching schemes. Because of the large amounts of power transferred via 500kV switchyards and the necessity of having adequate reliability, all 500kV circuit breaker arrangements are planned for an ultimate breaker-and-one-half scheme. If only three or four elements are initially required, the circuit breakers are connected in a ring bus arrangement, but physically positioned for a breaker-and-one-half scheme. The maximum desired number of elements to be connected in the ring bus arrangement is four. System elements such as generators, transformers, and lines will be arranged in breaker-and-one-half schemes such that a failure of a center breaker will not result in the loss of two lines routed in the same general direction and will minimize the impact of losing two elements.

b. 230kV Substations

Future 230/69kV substations should be capable of serving up to 452 MVA of load. 400 MVA has historically been the most common substation load level in the Phoenix Metropolitan area. Future, typical 230/69kV substations should accommodate up to four 230kV line terminations and up to three 230/69kV transformer bays. Based upon costs, as well as reliability and operating flexibility considerations, a breaker-and-one-half layout should be utilized for all future 230/69kV Metropolitan Phoenix Area substations, with provision for initial development to be a ring bus. Any two 230/69kV transformers are to be

separated by two breakers, whenever feasible, so that a stuck breaker will not result in an outage of both transformers.

11. Series Capacitor Application

Series capacitors may be used on EHV lines to increase system stability, for increased transfer capability, and/or for control of power flow. The series capacitors may be lumped at one end of a line because of lower cost; however, the capacitors are generally divided into two banks, one at either end of a line, for improved voltage profile.

12. Shunt and Tertiary Reactor Application

Shunt and/or tertiary reactors may be installed to prevent open end line voltages from being excessive, in addition to voltage control. The open end line voltage must not be more than 0.05 per unit voltage greater than the sending end voltage. Tertiary reactors may also be used for voltage and VAR control as discussed above.

B. Power Flow Studies

1. System Stressing

Realistic generation capabilities and schedules should be used to stress the transmission system in order to maximize the transfer of resources during the maximum load condition.

2. Displacement

In cases where displacements (due to power flow opposite normal generation schedules) may have an appreciable effect on transmission line loading, a reasonable amount of displacement (Generation Units) may be removed in-order to stress a given transmission path.

C. Transient Stability Studies

1. Fault Simulation

When studying system disturbances caused by faults, two conditions will be simulated:

a. Three-phase-to-ground faults, and

b. Single-line-to-ground faults with a stuck circuit breaker in one phase with back-up delayed clearing.

2. Margin

a. Generation margin may be applied for the contingencies primarily affected by generation, or

b. Power flow margin may be applied for the contingencies primarily affected by power flow.

3. Unit Tripping

Generator unit tripping may be allowed in-order to increase system stability performance.

4. Machine Reactance Representation

For transient stability studies, the unsaturated transient reactance of machines with full representation will be used.

5. Fault Damping

Fault damping will be applied to the generating units adjacent to faults. Fault damping will be determined from studies that account for the effect of generator amortisseur windings and the SSR filters.

6. Series Capacitor Switching

Series capacitors, locations to be determined from short circuit studies, will be flashed and reinserted as appropriate.

D. Short Circuit Studies

Three-phase and single-phase-to-ground faults will be evaluated.

1. Generation Representation

All generation will be represented.

2. Machine Reactance Representation

The saturated subtransient reactance (X''_d) values will be used.

3. Line Representation

The transmission line zero sequence impedance (X_0) is assumed to be equal to three times the positive sequence impedance (X_1).

4. Transformer Representation

The transformer zero sequence impedance (X_0) is assumed to be equal to the positive sequence impedance (X_1). Bulk substation transformers are modeled as auto-transformers. The two-winding model is that of a grounded-wye transformer. The three-winding model is that of a wye-delta-wye with a solid ground.

E. Reactive Power Margin Studies

Using Q-V curve analyses, APS assesses the interconnected transmission system to ensure there are sufficient reactive resources located throughout the electric system to maintain post-transient voltage stability for system normal conditions and certain contingencies.

IV. SYSTEM PERFORMANCE

A. Power Flow Studies

1. Normal (Base Case Conditions)

a. Voltage Levels

1) General

(a) 500kV bus voltages will be maintained between 1.05 and 1.08 p.u. on a 500kV base.

(b) 345kV bus voltages will range between .99 and 1.04 p.u. on the 345kV system.

(c) 500kV and 345kV system voltages are used to maintain proper 230kV bus voltages.

(d) Voltage on the 230kV and 115kV system should be between 1.01 p.u. and 1.05 p.u.

(e) Tap settings for 230/69kV and 345/69kV transformers should be used to maintain low side (69kV) voltages of 1.03 to 1.04 p.u. Seasonal tap changes may be required.

2) Specific Buses

(a) APS Pinnacle Peak 230kV bus voltage should be between 1.025 p.u. and 1.035 p.u.

(b) APS Westwing 230kV bus voltage should be between 1.04 p.u. and 1.05 p.u.

(c) Saguaro 115kV bus voltage will be approximately 1.035 p.u.

(d) Voltage at the Prescott (DOE) 230kV bus should be approximately 1.02 p.u.

b. Facility Loading Limits

1) Transmission Lines

Transmission line loading cannot exceed 100% of the continuous rating, which is based upon established conductor temperature limit or sag limitation.

2) Underground Cable

Underground cable loading should not exceed 100% of the continuous rating with all elements in service. This rating is based on a cable temperature of 85°C with no loss of cable life.

3) Transformers

Transformers cannot exceed 100% of top FOA, 65°C rise, nameplate ratings.

4) Series Capacitors

Series Capacitors cannot exceed 100% of continuous rating.

c. Interchange of VARs

Interchange of VARs between companies at interconnections will be reduced to a minimum and maintained near zero.

d. Distribution of Flow

Schedules on a new project will be compared to simulated power flows to ensure a reasonable level of flowability.

2. Single Contingency Outages

a. Voltage Levels

Maximum voltage deviation on APS' major buses cannot exceed 5%. This deviation level yields a close approximation to the post-transient VAR margin requirements of WECC.

b. Facilities Loading Limits

1) Transmission Lines

Transmission line loading cannot exceed 100% of the lesser of the sag limit or the emergency rating (30-minute rating) which is based upon established conductor temperature limits.

2) Underground Cable

Underground cable loading should not exceed the emergency rating during a single-contingency outage. This rating is based on a cable temperature of 105°C for two hours of emergency operation with no loss of cable life.

3) Transformers

Transformers cannot exceed 120% of top FOA, 65°C rise, nameplate ratings.

4) Series Capacitors

Series Capacitors cannot exceed 100% of emergency rating.

c. Generator Units

Generator units used for controlling remote voltages will be modified to hold their base case terminal voltages.

d. Impact on Interconnected System

Single contingency outages will not cause overloads upon any neighboring transmission system.

B. Transient Stability Studies

Transient stability studies are primarily performed on the 500kV and 345kV systems.

1. Fault Simulation

Three-phase-to-ground faults and single-line-to-ground faults, simulating a stuck circuit breaker in one phase with back-up delayed clearing will be simulated. Fault clearing times of four cycles after fault inception (5 cycles for a 230kV fault) and a back-up clearing time of twelve cycles after fault inception is utilized. System elements are switched out at the appropriate clearing times, as applicable. Fault damping will be applied when applicable at fault inception.

2. Series Capacitor Switching

Series capacitors, at locations determined from short-circuit studies, will be flashed at fault inception and will be reinserted depending on their reinsertion types.

3. System Stability

The system will be considered stable if the following conditions are met:

a. All machines in the system remain synchronized as demonstrated by the relative rotor angles.

b. Positive system damping exists as demonstrated by the damping of relative rotor angles and the damping of voltage magnitude swings. For N-1 disturbances, voltages for the first swing after fault clearing should not drop below 75% of pre-fault value with maximum time duration of 20 cycles for voltage dip exceeding 20%.

4. Re-closing

Automatic re-closing of circuit breakers controlling EHV facilities is not utilized.

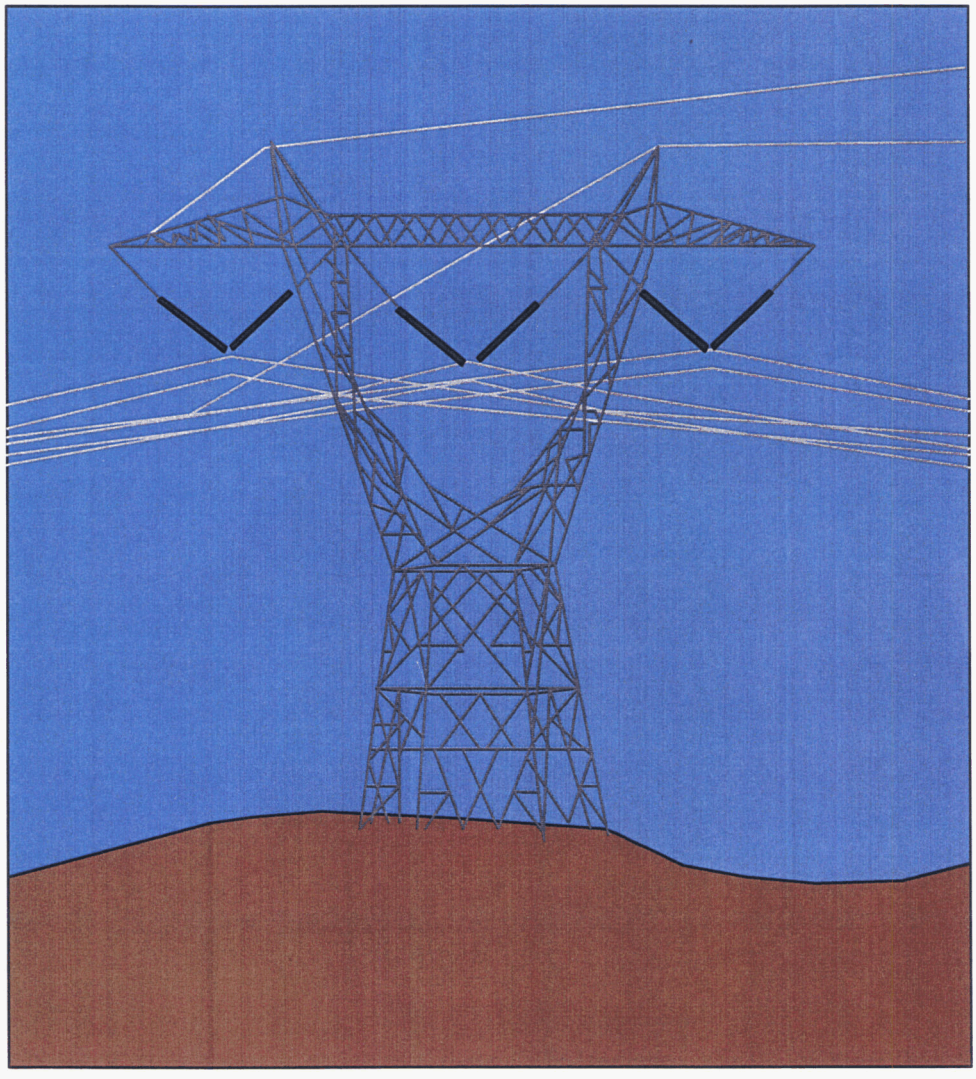
C. Short Circuit Studies

Fault current shall not exceed 100% of the applicable breaker fault current interruption capability for three-phase or single-line-to-ground faults.

D. Reactive Power Margin Studies

For system normal conditions or single contingency conditions, post-transient voltage stability is required with a path or load area modeled at a minimum of 105% of the path rating or maximum planned load limit for the area under study, whichever is applicable. For multiple contingencies, post-transient voltage stability is required with a path or load area modeled at a minimum of 102.5% of the path rating or maximum planned load limit for the area under study, whichever is applicable.

2006 SYSTEM RATING MAPS



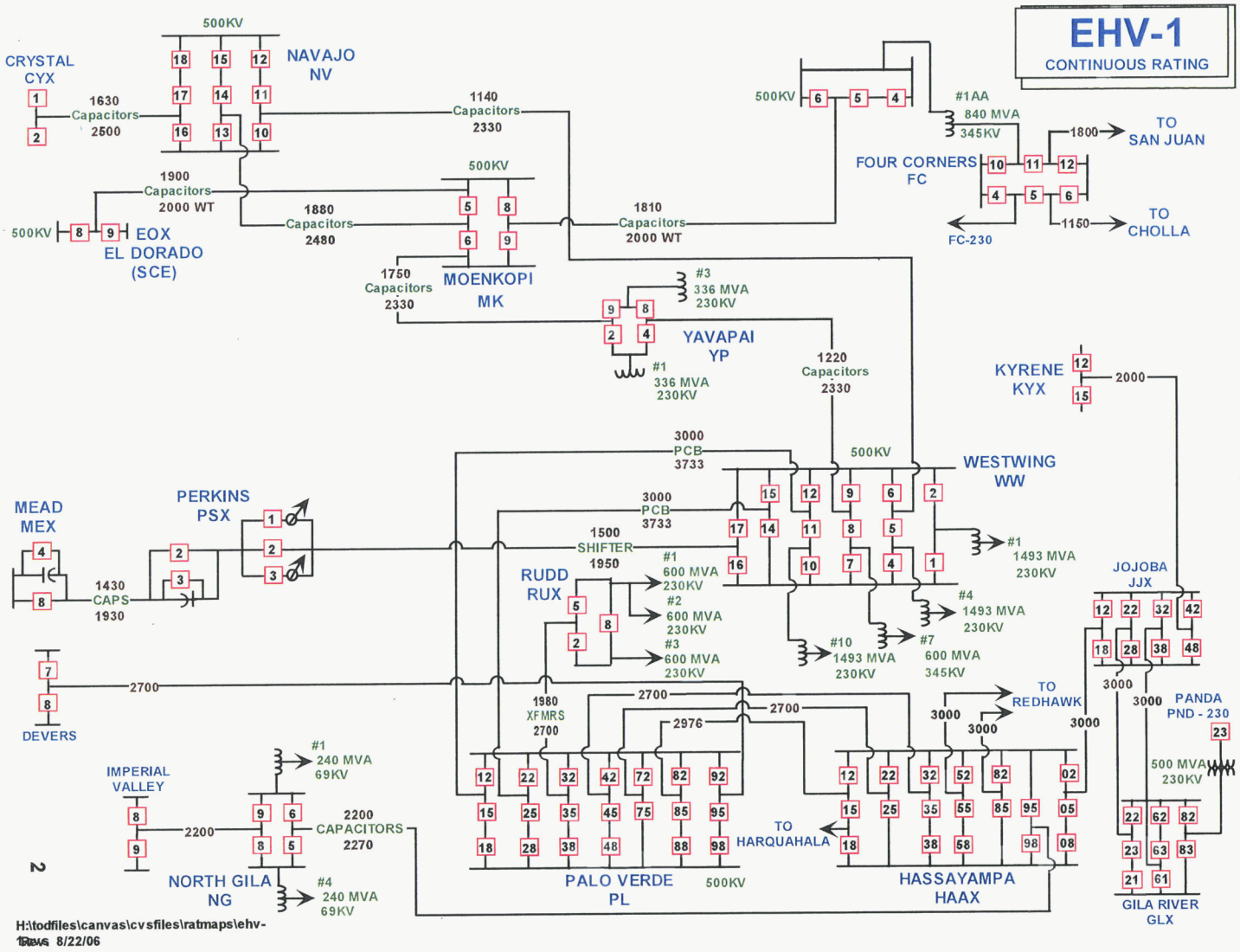
Prepared By

Transmission Operations
August, 2006

TABLE OF CONTENTS

LEGEND
SYSTEM RATING MAPS

SYMBOL	DESCRIPTION
###	CURRENT LIMIT IN AMPS
###	LIMITING ELEMENT
###	CONDUCTOR LIMIT IN AMPS
	TRANSFORMER LIMITS ARE IN MVA
————	OVERHEAD TRANSMISSION LINE
– – – – – –	UNDERGROUND CABLE
M	MOTOR OPERATED SWITCH
V	VACCUM SWITCH
H	HYDRAULIC SWITCH
1	BREAKER NUMBER


EHV-1
CONTINUOUS RATING
CRYSTAL
CYX
1630
Capacitors
2500
500KV
NAVAJO
NV
1140
Capacitors
2330
1900
Capacitors
2000 WT
1880
Capacitors
2480
500KV
EOX
EL DORADO
(SCE)
1750
Capacitors
2330
MOENKOPI
MK
1810
Capacitors
2000 WT
500KV
#1AA
840 MVA
345KV
FOUR CORNERS
FC
FC-230
1800
TO
SAN JUAN
1150
TO
CHOLLA
#3
336 MVA
230KV
#1
336 MVA
230KV
YAVAPAI
YP
1220
Capacitors
2330
KYRENE
KYX
2000
3000
PCB
3733
500KV
WESTWING
WW
MEAD
MEX
PERKINS
PSX
1430
CAPS
1930
3000
PCB
3733
1500
SHIFTER
1950
RUDD
RUX
#1
600 MVA
230KV
#2
600 MVA
230KV
#3
600 MVA
230KV
#1
1493 MVA
230KV
#4
1493 MVA
230KV
#10
1493 MVA
230KV
#7
600 MVA
345KV
JOJOBA
JJX
DEVERS
2700
1980
XFMRS
2700
2700
2700
2976
TO
REDHAWK
3000
3000
3000
3000
PANDA
PND - 230
500 MVA
230KV
IMPERIAL
VALLEY
#1
240 MVA
69KV
2200
2200
CAPACITORS
2270
NORTH GILA
NG
#4
240 MVA
69KV
PALO VERDE
PL
500KV
TO
HARQUAHALA
HASSAYAMPA
HAAX
GILA RIVER
GLX
2
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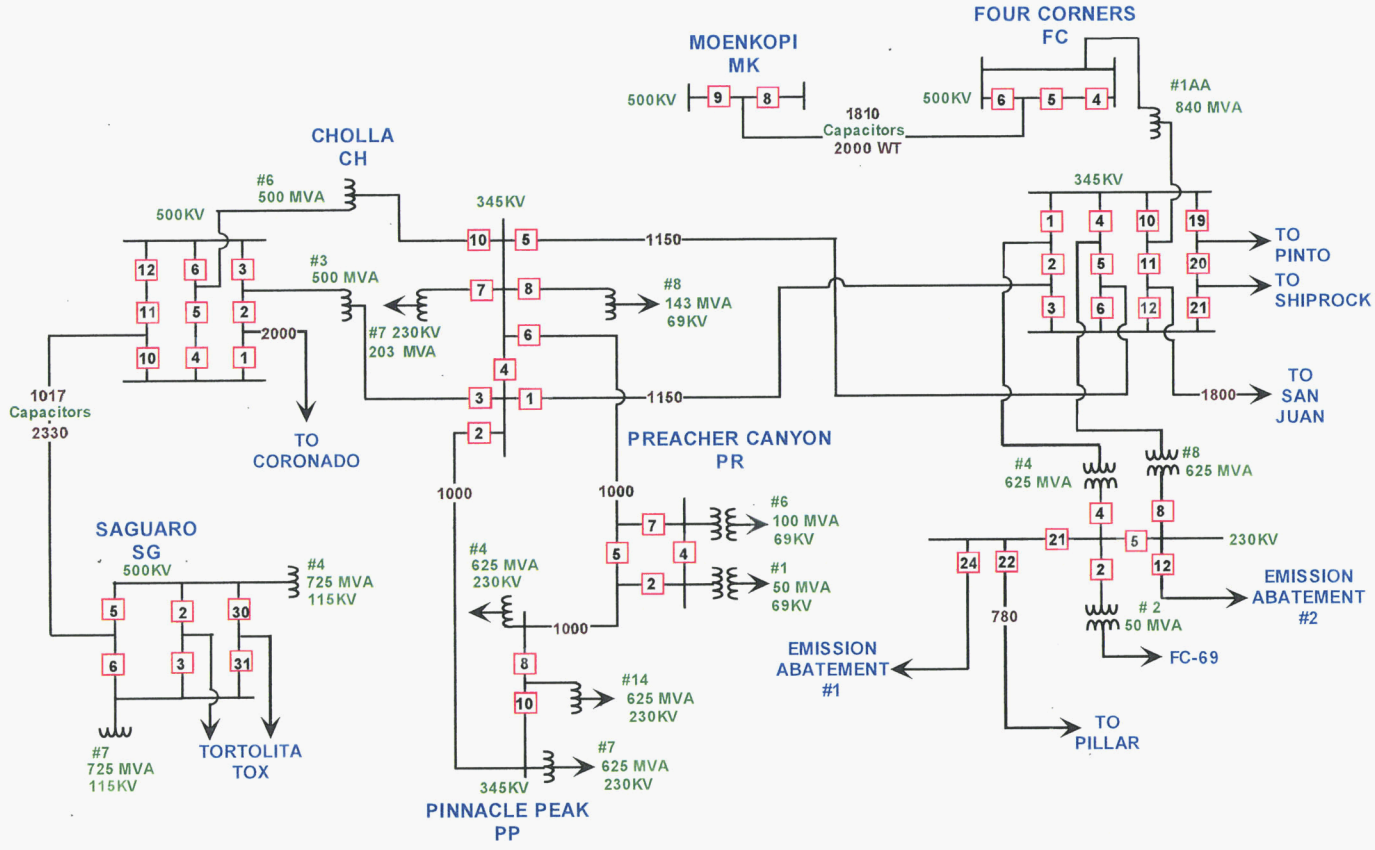
EHV-2
CONTINUOUS RATINGS



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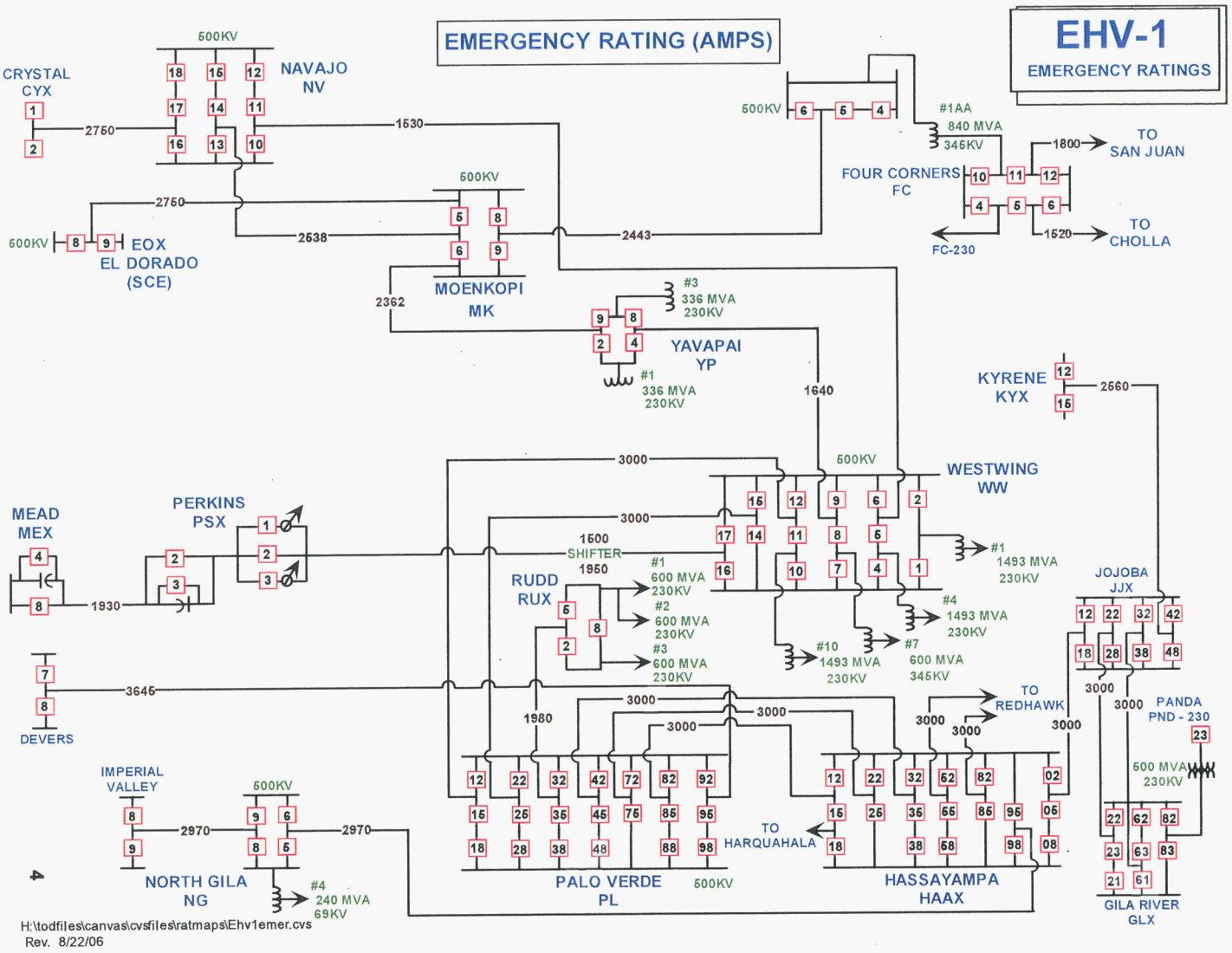
EMERGENCY RATING (AMPS)
EHV-1
EMERGENCY RATINGS
CRYSTAL
CYX
NAVAJO
NV
500KV
2750
1530
2750
2538
2443
500KV
EOX
EL DORADO
(SCE)
MOENKOPI
MK
2362
500KV
#1AA
840 MVA
345KV
FOUR CORNERS
FC
1800
TO
SAN JUAN
1520
TO
CHOLLA
FC-230
#3
336 MVA
230KV
YAVAPAI
YP
#1
336 MVA
230KV
1640
KYRENE
KYX
2560
3000
500KV
WESTWING
WW
#1
1493 MVA
230KV
#4
1493 MVA
230KV
#10
1493 MVA
230KV
#7
600 MVA
345KV
MEAD
MEX
PERKINS
PSX
1930
1500
SHIFTER
1950
RUDD
RUX
#1
600 MVA
230KV
#2
600 MVA
230KV
#3
600 MVA
230KV
JOJOBA
JJX
3000
3000
PANDA
PND - 230
500 MVA
230KV
3645
DEVERS
1980
TO
REDHAWK
IMPERIAL
VALLEY
500KV
2970
2970
NORTH GILA
NG
#4
240 MVA
69KV
TO
HARQUAHALA
PALO VERDE
PL
500KV
HASSAYAMPA
HAAX
GILA RIVER
GLX
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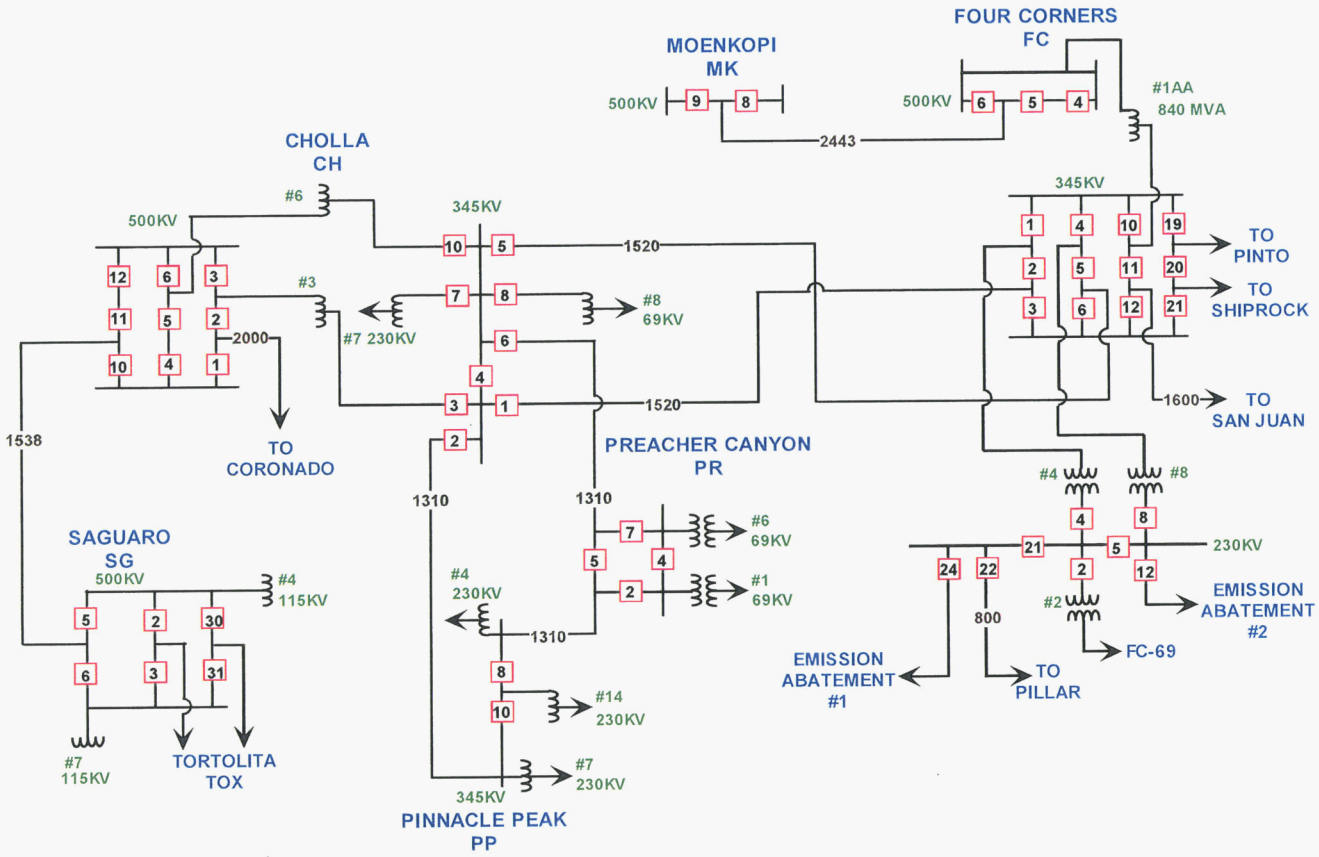
EMERGENCY RATING (AMPS)

EHV-2
EMERGENCY RATINGS



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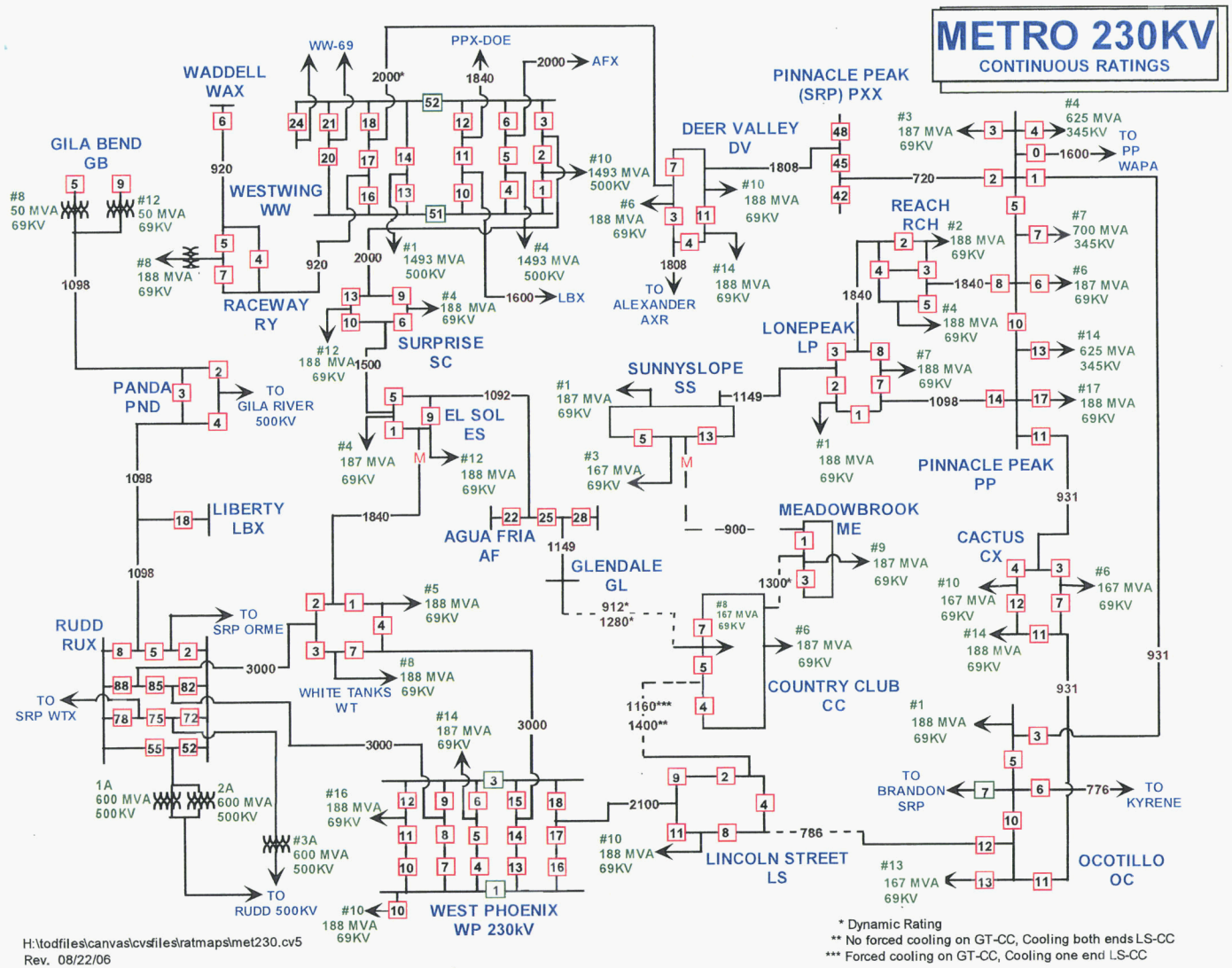

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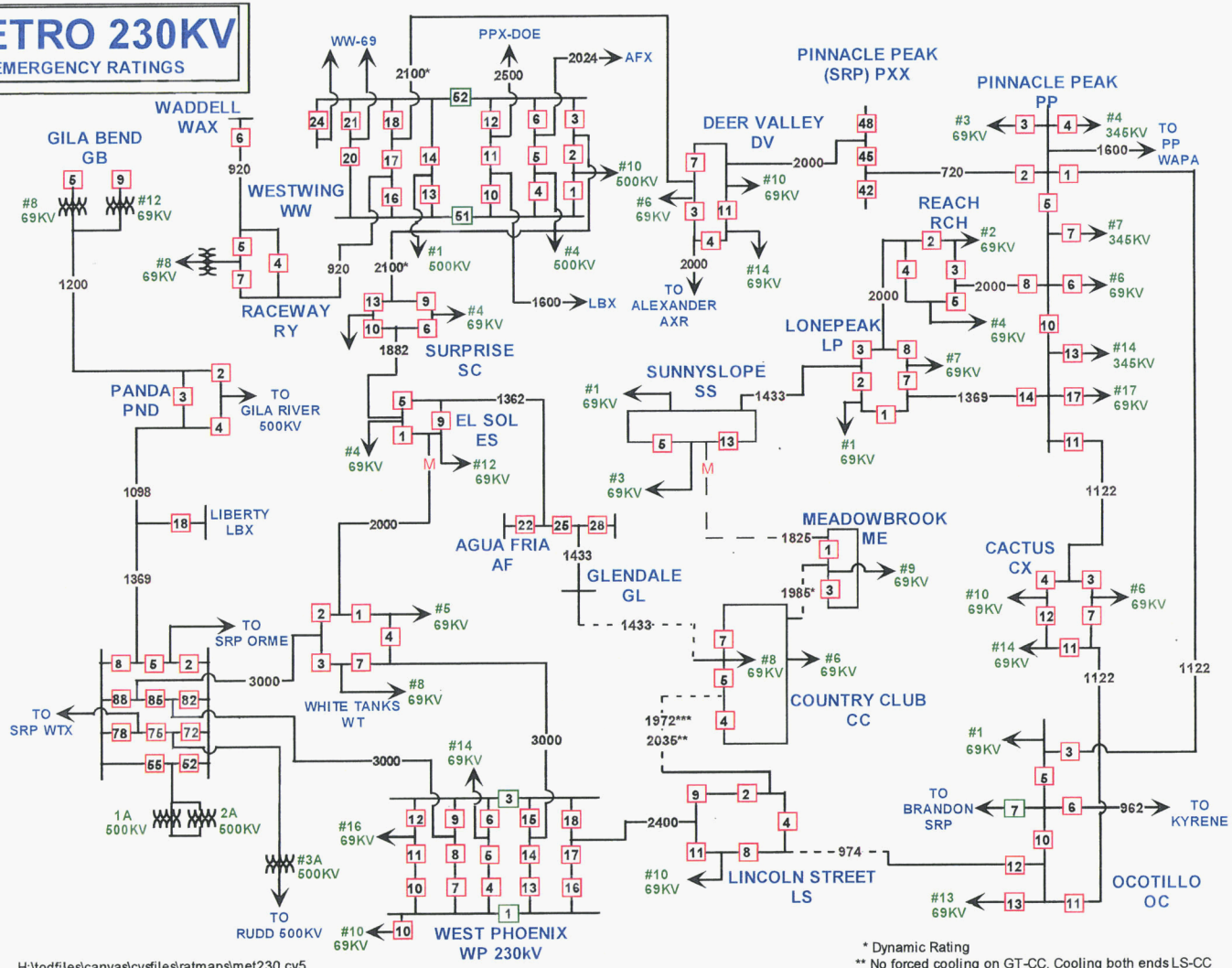
METRO 230KV

EMERGENCY RATINGS



* Dynamic Rating

** No forced cooling on GT-CC, Cooling both ends LS-CC

*** Forced cooling on GT-CC, Cooling one end LS-CC

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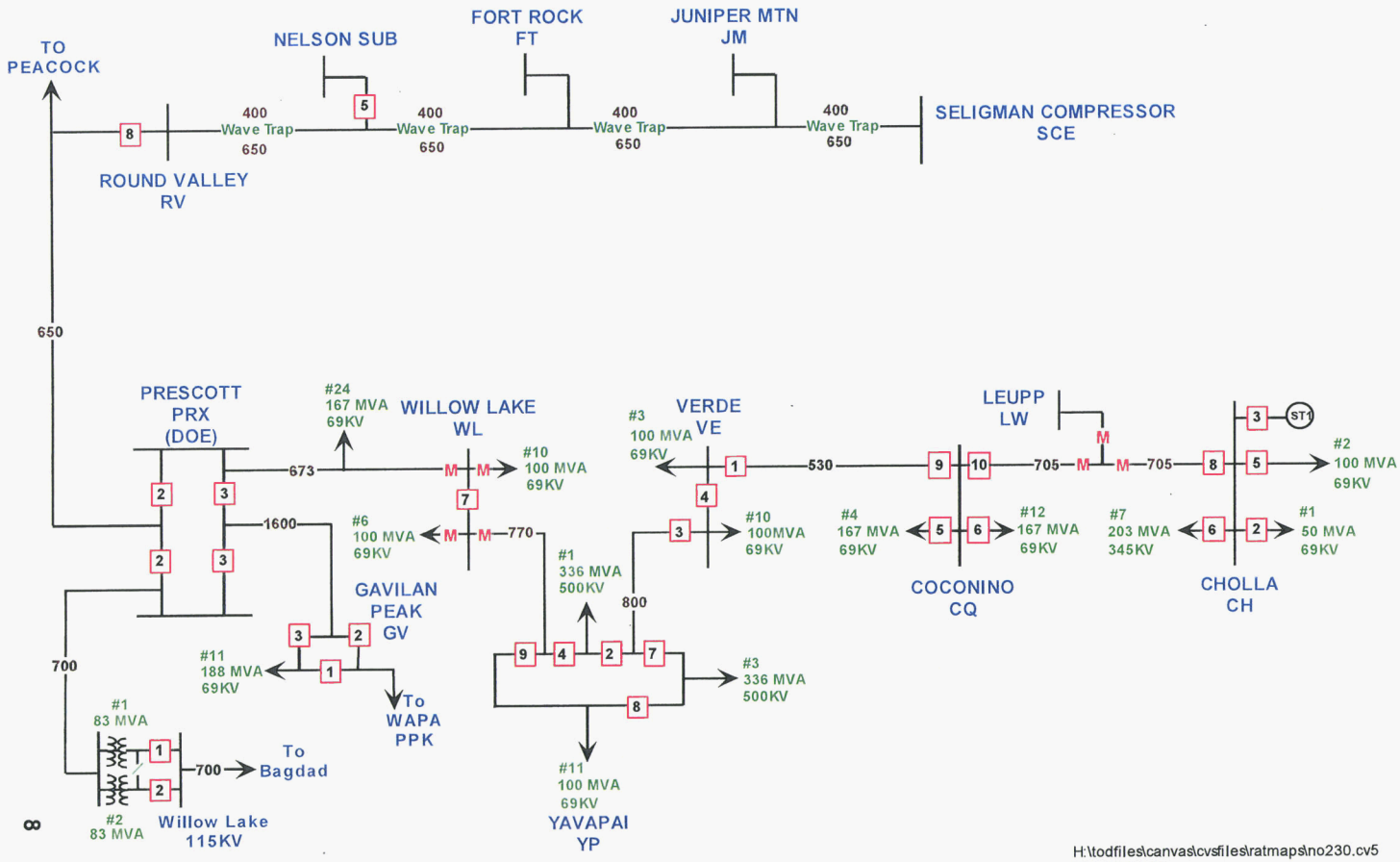
Rev. 08/22/06

NORTHERN 230KV

CONTINUOUS RATING



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NORTHERN 230KV

EMERGENCY RATINGS

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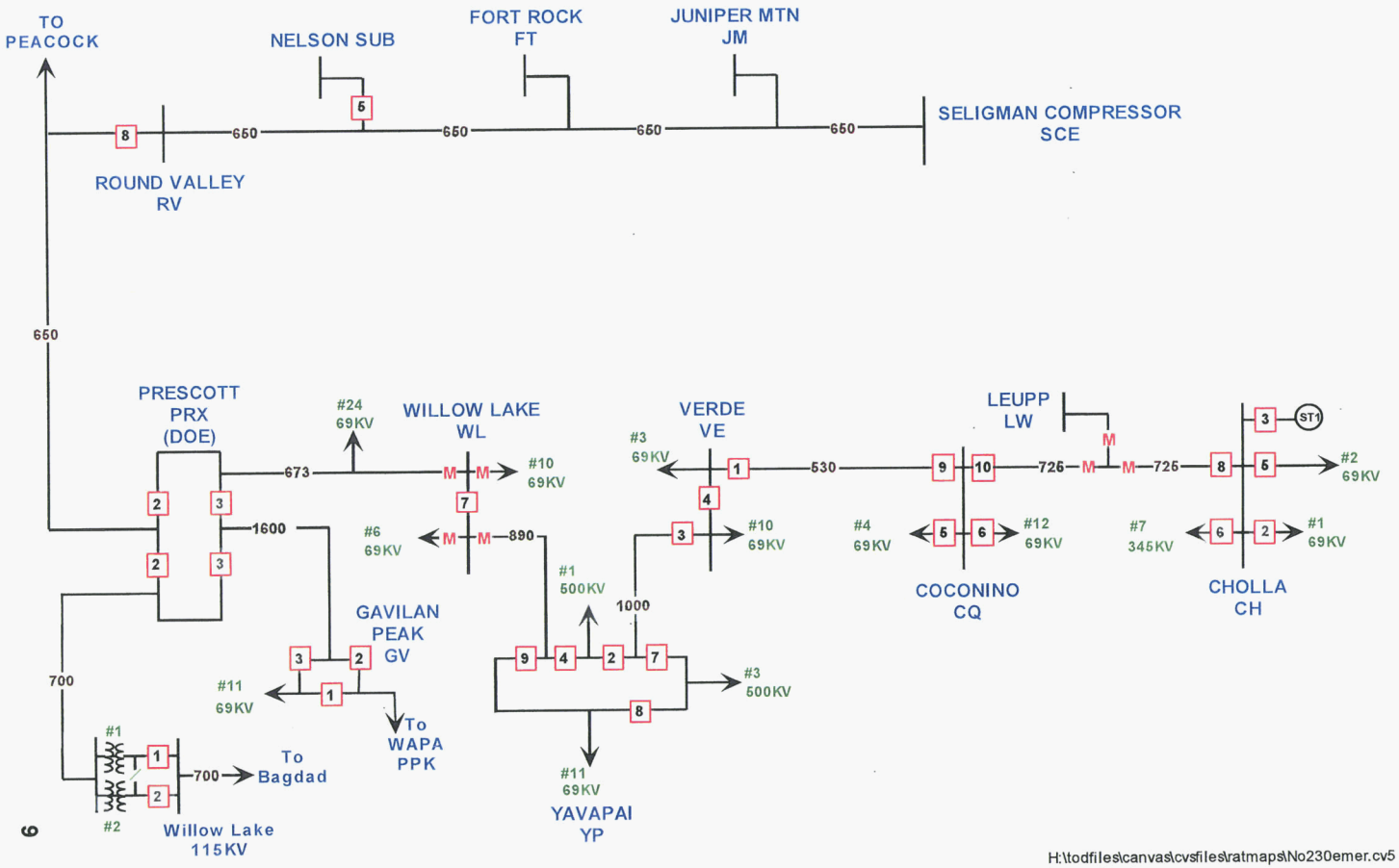

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SOUTHERN 230KV

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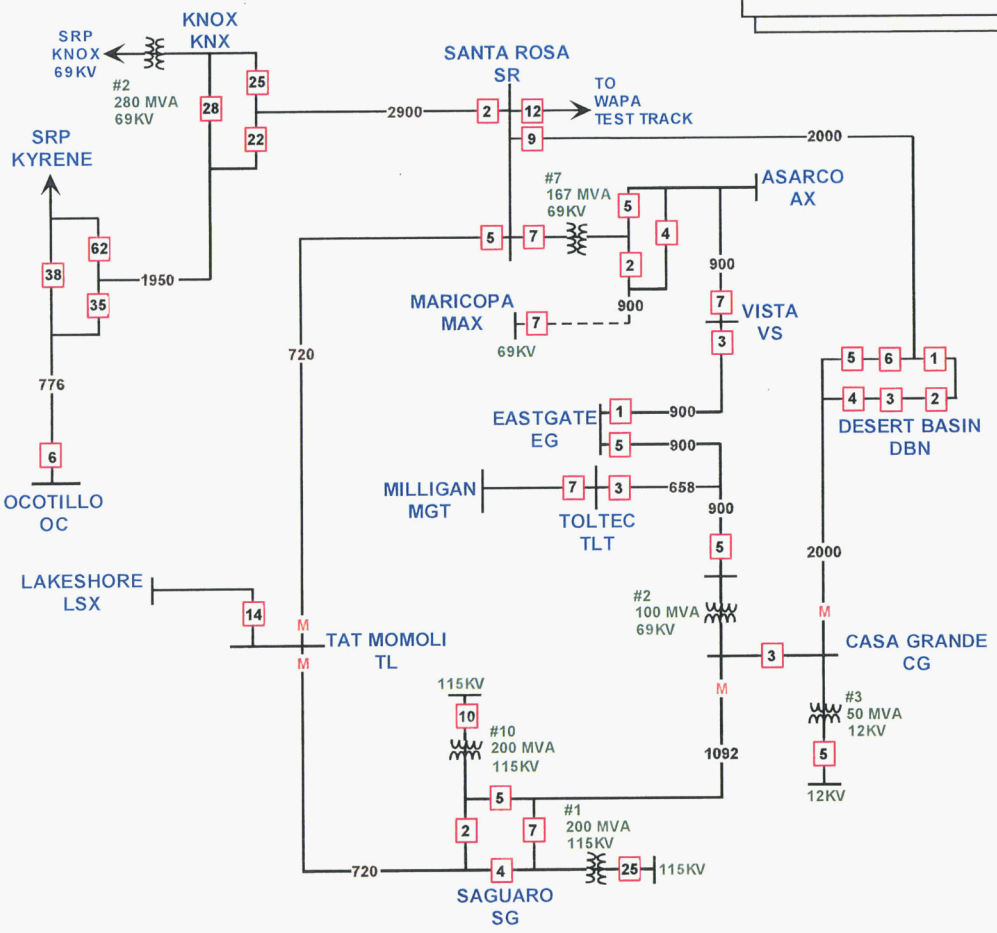

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SOUTHERN 230KV

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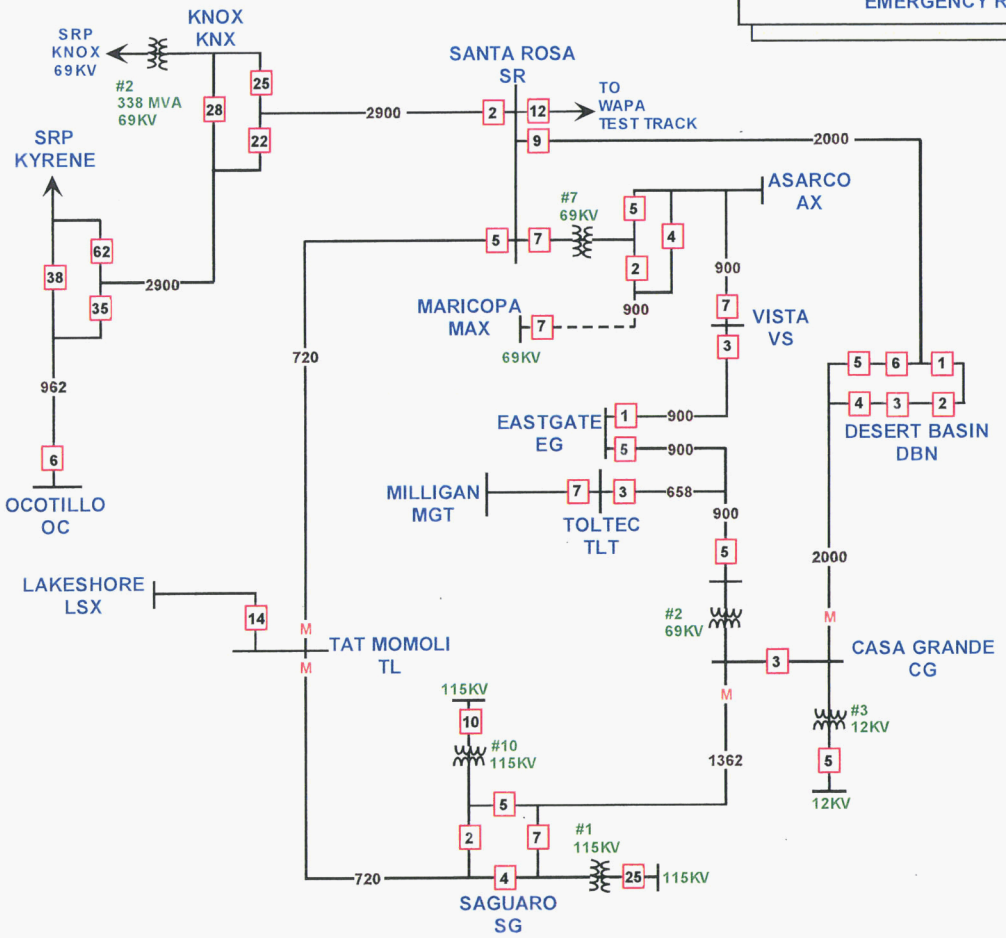

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Rev. 08/22/06

ARIZONA PUBLIC SERVICE COMPANY

TEN-YEAR PLAN

2007 – 2016

TECHNICAL STUDY REPORT

FOR

THE ARIZONA CORPORATION COMMISSION

JANUARY 2007

Table of Contents

ARIZONA PUBLIC SERVICE COMPANY
2007-2016
TEN-YEAR PLAN
TECHNICAL STUDY REPORT

I. Introduction

This technical study report is filed with the Arizona Corporation Commission ("Commission") pursuant to ARS 40-360.02 and Commission Decision No. 63876 (July 25, 2001). This report summarizes the results of power flow analyses and stability analyses for the APS system. Power flow analyses were performed for two scenarios: (i) assumption that all transmission system elements are in service and within continuous ratings; and (ii) assumption of an outage on a single element, with all remaining system elements remaining within emergency ratings. Voltage deviations for these scenarios must also be within established guidelines. These voltage deviation guidelines closely approximate post-transient VAR margin requirements of the Western Electricity Coordinating Council. More detail is provided in APS' Transmission Planning Process and Guidelines, which is also included in this filing.

The stability analyses were performed to simulate electrical disturbances on the transmission system and evaluate the system response. The desired result is that all generators will remain on line, no additional lines will open, and the system oscillations will damp out.

Results of the power flow and stability analyses aid in determining when and where new electrical facilities are needed because of reliability or security reasons. Additionally, some facilities are planned to address adequacy concerns. These include the interconnection of generation to the transmission system or efforts to increase import capability to load-constrained or other areas.

II. Power Flow Analyses

Power flow cases were created for each year of the 2007-2016 study time frame. These cases represent the latest transmission and sub-transmission plans, load projections, and resource plans of utilities and independent power producers. Base case and single contingency conditions are evaluated to determine system needs and timing. Various iterations of possible solutions lead to the final plans for transmission additions.

The contingency analysis involves simulations for every non-radial 115kV or above line that APS owns, partially owns, or operates. Transformer outages are also evaluated. Results of the power flow studies are tabulated in a Security Needs Table and an Adequacy Needs Table, below. These tables identify sixteen transmission projects that are included in this Ten-Year Plan filing. Some of the projects were classified as Adequacy Needs because of the uncertainty of generation location, size, and availability in the later years. As projects near the five-year planning time frame, they may be redefined as Security Needs projects. Selected maps of the power flow simulations are contained in the appendix. Some projects reference study work that was performed in

Regional Planning Groups and will not have any power flow maps associated with them in this filing.

Security Needs Table

Transmission Project	In Service Year	Critical Outage	Limiting Element	Map
Rudd-Palm Valley-TS4 230kV lines.	2007	White Tanks 230/69kV transformer.	White Tanks 230/69kV xfmr #2 & voltage deviation at White Tanks & 69kV system busses.	A1-A2
PV-TS5 500kV line & TS5-TS1 230kV line.	2009	Loss of Javelina-Surprise 69kV line.	Overloads the Dysart-Surprise 69kV line.	A3-A4
Raceway-Avery 230kV line.	2009	Loss of Westwing-Hatfield 69kV line.	Overloads Deer Valley-Adobe 69kV line.	A5-A6
Second Knoll 500kV substation.	2009	Cholla-Zeniff 69kV line or Cholla-Showlow 69kV line.	Voltage deviations and line overloads on the sub-transmission system in the area resulting in load shedding.	A7-A8
VV1 500kV substation.	2009	Verde-Cottonwood 69kV line 69kV line.	Voltage deviations and line overloads on the sub-transmission system in the area resulting in load shedding.	A9-A10
Flagstaff 345/69kV interconnection.	2009	Loss of the 230/69kV transformers at Coconino	Voltage deviations and line overloads on the sub-transmission system in the area resulting in load shedding.	A11-A12
Pinnacle Peak-TS6-Avery 230kV lines.	2011	A Pinnacle Peak 230/69kV transformer.	The remaining two 230/69kV transformers at Pinnacle Peak.	A13-A14
Loop-in of TS4-Panda 230kV line to Jojoba 230kV substation	2011	Buckeye 230/69kV #6 transformer	Buckeye 230/69kV #2 transformer	A15-A16
Mazatzal 345kV substation.	2011	Preacher Canyon-Tonto 69kV line	Voltage deviations and line overloads on the sub-transmission system in the area resulting in load shedding.	A17-A18

Adequacy Needs Table

Transmission Project	In Service Year	System Benefits	Map
Palm Valley-TS2-TS1 230kV line.	2010	Provides a second source for TS1 so TS1 is not served as a radial substation, thereby increasing system reliability. Also provides the transmission sources for the TS2 substation in 2012.	No Map.
TS9-Pinnacle Peak 500kV line.	2010	Increases import capability for the Phoenix Metropolitan area. Increases transmission system reliability and ability to deliver power.	No Map. See SWAT study report.
Loop-in of Navajo-Westwing 500kV to TS9 500kV substation, TS9 500kV to 230kV substation.	2010	Provides a source for the TS9-Pinnacle Peak 500kV line. Also, provides a backup for outage of Westwing 500/230kV transformers and adds another source for the Raceway 230kV substation. Increases import capability for the Phoenix metropolitan area, increases the export capability from the PV area.	No Map.
TS5-TS9 500kV line.	2012	Provides a second source for TS5. Increases import capability for the Phoenix Metropolitan area, increases the export capability from the PV area.	No Map.
Palo Verde vicinity to North Gila 500kV.	2012	Increases import capability for the Yuma area allowing APS to serve the growing load. Increases transmission system reliability.	No Map.
North Gila-TS8 230kV line.	2012	Increase transmission system reliability and ability to deliver power within the Yuma area.	No Map.

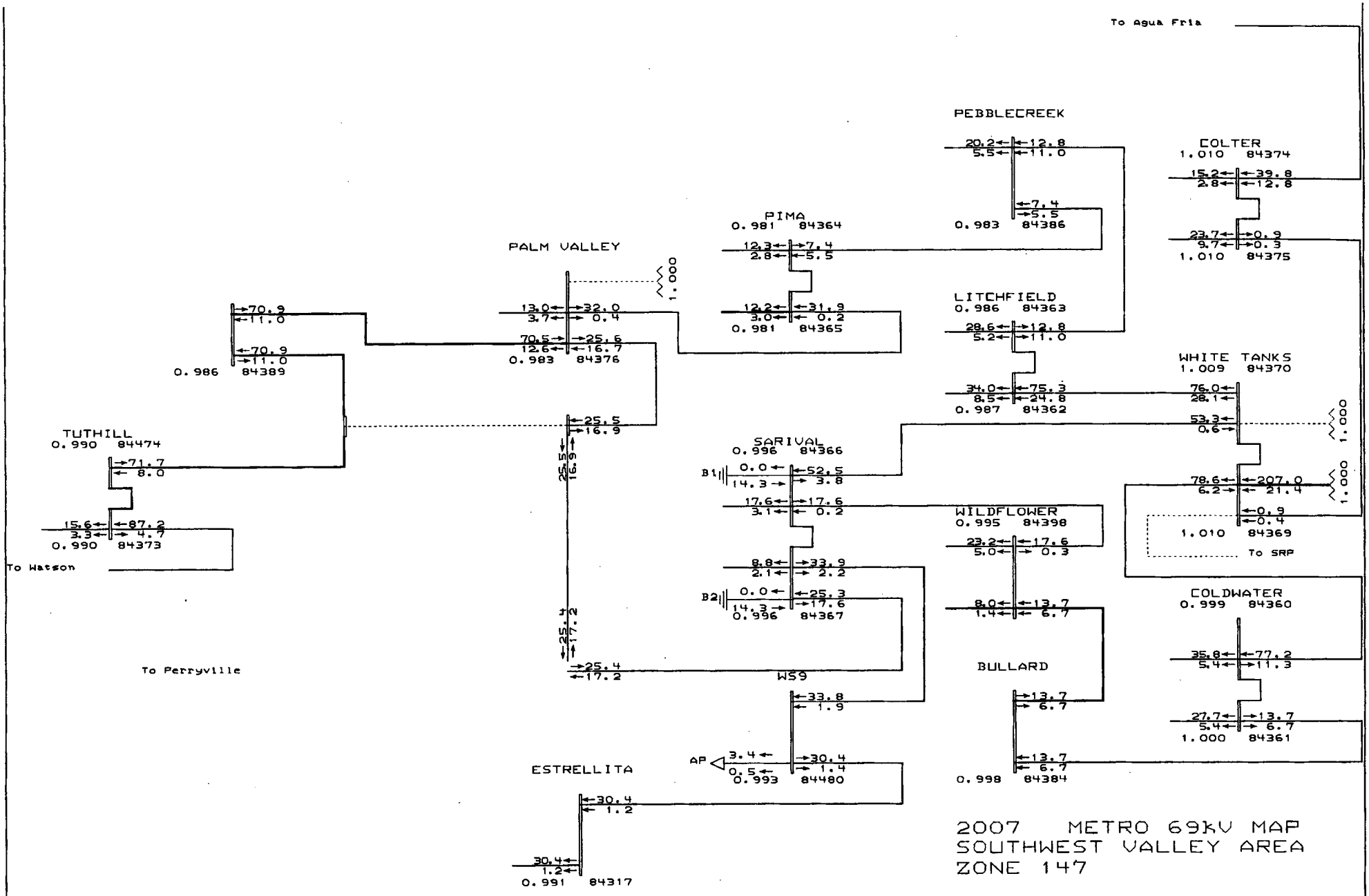
III. Stability Analyses

A stability simulation for simulated three-phase faults was performed for 2010 and 2016 for every 345kV or 500kV line that APS owns (totally or partially) or operates. It has been APS' experience that stability concerns do not manifest on the 230kV system, which is primarily designed to deliver power to load. Therefore, no 230kV simulations were performed. Additionally, every new proposed generation plant will be required to perform stability evaluations prior to receiving permission to interconnect to the transmission system.

Each simulation modeled a 3-phase bus fault, appropriate series capacitor flashing and reinsertion, and fault removal and transmission line removal. System performance was evaluated by monitoring representative generator rotor angles, bus voltages and system frequency. Plots of these system parameters are included in Appendices B and C. The stability simulations performed to date indicate that no stability problems limit the transmission system.

APPENDIX A

Power Flow Maps



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2007 BASE CASE
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4/17/06

Appendix A
Page 1

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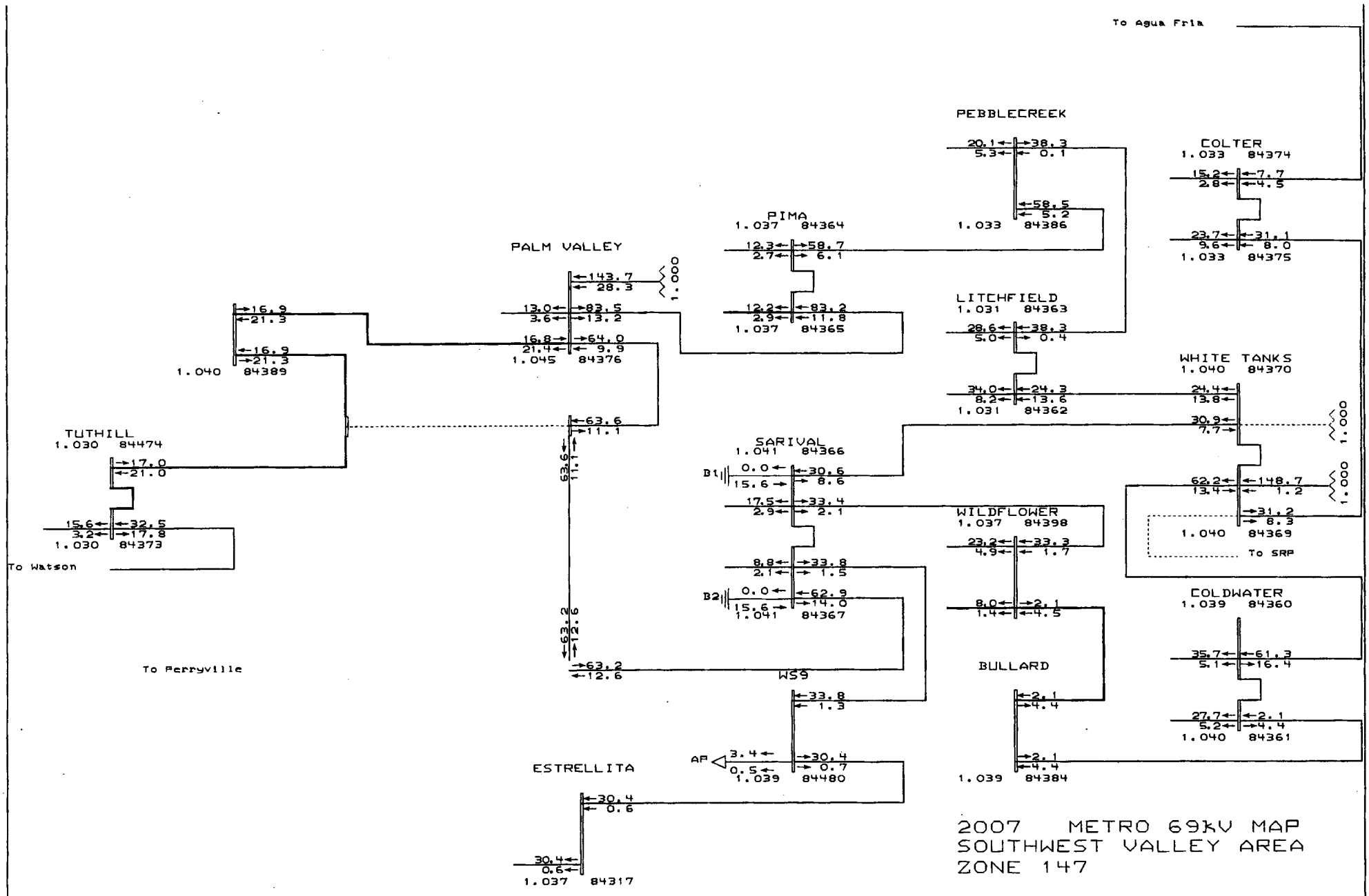

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2007 BASE CASE
sm07e12.sav
4/17/06

Appendix A
Page 2

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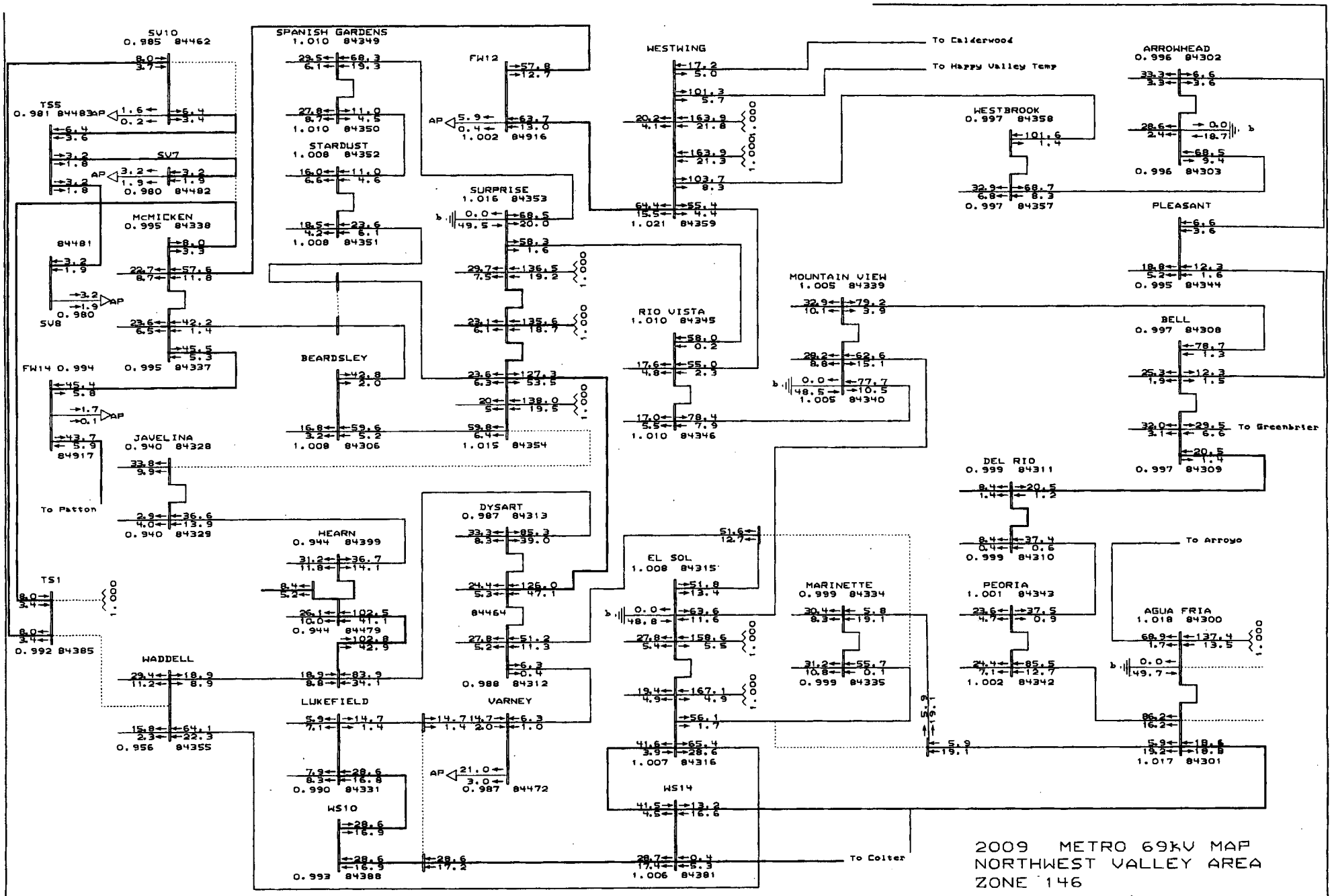

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2009 BASE CASE
sm09e10.sav
4/17/06

Appendix A
Page 3

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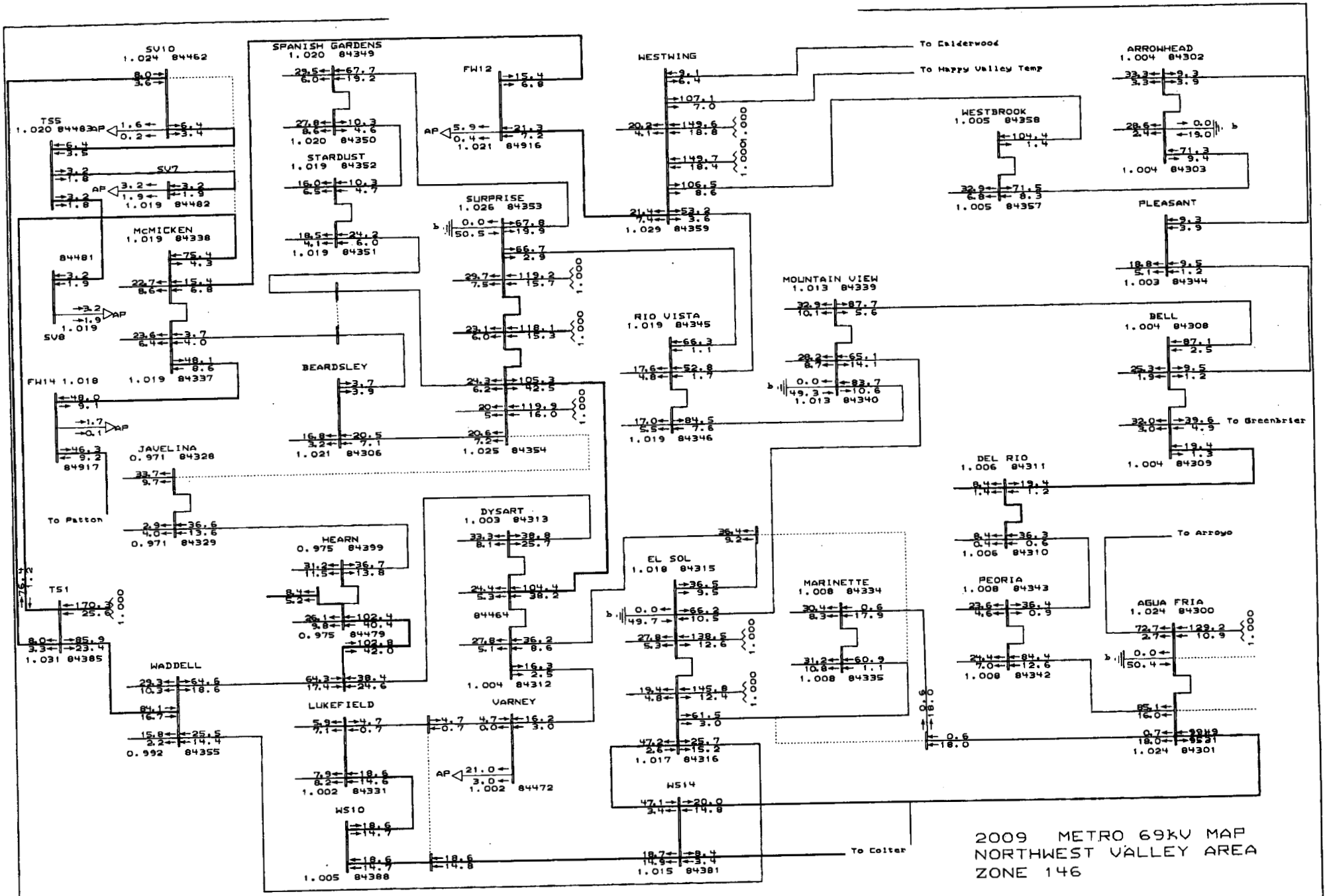

2009 METRO 69kV MAP
NORTHWEST VALLEY AREA
ZONE 146

Tue Jan 23 12:04:15 2007

MW/MVAR

sm09e08.sav

2009 BASE CASE
sm09e10.sav
4/17/06

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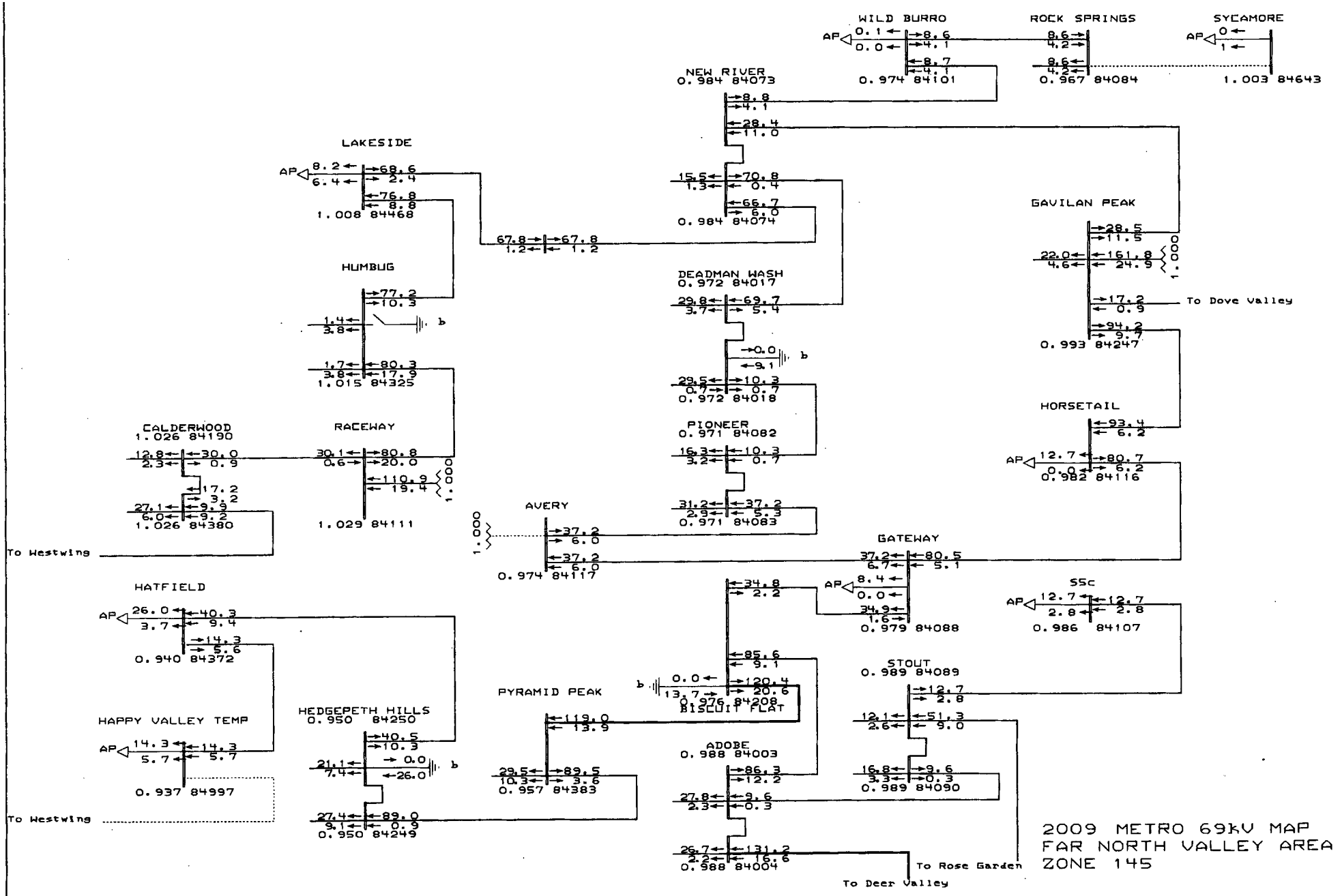
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ROCK SPRINGS
SYCAMORE
NEW RIVER
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LAKESIDE
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HUMBUG
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DEADMAN WASH
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0.972 84018
GAVILAN PEAK
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To Dove Valley
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CALDERWOOD
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1.026 84380
RACEWAY
1.029 84111
PIONEER
0.971 84082
0.971 84083
AVERY
0.974 84117
To Westwing
GATEWAY
0.979 84088
SSc
0.986 84107
HATFIELD
0.940 84372
HEDGEPETH HILLS
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PYRAMID PEAK
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BISCUIT FLAT
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ADOBE
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STOUT
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0.989 84090
HAPPY VALLEY TEMP
0.937 84997
To Westwing
To Rose Garden
To Deer Valley
2009 METRO 69kV MAP
FAR NORTH VALLEY AREA
ZONE 145
sm09e08.sav
MW/MVAR
Tue Jan 23 12:07:06 2007
2009 BASE CASE
sm09e10.sav
4/17/06
PSLF Program
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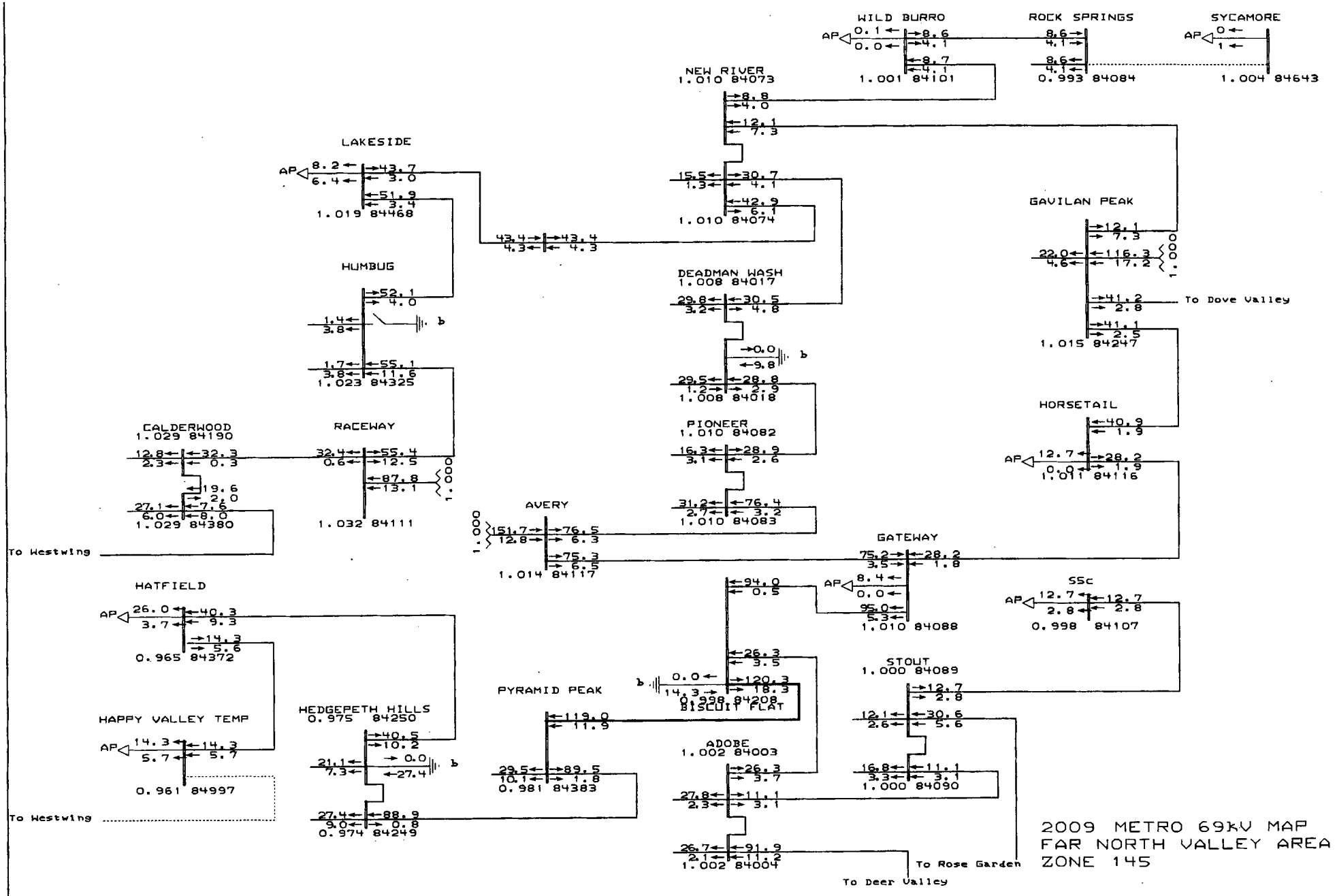
Rating = 2



sm09e08.sav | MW/MVAR | Tue Jan 23 12:07:26 2007

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4/17/06

PSLF Program
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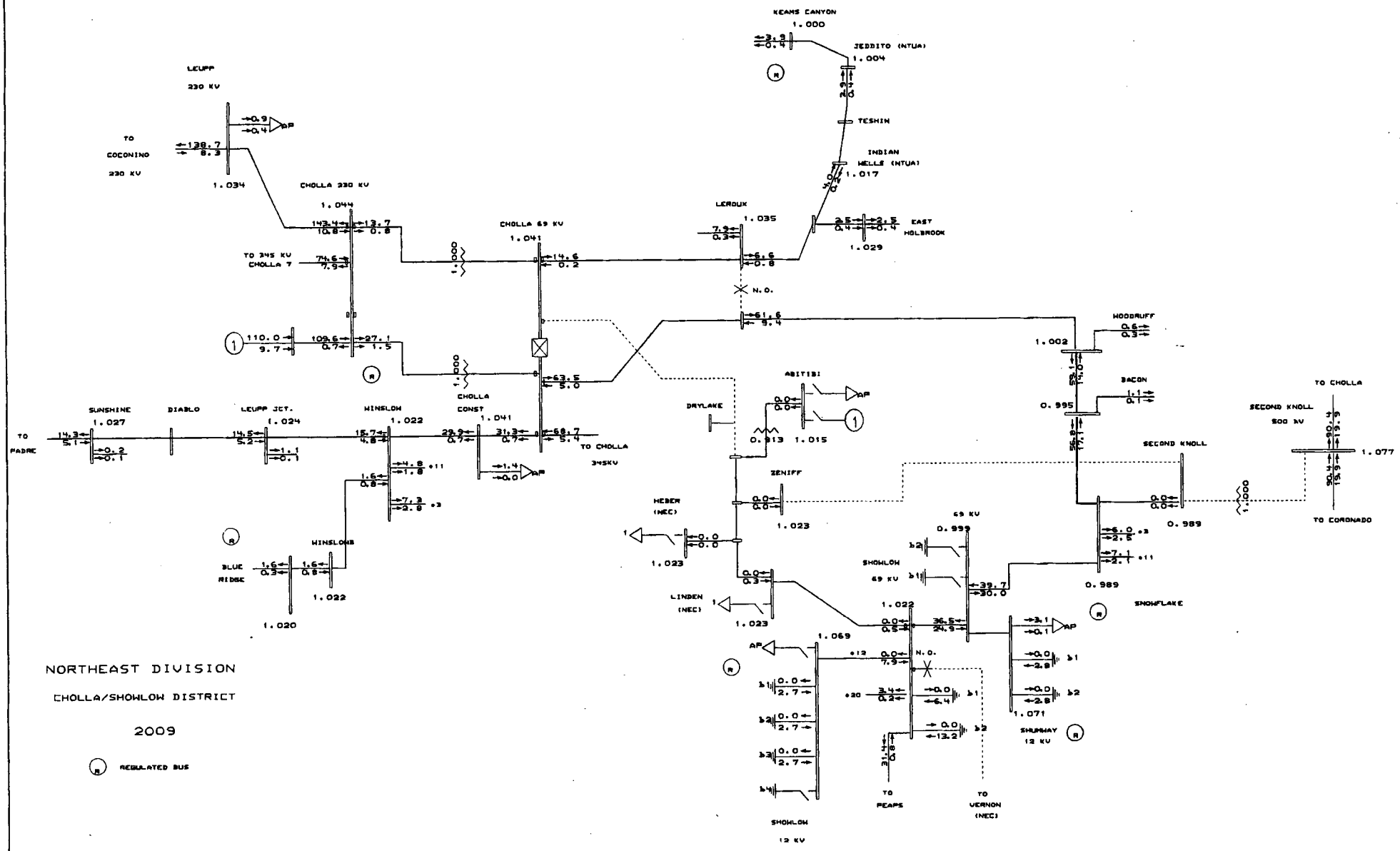

NORTHEAST DIVISION

CHOLLA/SHOWLOW DISTRICT

2009

R REGULATED BUS

sm09e05_wo_sech.sav

MW/MVAR

Tue Jan 23 16:21:28 2007

2009 BASE CASE
sm09e10.sav
4/17/06

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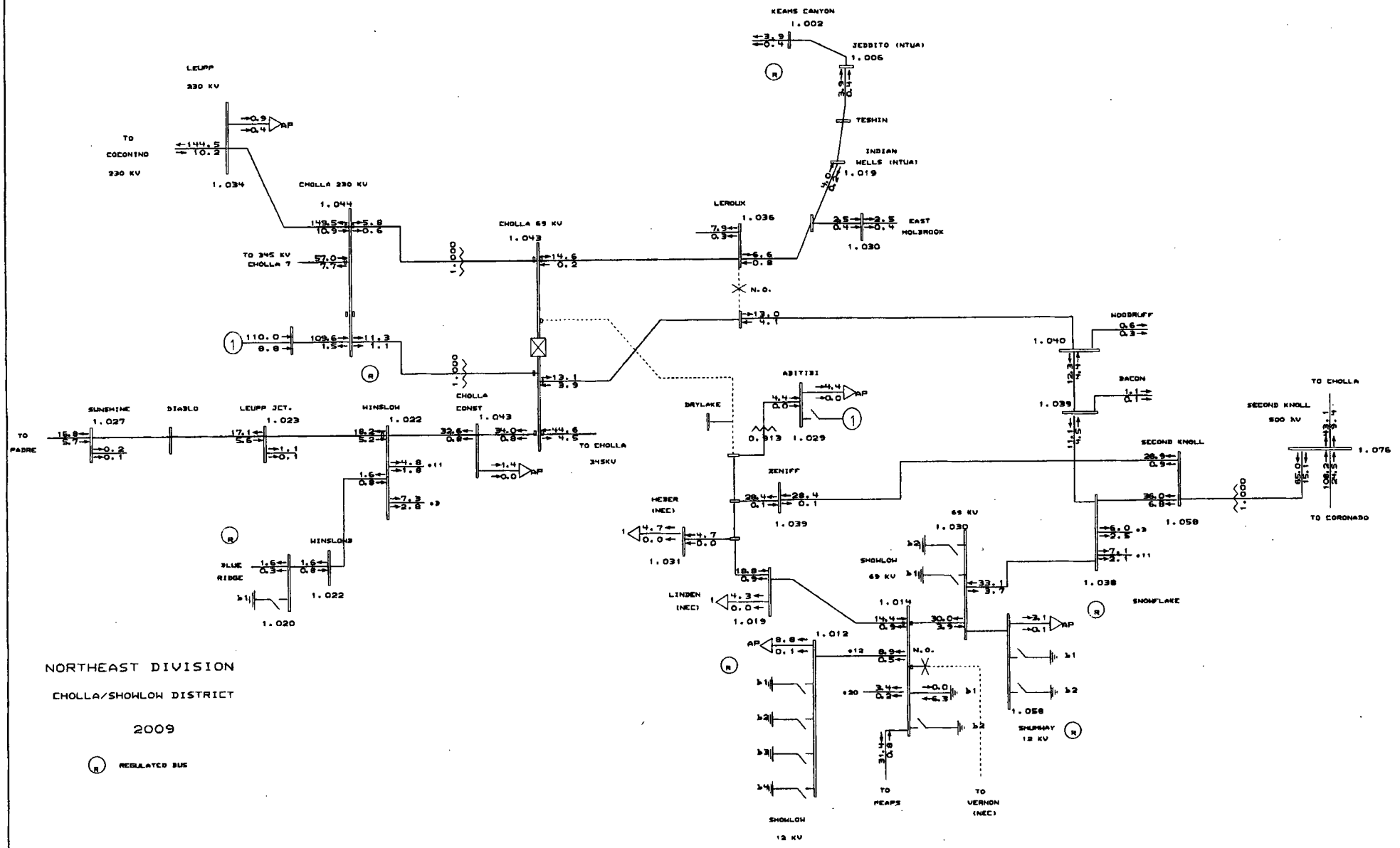
PSLF Program
cholla09.drw
Rating - 2



NORTHEAST DIVISION

CHOLLA/SHOWLOW DISTRICT

2009

R REGULATED BUS

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MW/MVAR

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2009 BASE CASE

sm09e10.sav

4/17/06

PSLF Program

Cholla09.drw

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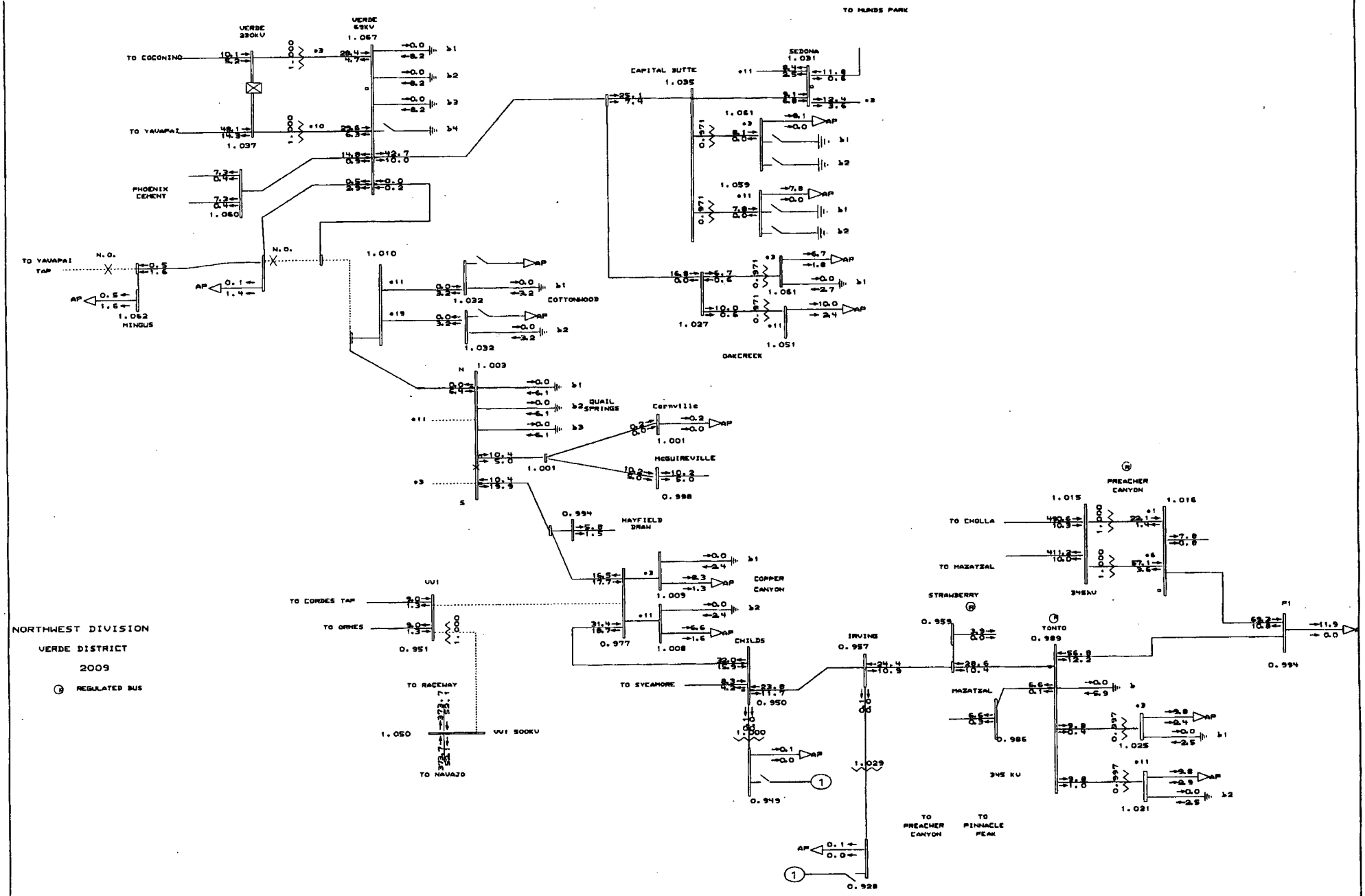

NORTHWEST DIVISION

VERDE DISTRICT

2009

(R) REGULATED BUS

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sm09e10.sav

4/17/06

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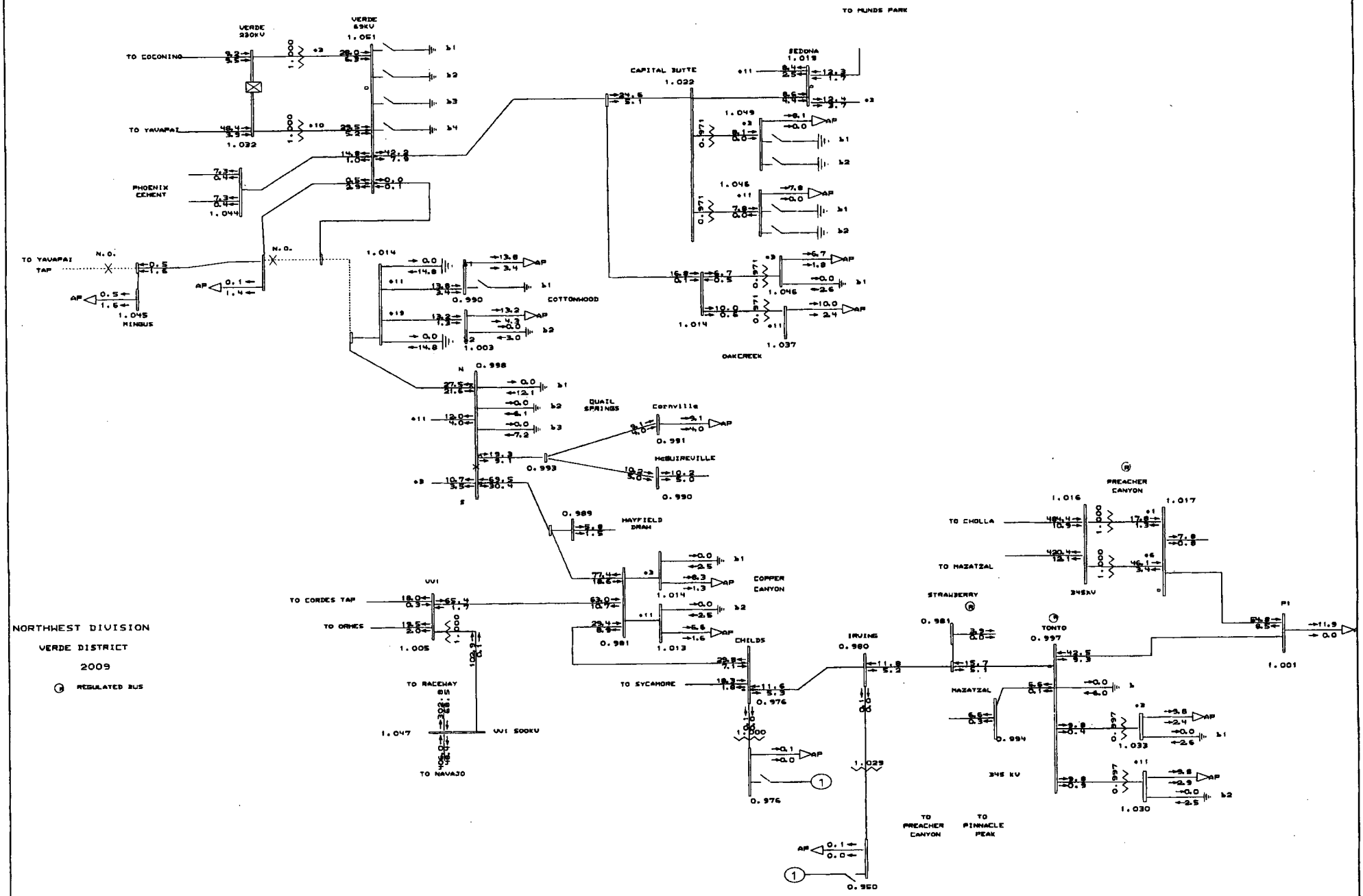

sm09e05_wsolution.sav

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sm09e10.sav
4/17/06

PSLF Program
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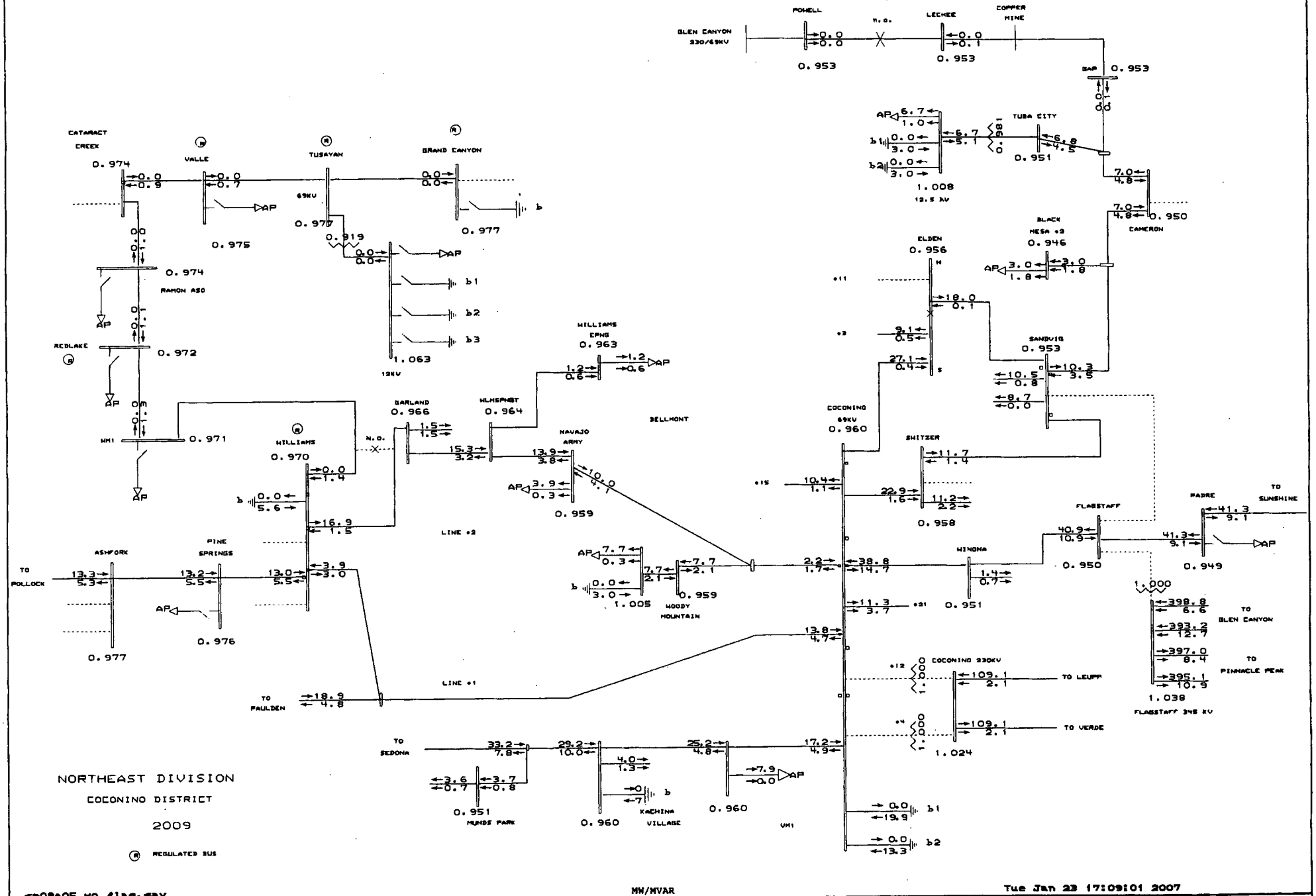
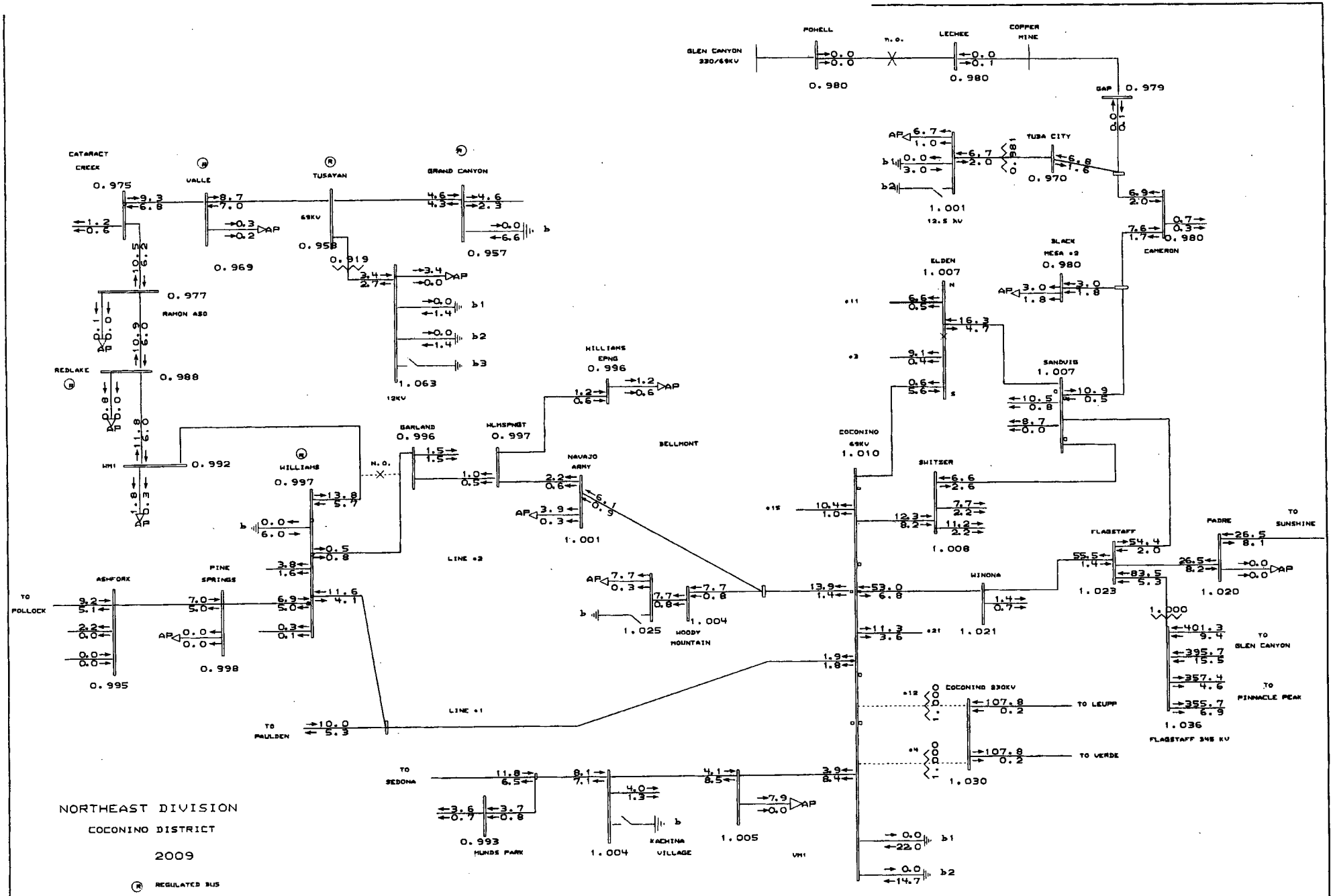


	2009 BASE CASE sm09e10.sav 4/17/06	Appendix A Page 11	PSLF Program coconino09.drw Rating = 2


GLEN CANYON 230/69KV
POWELL
LECHEE
COPPER MINE
GAP
TUBA CITY
CAMERON
CATARACT CREEK
VALLE
TUSAYAN
GRAND CANYON
69KV
RAMON 450
REDLAKE
WM1
WILLIAMS
BARLAND
HLHSPNGT
WILLIAMS EPNG
NAVAJO ARMY
BELLMONT
LINE #2
LINE #1
ELDEN
BLACK MESA #2
SANDVIS
COCONINO 69KV
SWITZER
WINONA
FLAGSTAFF
PADRE
TO SUNSHINE
TO GLEN CANYON
TO PINNACLE PEAK
FLAGSTAFF 345 KV
ASHFORK
PINE SPRINGS
TO POLLOCK
TO PAULDEN
TO SEDONA
MUNDS PARK
KACHINA VILLAGE
WOODY MOUNTAIN
COCONINO 230KV
TO LEUPP
TO VERDE
12.5 kV
12KV
N.O.
NORTHEAST DIVISION
COCONINO DISTRICT
2009
REGULATED BUS
MW/MVAR
sm09e05_wsolution.sav
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sm09e10.sav
4/17/06
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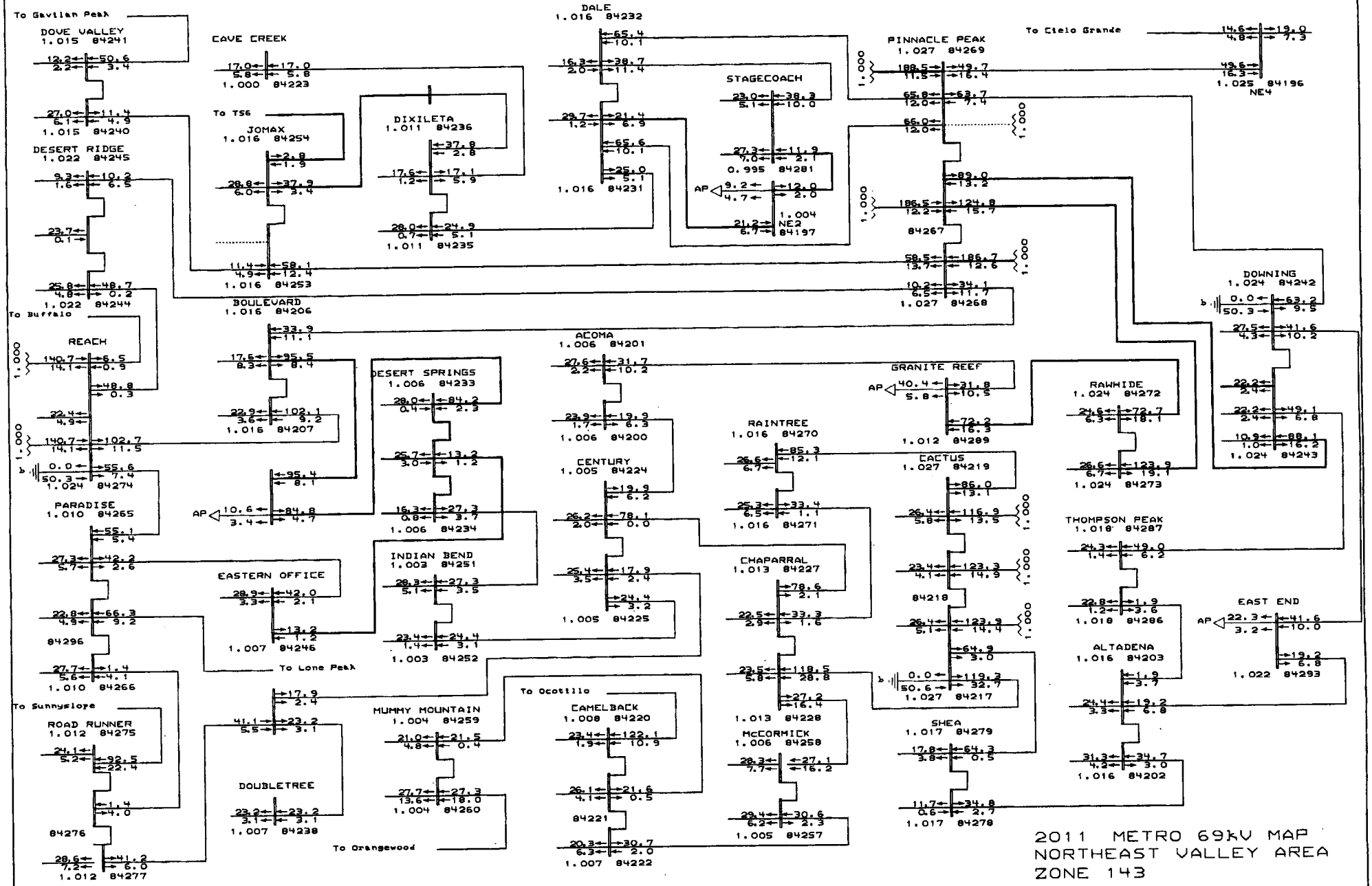

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4/17/06

PSLF Program
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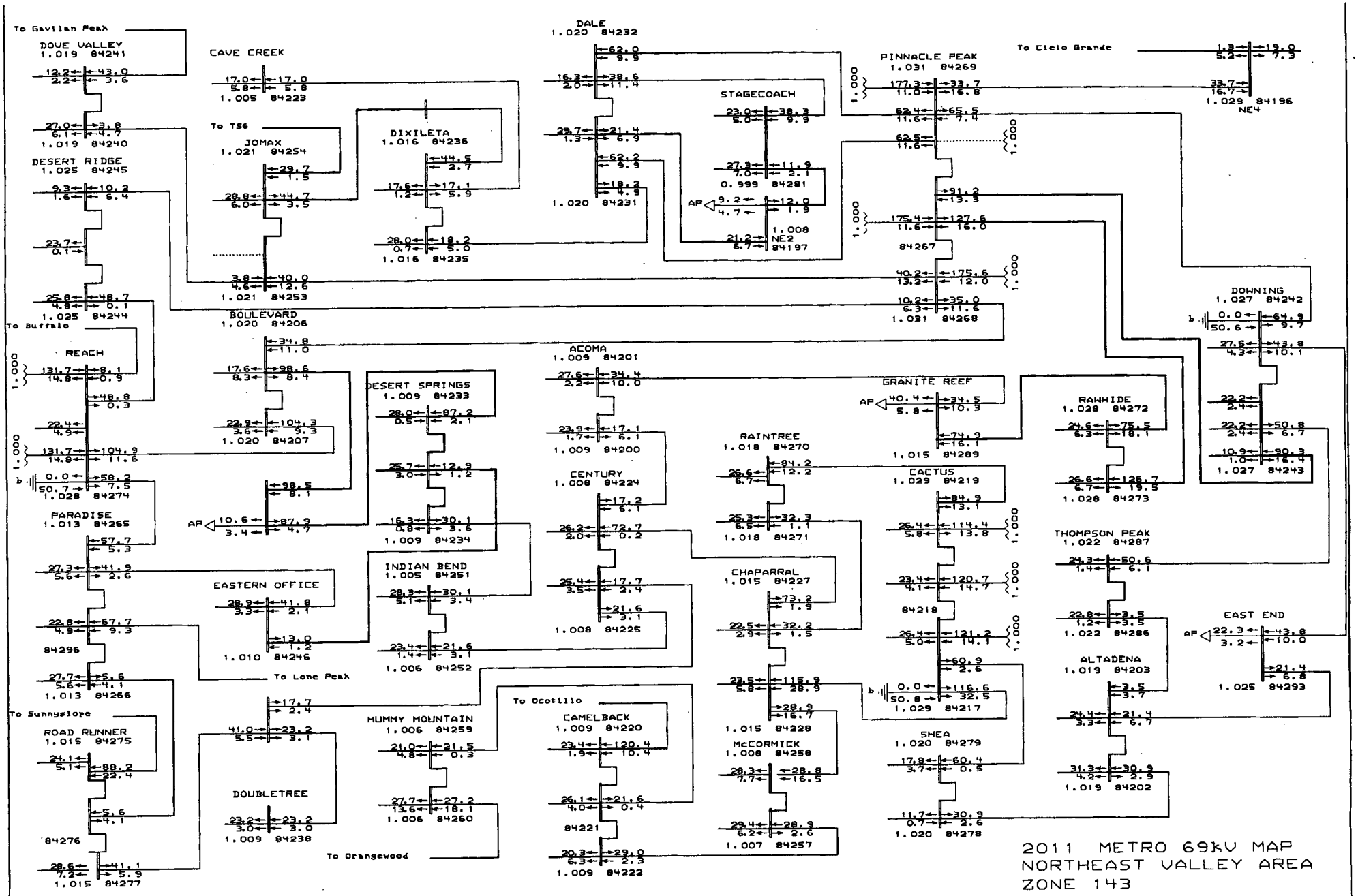

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MW/MVAR

Thu Jan 25 06:45:39 2007

2009 BASE CASE

sm09e10.sav

4/17/06

PSLF Program

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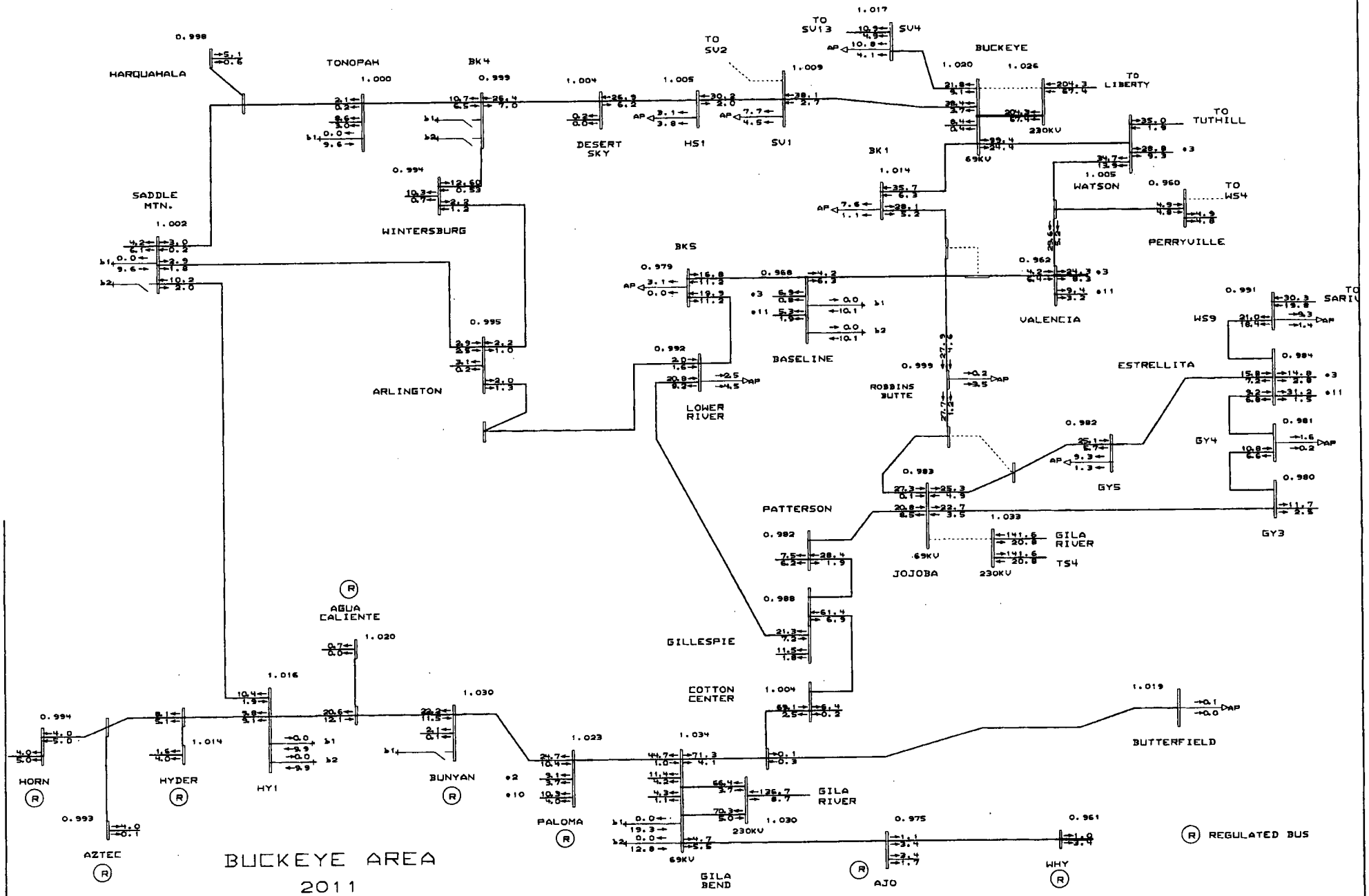
HARQUAHALA
TONOPAH
BK4
DESERT SKY
HS1
SV1
TO SV2
TO SV13
SV4
BUCKEYE
TO LIBERTY
TO TUTHILL
230KV
69KV
BK1
WATSON
TO WS4
PERRYVILLE
SADDLE MTN.
WINTERSBURG
BK5
VALENCIA
WS9
TO SARIV
ESTRELLITA
ARLINGTON
LOWER RIVER
BASELINE
ROBBINS BUTTE
GY4
GY5
GY3
PATTERSON
JOJOBA
GILA RIVER
TS4
AGUA CALIENTE
GILLESPIE
COTTON CENTER
BUTTERFIELD
HORN
HYDER
HY1
BUNYAN
PALOMA
AZTEC
GILA BEND
AJO
WHY
REGULATED BUS
BUCKEYE AREA
2011
MW/MVAR
Thu Jan 25 06:41:24 2007
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2009 BASE CASE
sm09e10.sav
4/17/06
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PSLF Program
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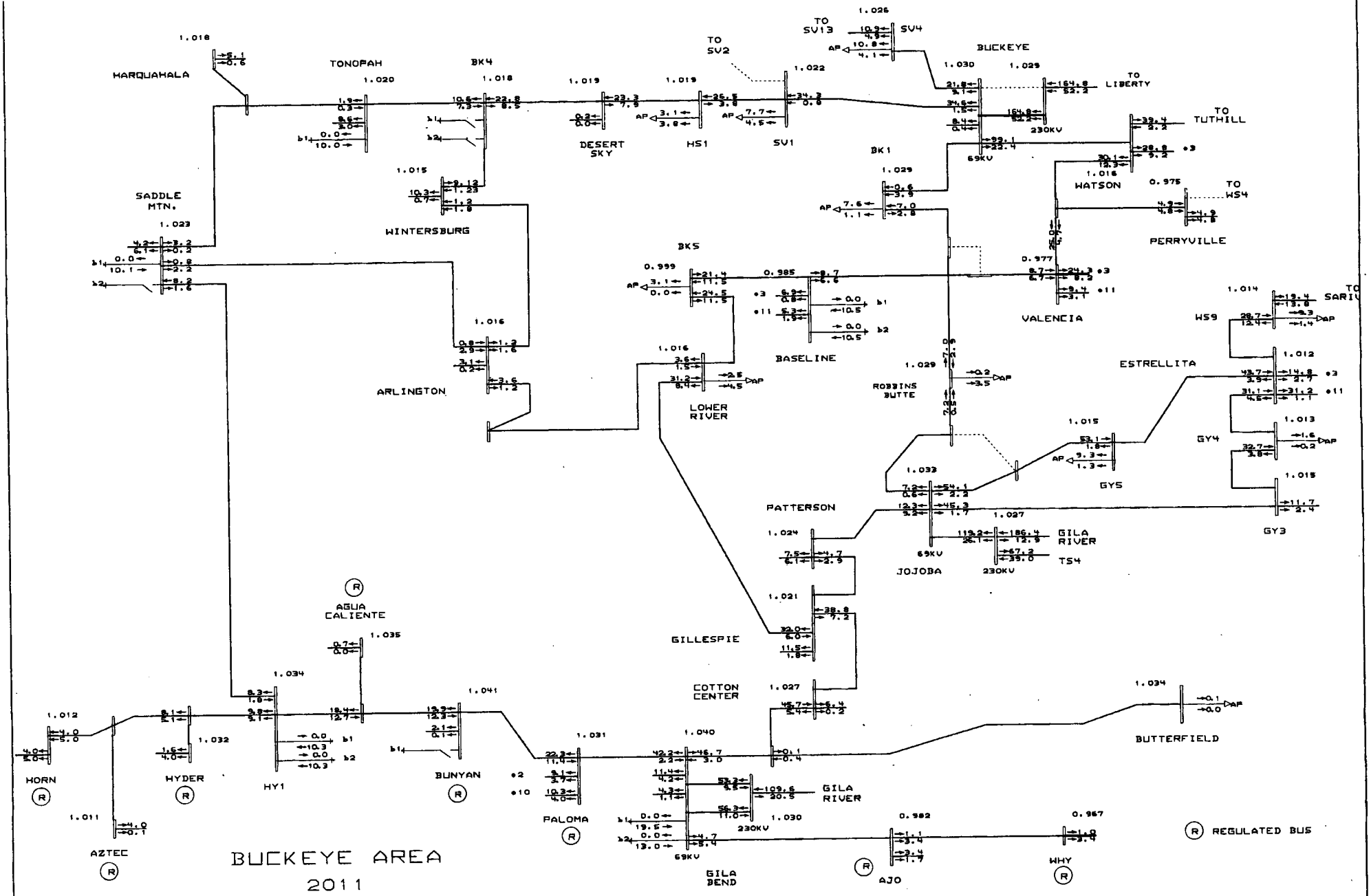
HARQUAHALA
TONOPAH
BK4
DESERT SKY
HS1
SV1
TO SV2
TO SV13
SV4
BUCKEYE
TO LIBERTY
230KV
69KV
TO TUTHILL
BK1
WATSON
TO WS4
PERRYVILLE
SADDLE MTN.
WINTERSBURG
BK5
BASELINE
VALENCIA
ARLINGTON
LOWER RIVER
ROBBINS BUTTE
ESTRELLITA
WS9
TO SARI
GY4
GY5
GY3
PATTERSON
JOJOBA
GILA RIVER
TS4
AGUA CALIENTE
GILLESPIE
COTTON CENTER
BUTTERFIELD
HORN
HYDER
HY1
BUNYAN
PALOMA
AZTEC
GILA BEND
AJO
WHY
REGULATED BUS
BUCKEYE AREA
2011
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MW/MVAR
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2009 BASE CASE
sm09e10.sav
4/17/06
Appendix A
Page 16
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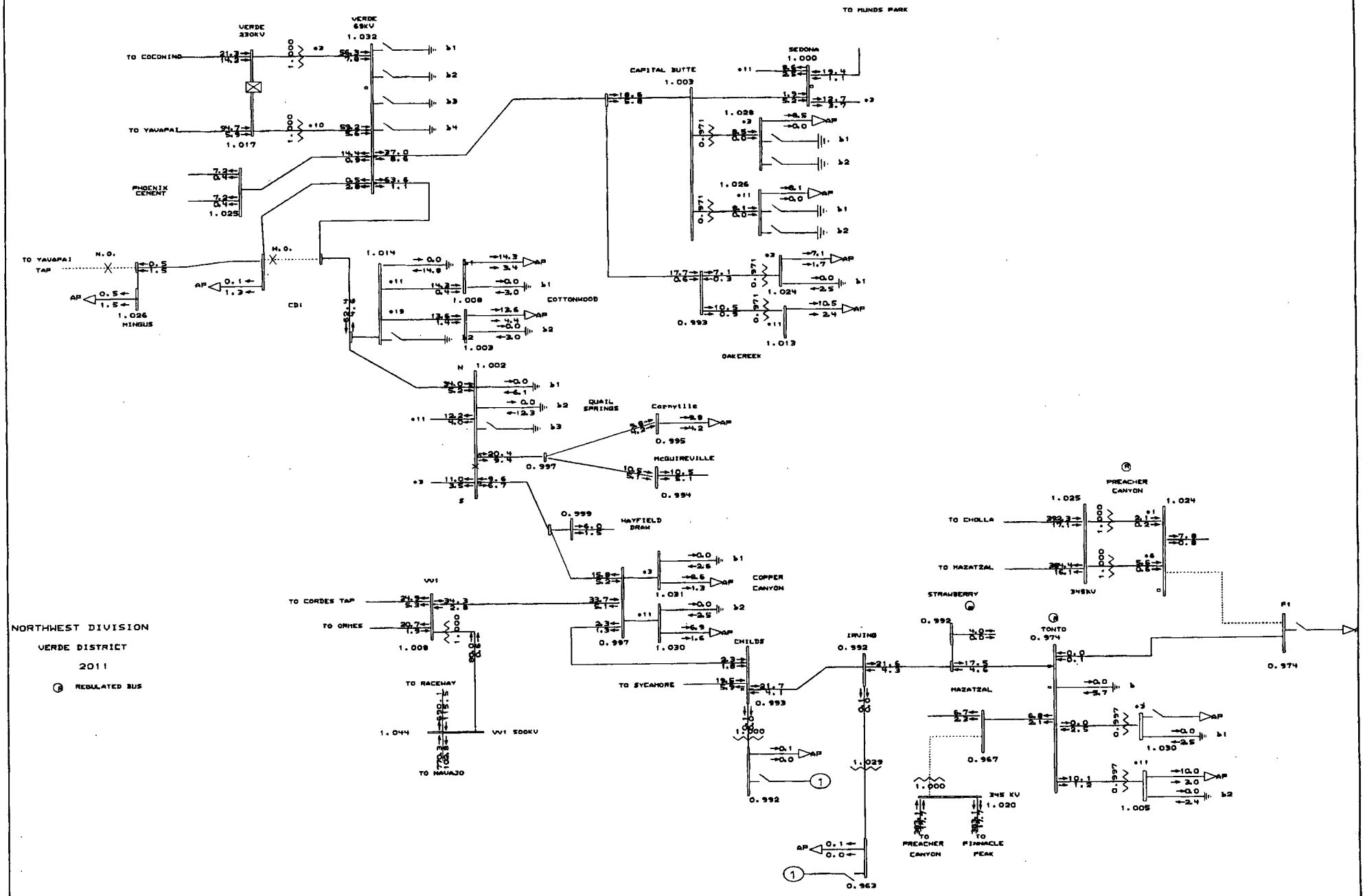

2009 BASE CASE
sm09e10.sav
4/17/06

PSLF Program
verde11.drw
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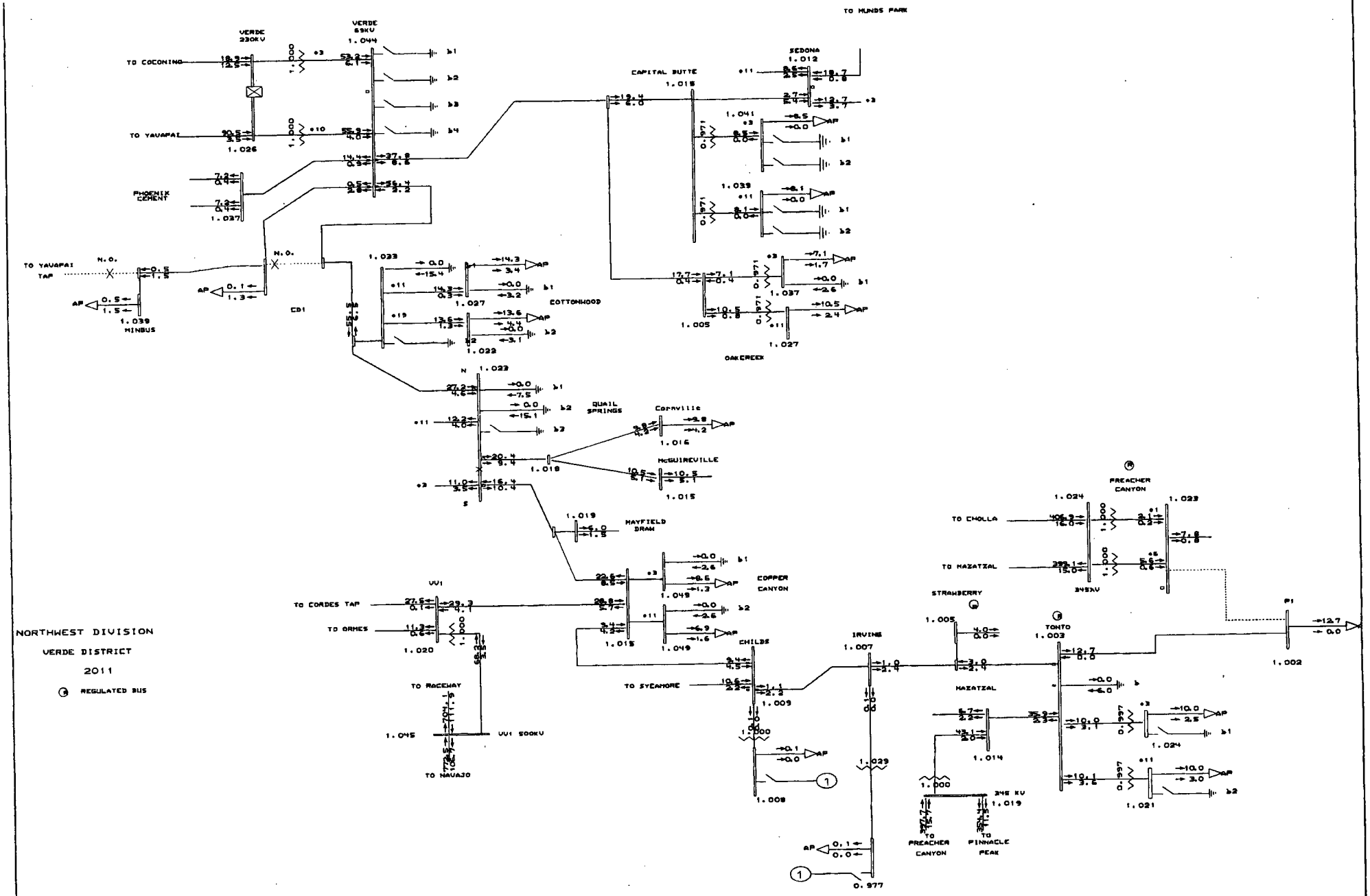
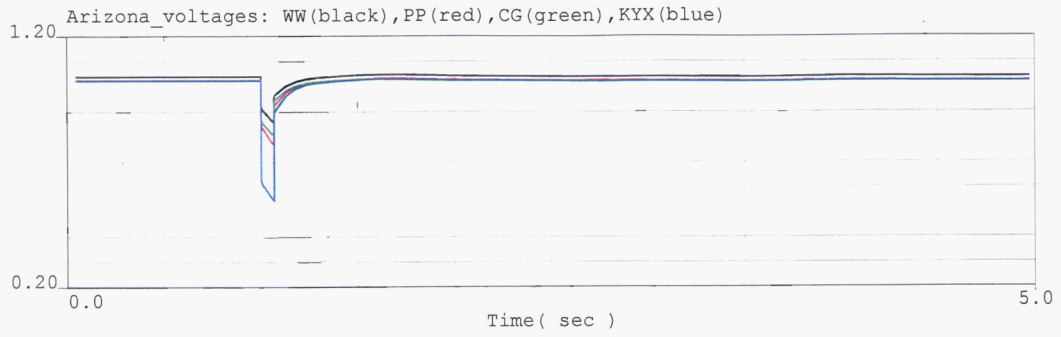
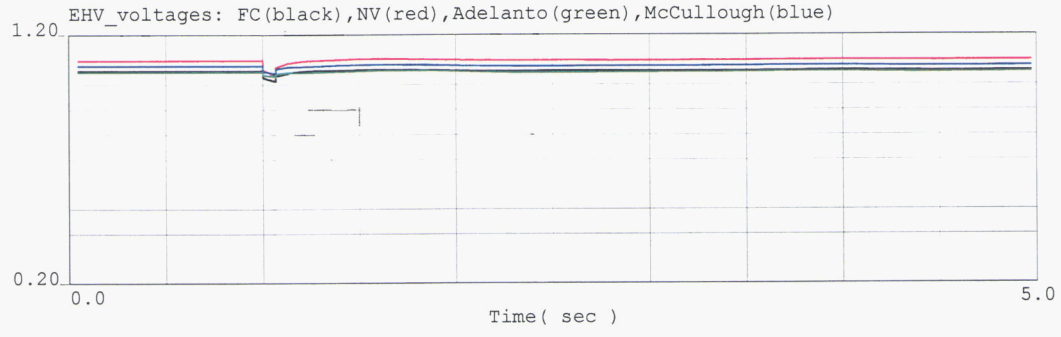

TO MUNDS PARK
VERDE 230KV
VERDE 69KV
1.044
TO COCONINO
TO YAVAPAI
1.026
PHOENIX CEMENT
1.037
TO YAVAPAI TAP
N.O.
1.039 MINBUS
CD1
1.033
1.027
COTTONWOOD
1.022
CAPITAL BUTTE
1.015
SEDONA
1.012
1.041
1.039
1.037
1.005
OAKCREEK
1.027
QUAIL SPRINGS
Cornville
1.016
McGUIREVILLE
1.015
1.018
1.019
MAYFIELD DRAM
1.049
COPPER CANYON
1.015
VV1
TO CORDES TAP
TO ORMES
1.020
TO RACEWAY
1.045
VV1 500KV
TO NAVAJO
CHILDS
TO SYCAMORE
1.009
1.008
IRVINE
1.007
1.029
0.977
PREACHER CANYON
1.024
1.023
TO CHOLLA
TO HAZATZAL
345KV
STRAWBERRY
1.005
TONTO
1.003
HAZATZAL
1.014
1.000
345 KV
1.019
TO PREACHER CANYON
TO PINNACLE PEAK
1.024
1.021
P1
1.002
NORTHWEST DIVISION
VERDE DISTRICT
2011
REGULATED BUS
MW/MVAR
Tue Jan 23 17:17:22 2007

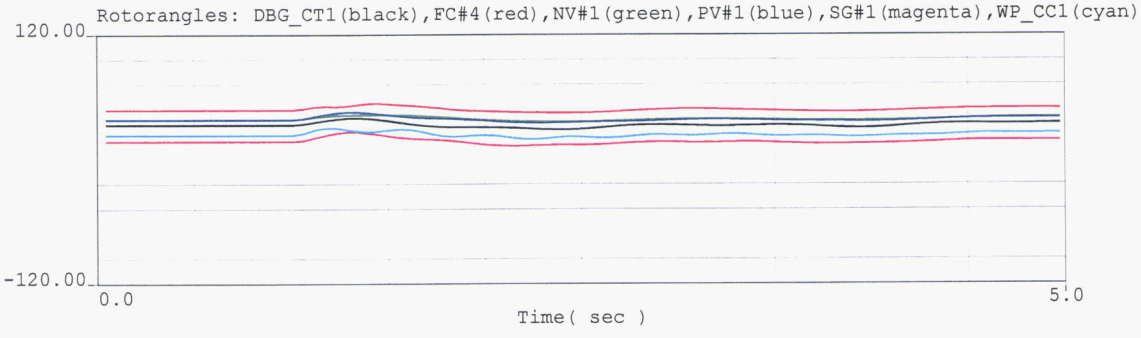
APPENDIX B

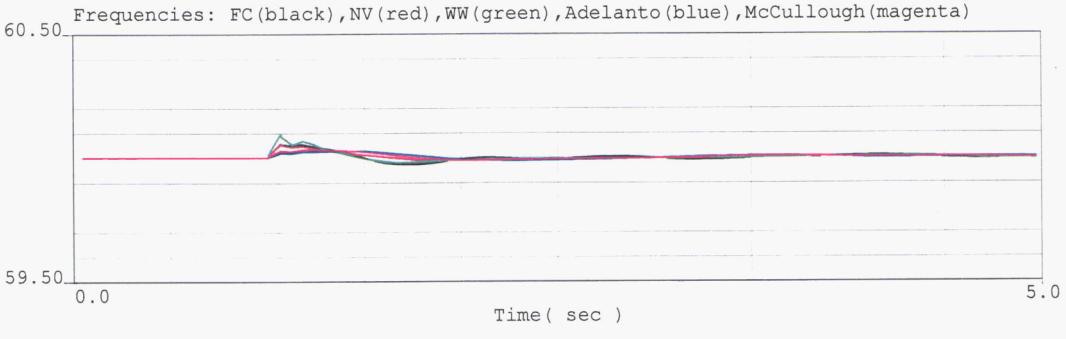
2010
Stability Plots

Table of Contents

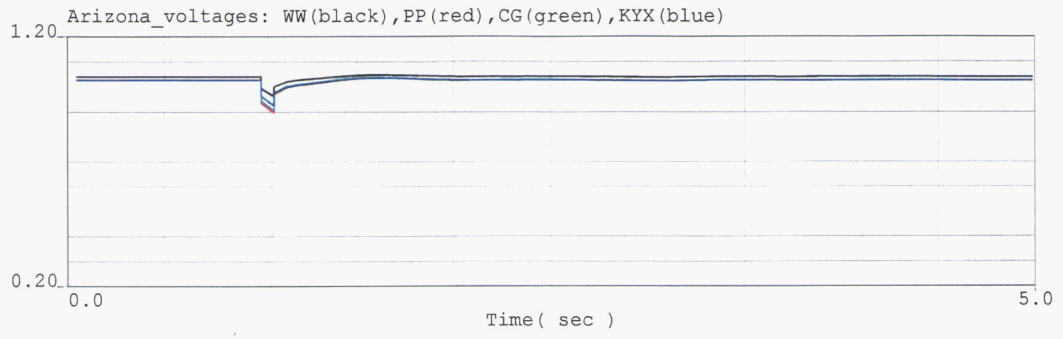


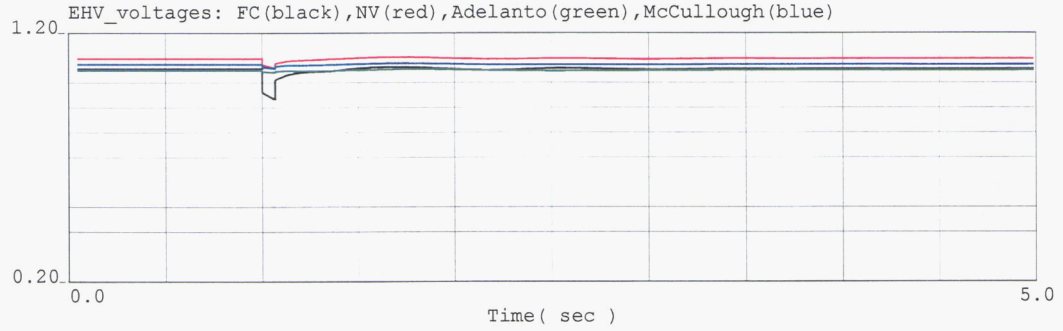


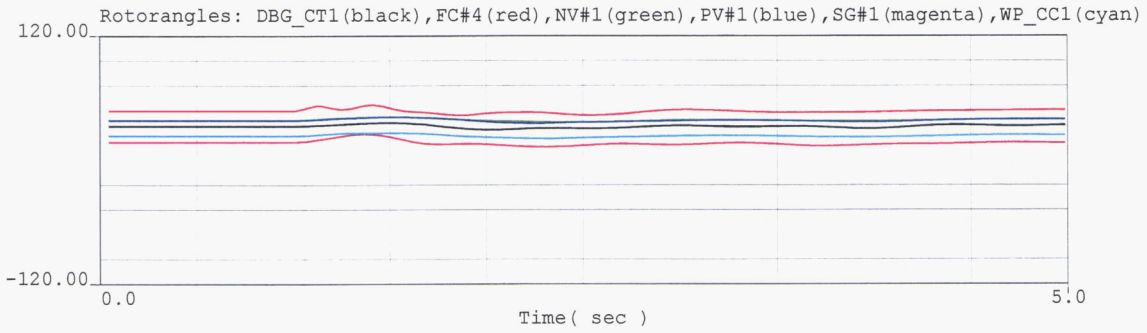


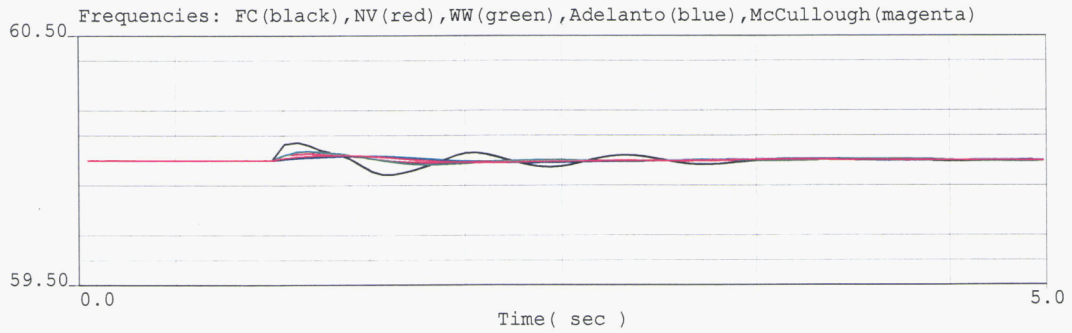


BROWNING FLT BNX-KYX LINE OUT
BNX-KYX STAB #1; 01/07; T=0 3P FLT BNX500;
4C CLR FLT W/BNX-KYX;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

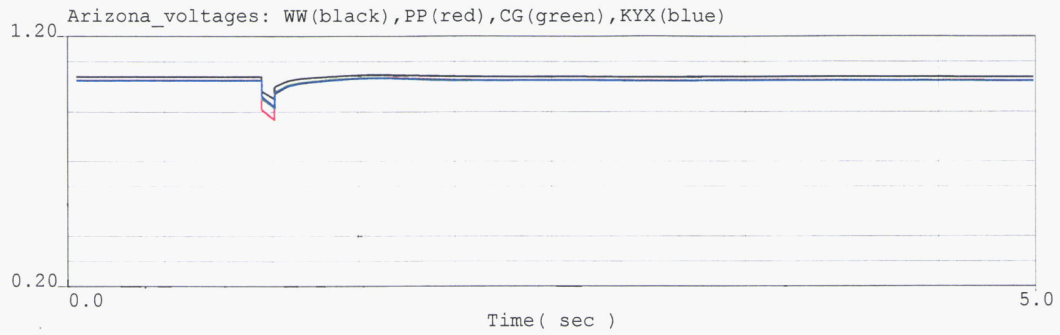








CHOLLA 500KV FLT CH-CNX LINE OUT
CH-CNX STAB; 1/07; T=0 3P FLT CH500; FLASH CAPS;
4C CLR FLT W/CH-CNX;8C REIN CAPS;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.


Arizona_voltages: WW(black),PP(red),CG(green),KYX(blue)
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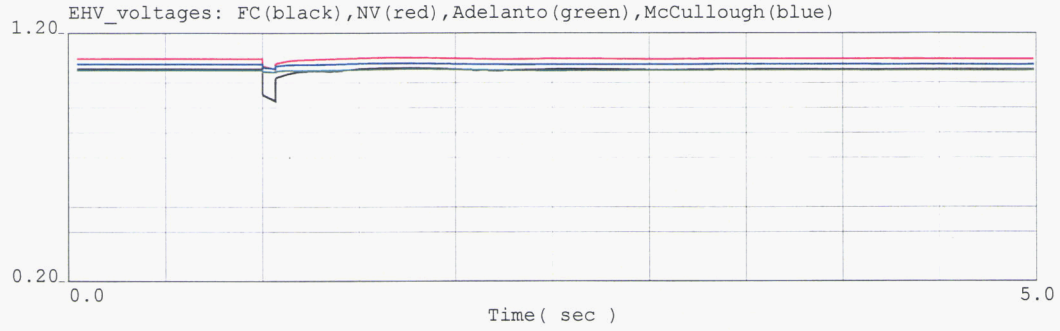
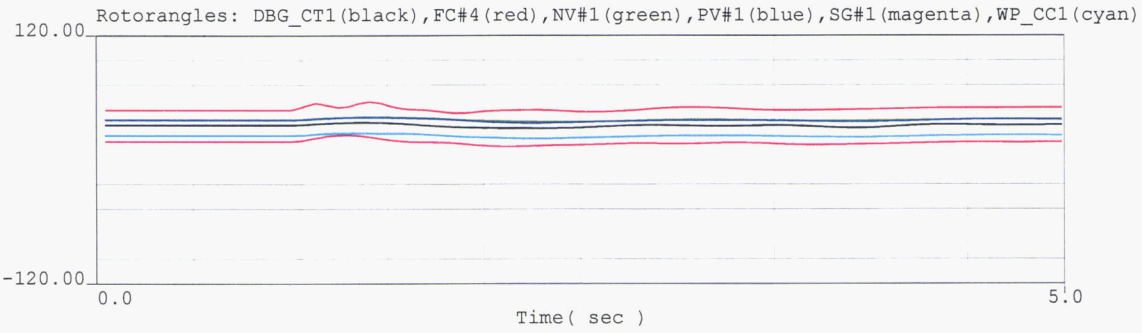
0.20
0.0
5.0
Time(sec)


EHV_voltages: FC(black),NV(red),Adelanto(green),McCullough(blue)
1.20
0.20
0.0
5.0
Time(sec)


Rotorangles: DBG_CT1(black),FC#4(red),NV#1(green),PV#1(blue),SG#1(magenta),WP_CC1(cyan)
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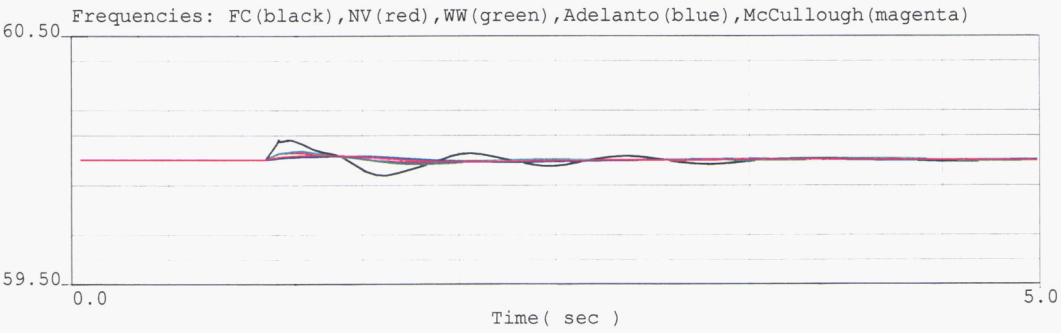
-120.00
0.0
5.0
Time(sec)


Frequencies: FC(black),NV(red),WW(green),Adelanto(blue),McCullough(magenta)
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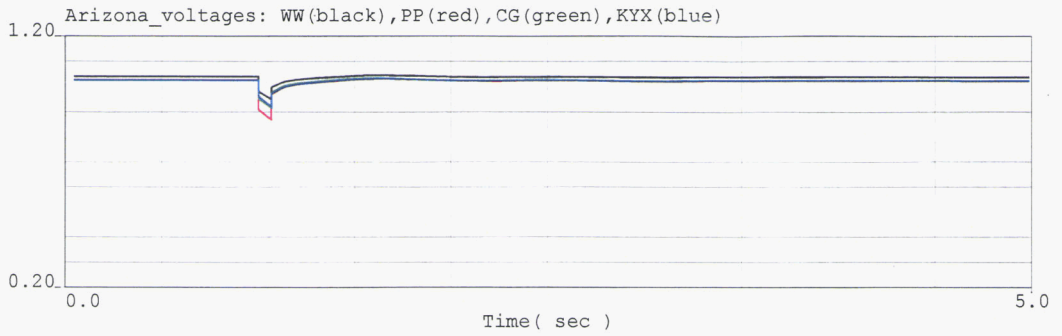
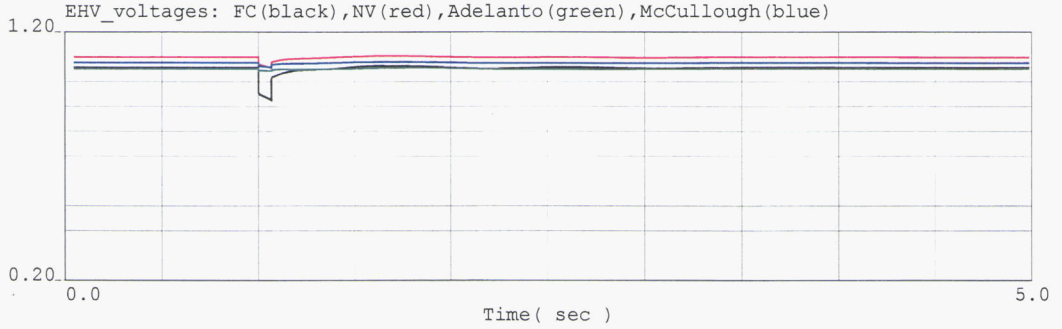
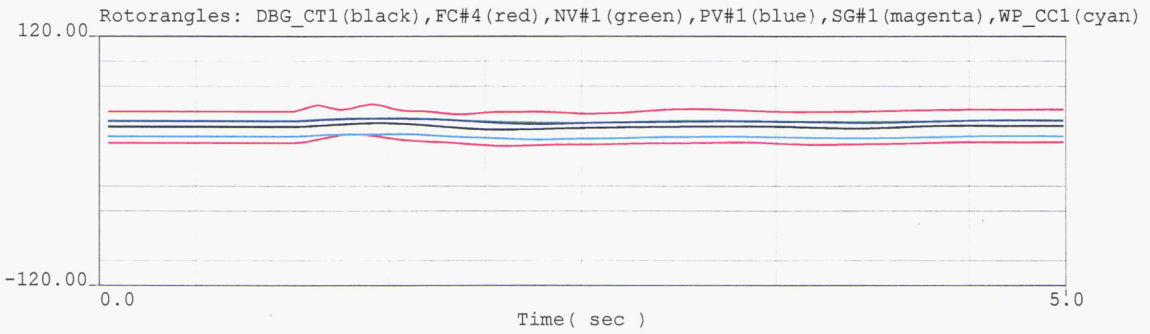
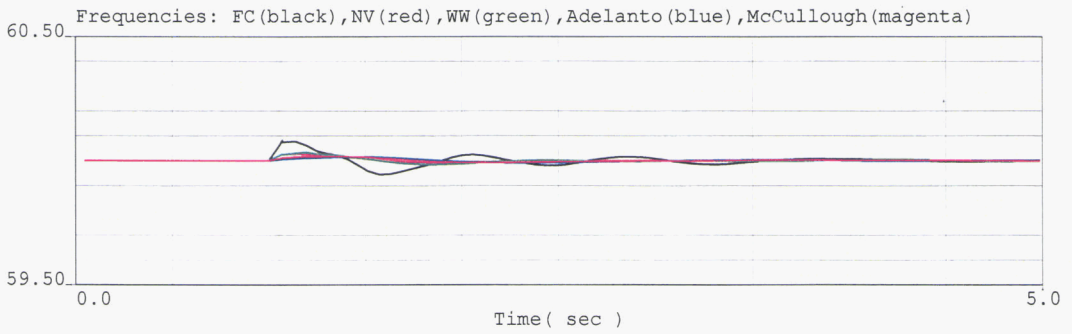
59.50
0.0
5.0
Time(sec)

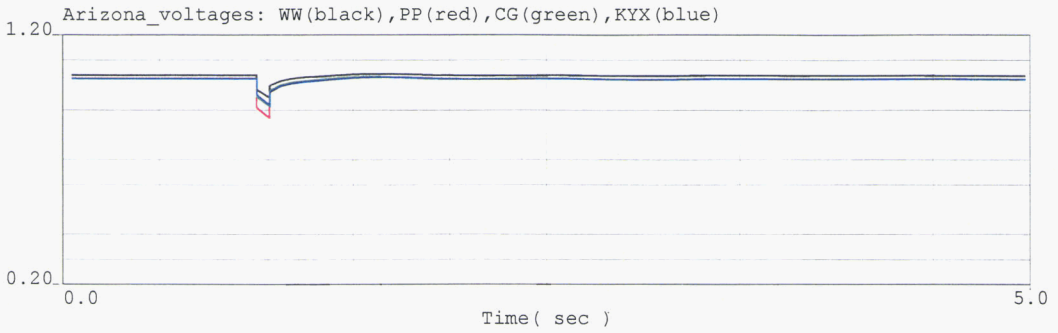


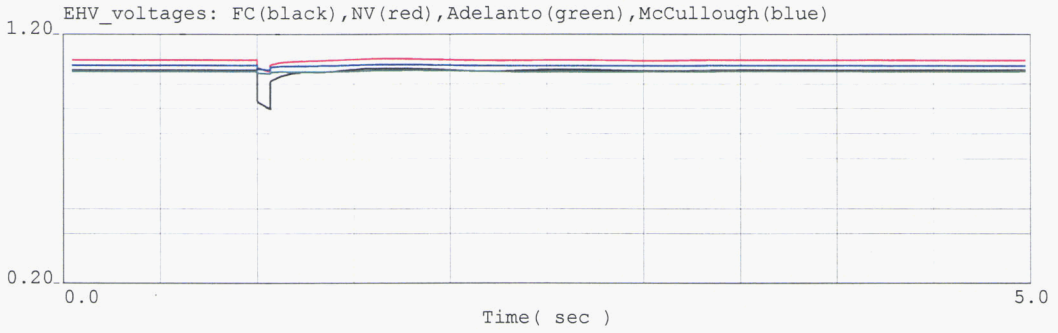


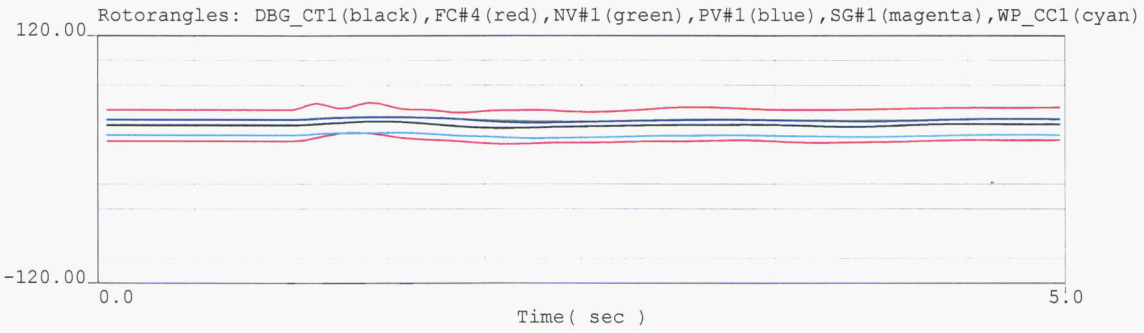


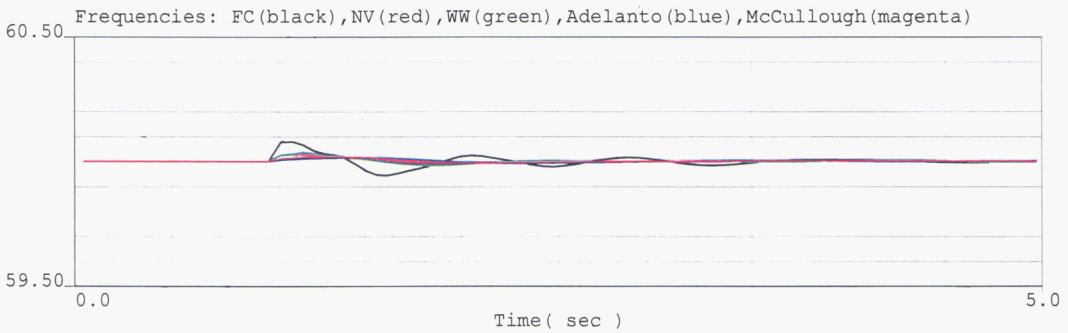


CHOLLA FLT CH-PP LINE OUT
CH-PP STAB; 01/07; T=0 3P FLT CH345;FLSH CAPS;
4C CLR FLT W/CH-PP #1;8C REIN CAPS;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

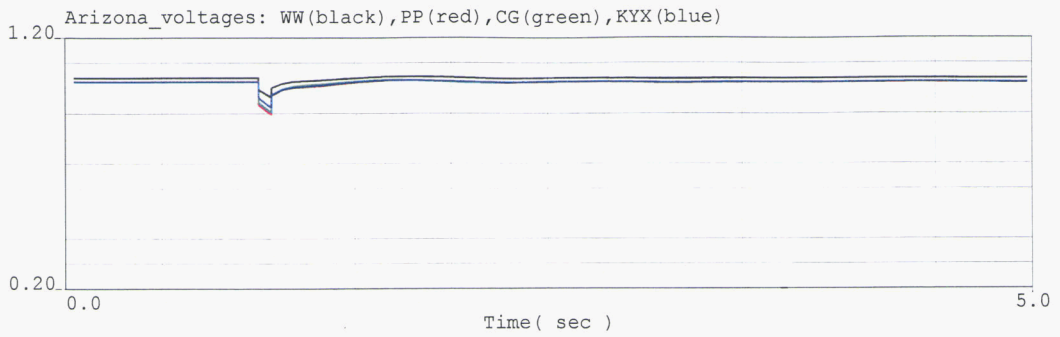


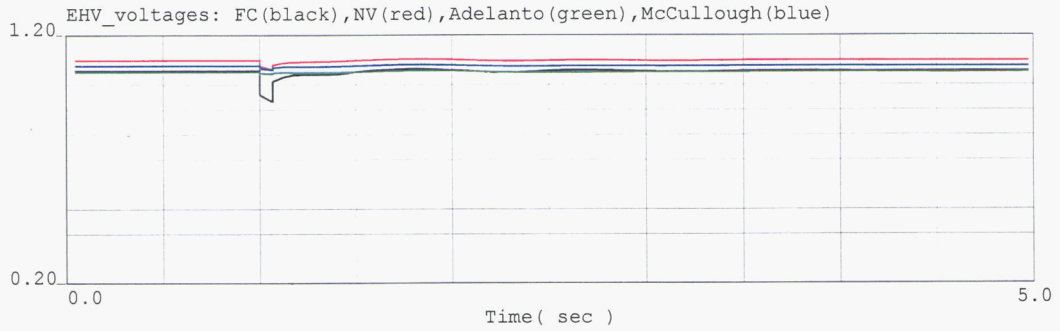


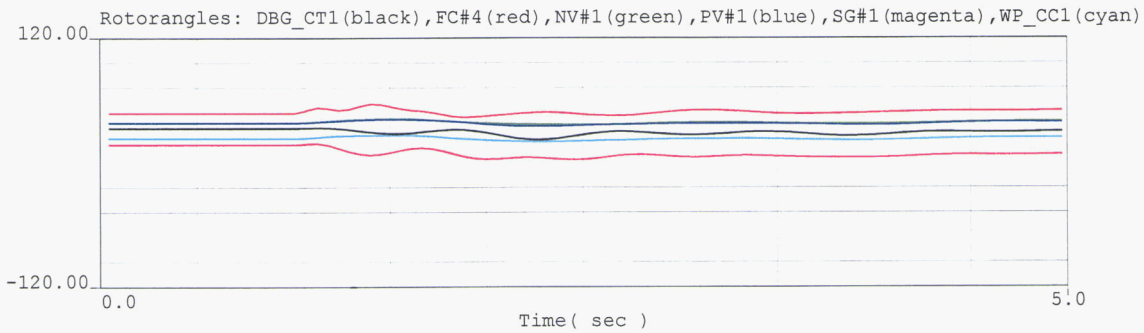


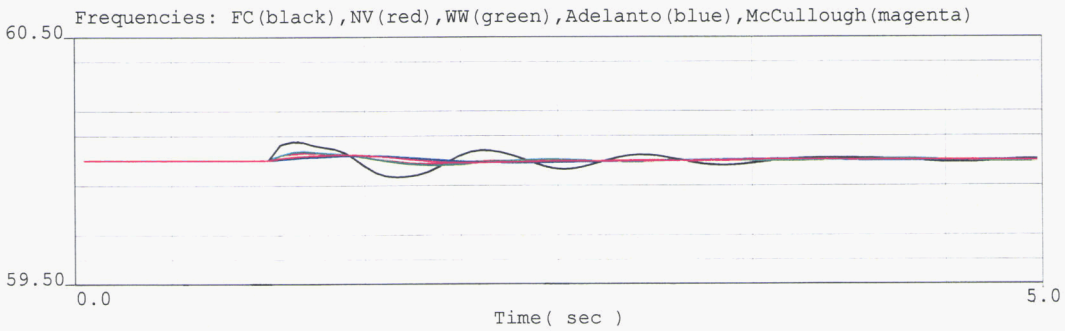


CHOLLA 345KV FLT CH-PC LINE OUT
CH-PC STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/CH-PC;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.









CHOLLA 500KV FLT CH-SG LINE OUT
CH-SG STAB; 1/07; T=0 3P FLT CH500;FLASH CAPS;
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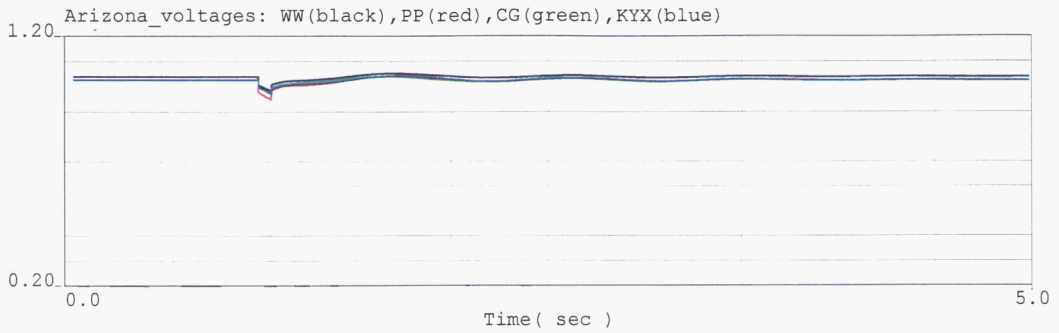
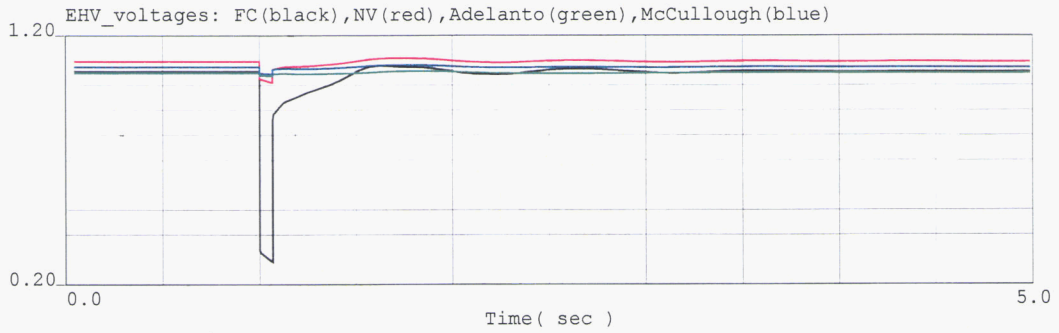
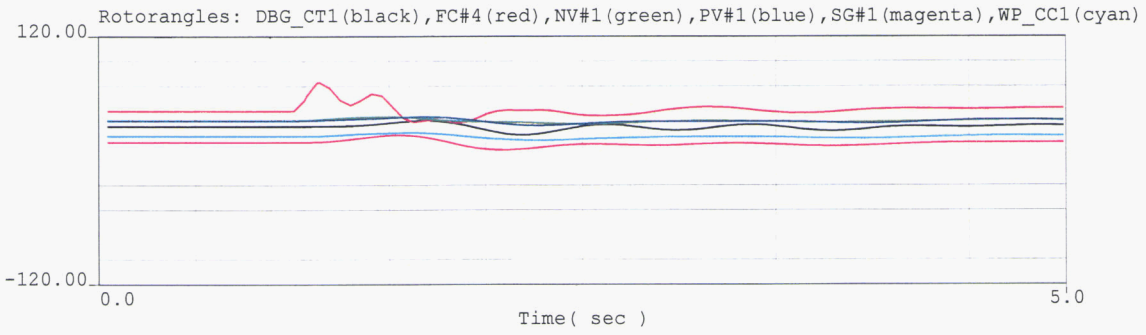
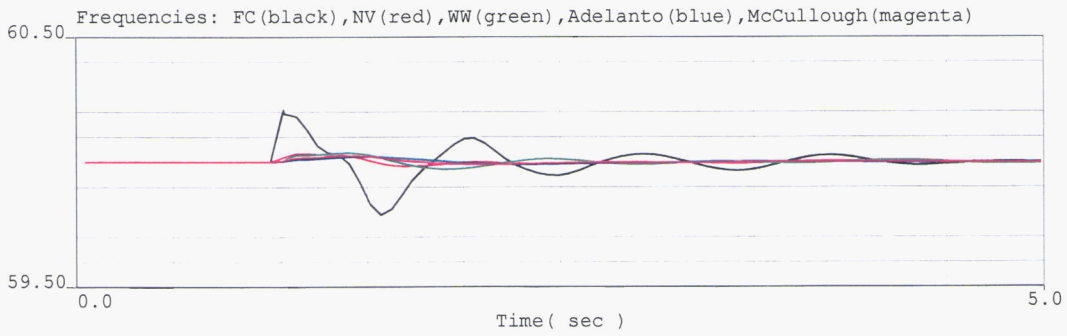
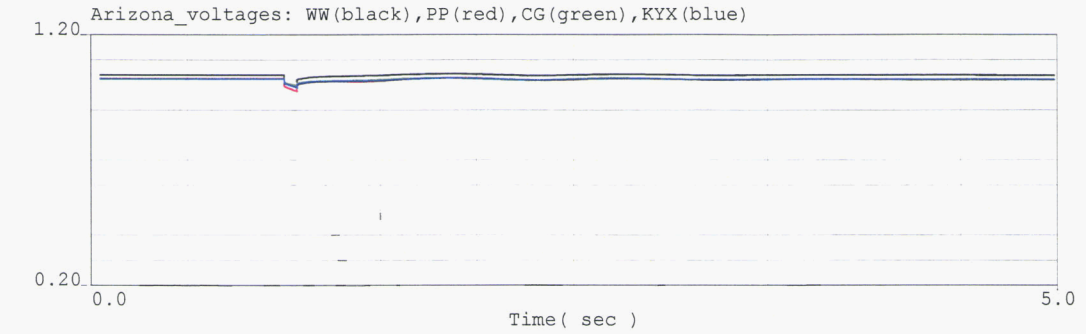


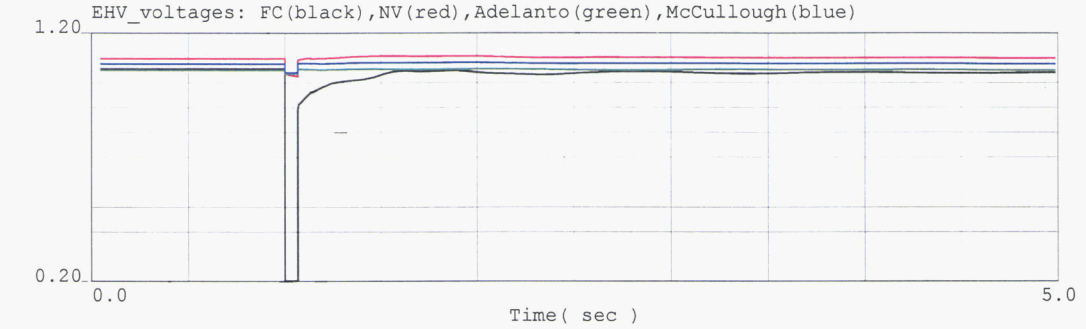


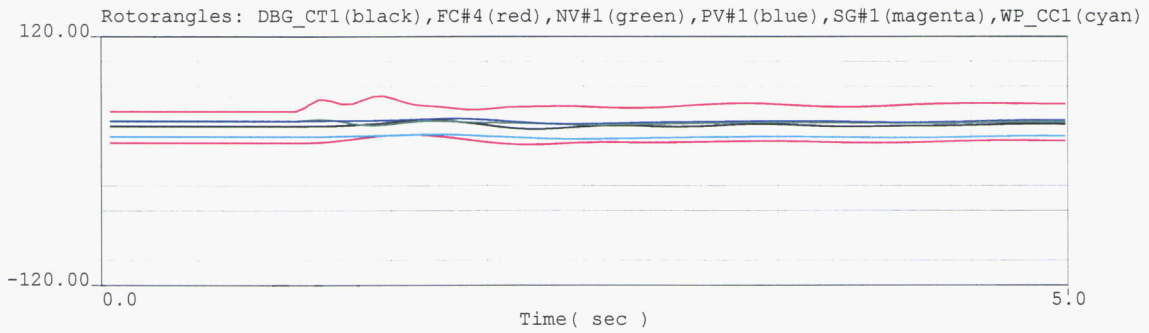


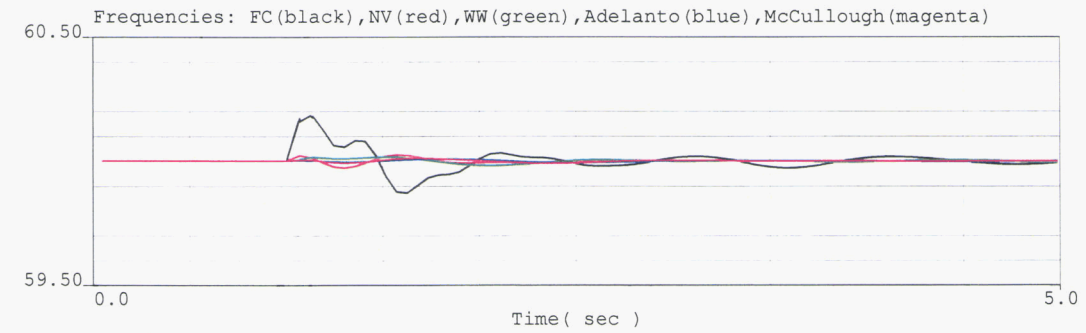


FOUR CORNERS fault w/FC-CH line out
FC-CH STAB; 1/07; T=0 3P FLT FC345;10% FLT DMPING;FLSH
CAPS;4C CLR FLT W/FC-CH #1; 8C REIN CAPS;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

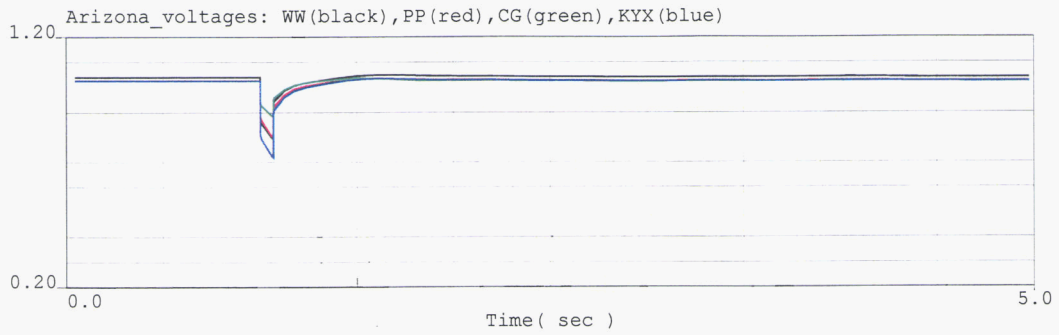


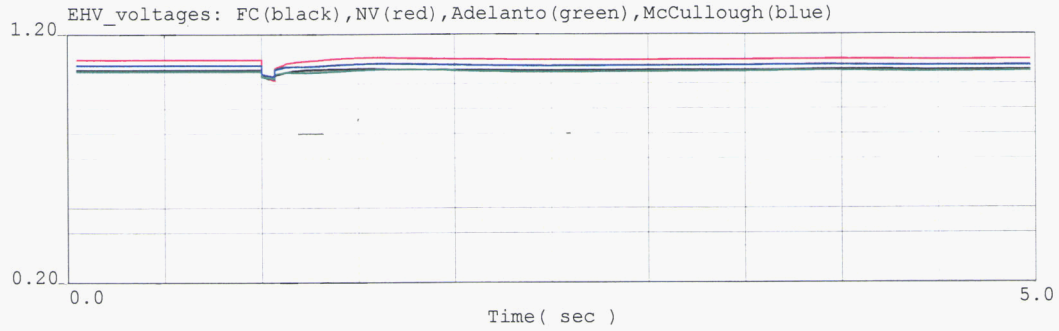


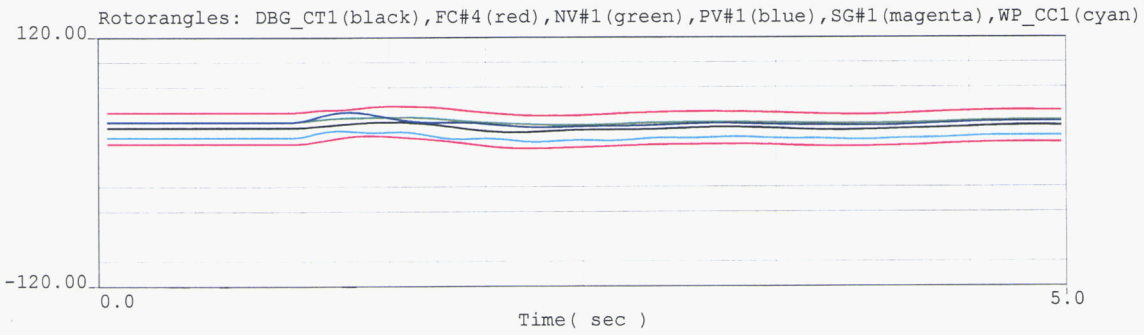


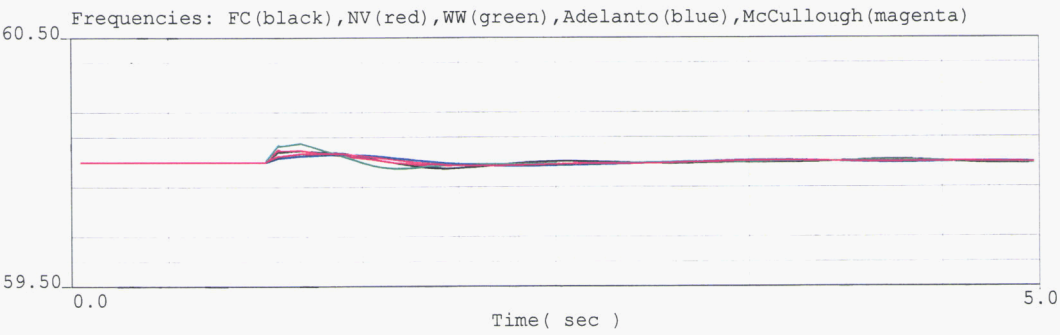


FOUR CORNERS FLT500 FC-MK out
FC-MK STAB; 1/07; T=0 3P FLT FC500;10% FLT DMPING;FLSH
CAPS; 4C CLR FLT W/FC-MK;8C REIN CAPS;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

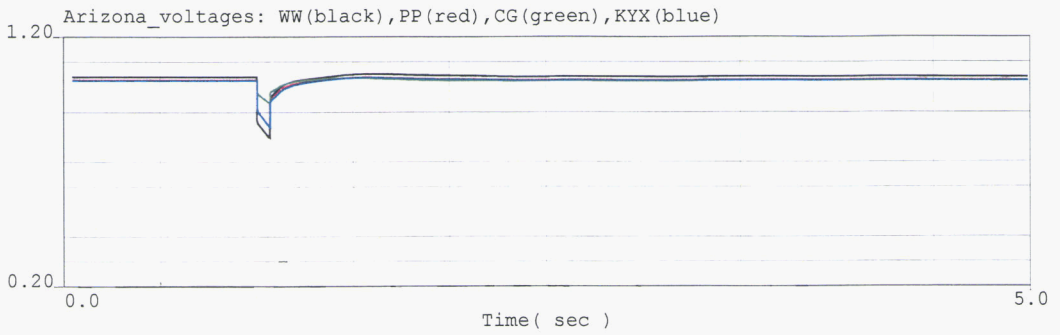


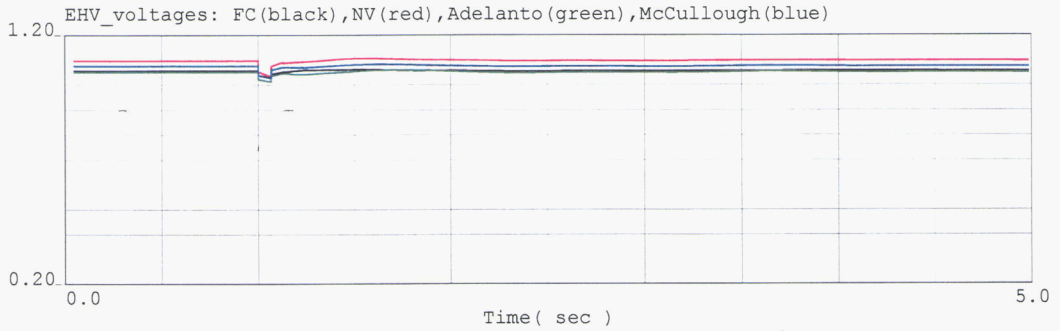


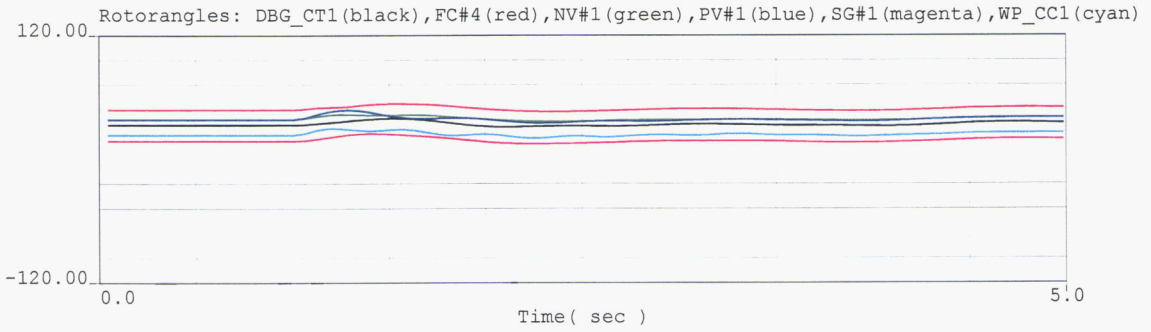


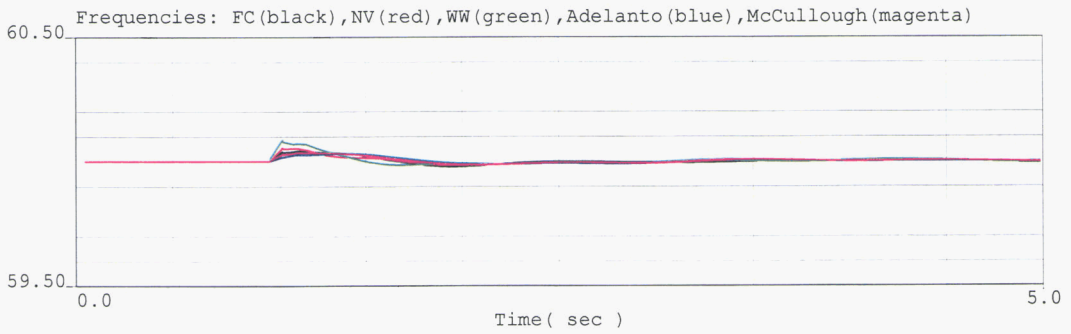


GILA RIVER FLT GR-JJX LINE OUT
GR-JJX STAB; 01/07; T=0 3P FLT GR500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/GR-JJX;8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

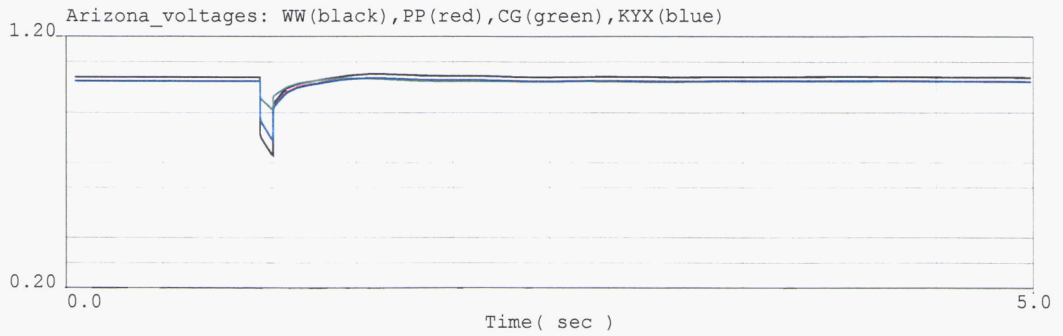


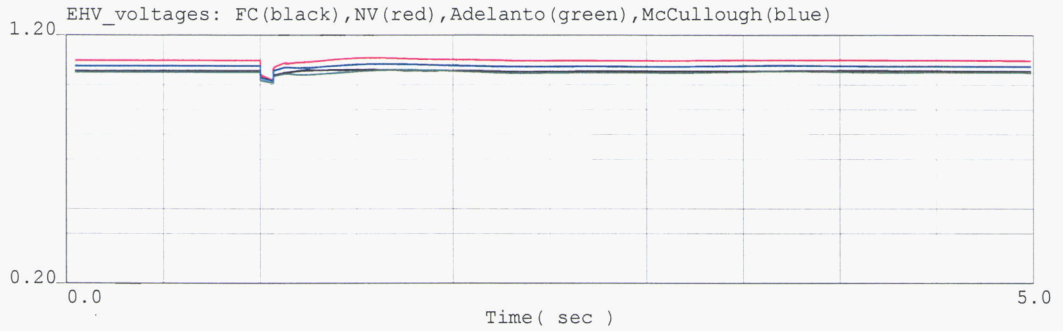


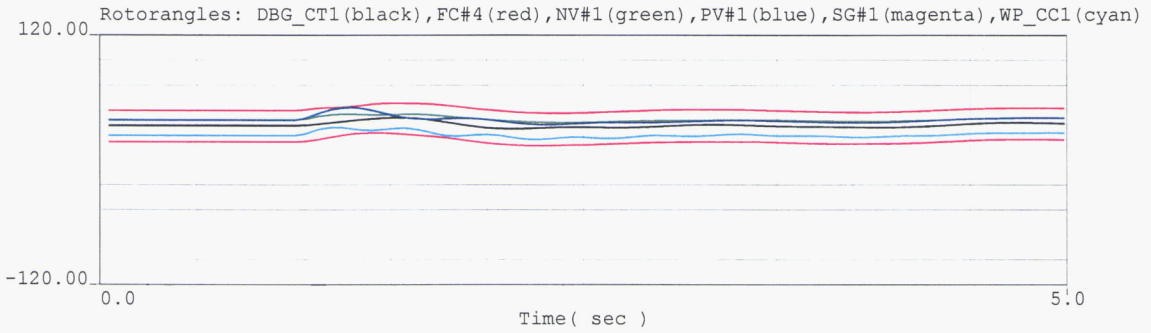


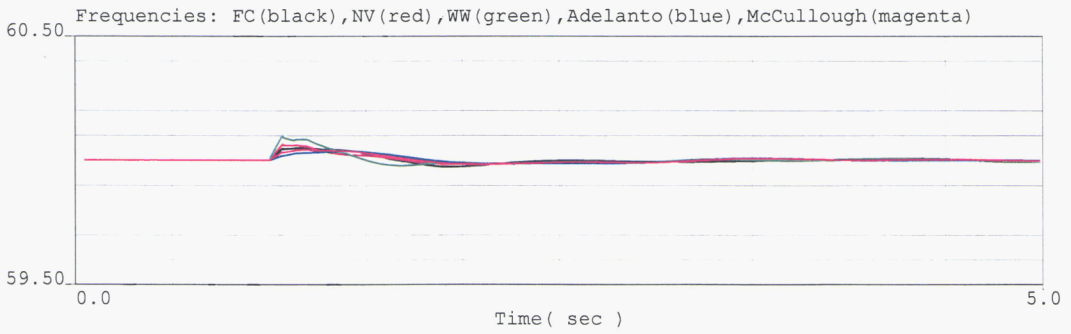


HARQUAHALA FLT HQ-HQJ LINE OUT
HQ-HQJ STAB; 01/07; T=0 3P FLT HQ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQ-HQJ;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

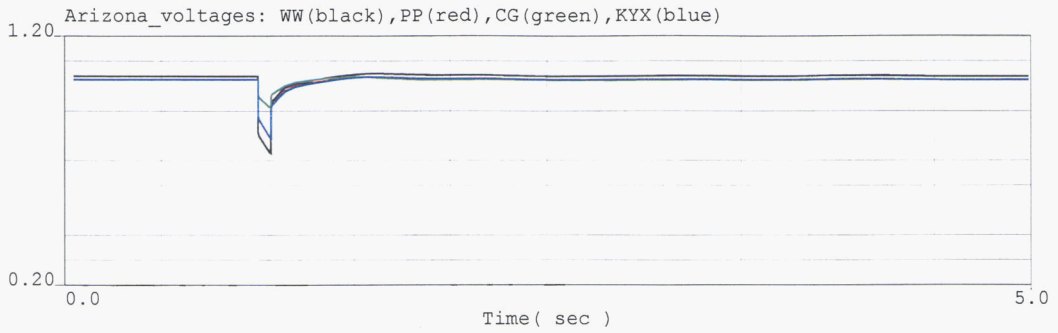


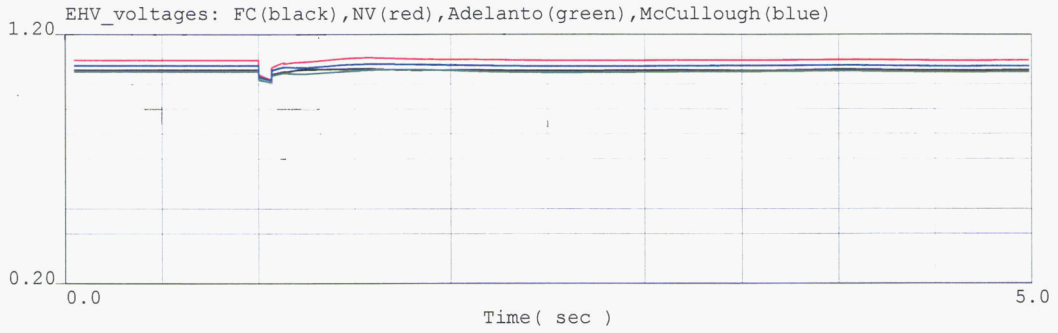


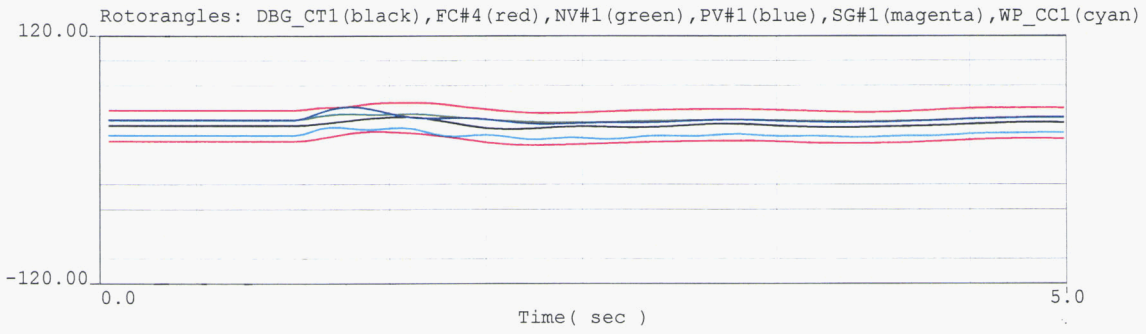


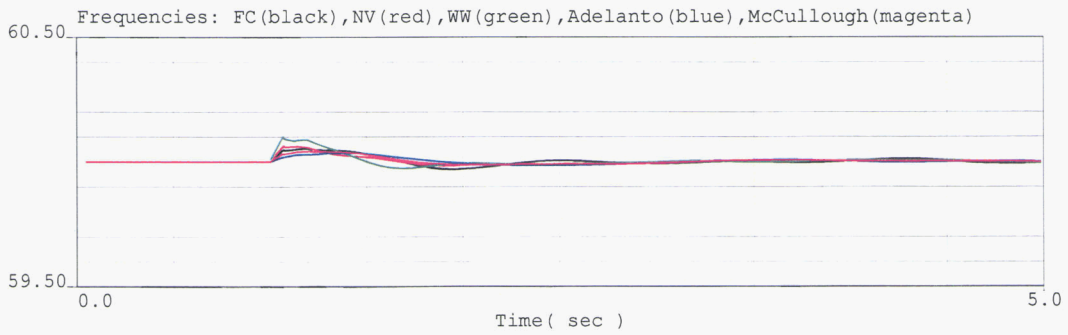


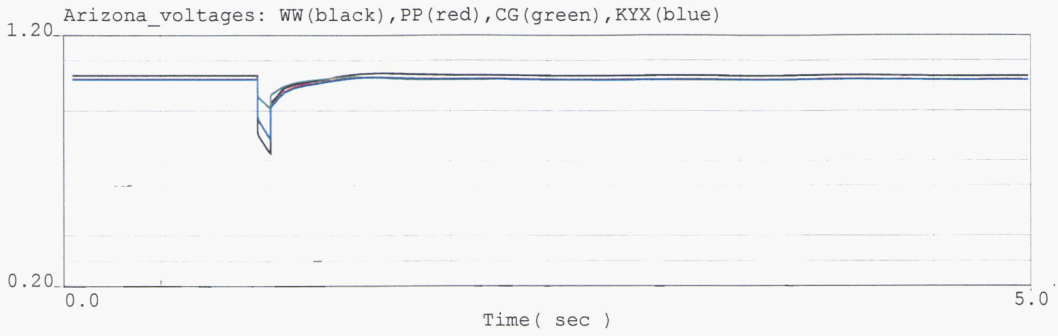
HARQUAHALA JUNCTION FLT HQJ-HQ LINE OUT
HQJ-HQ STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-HQ;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

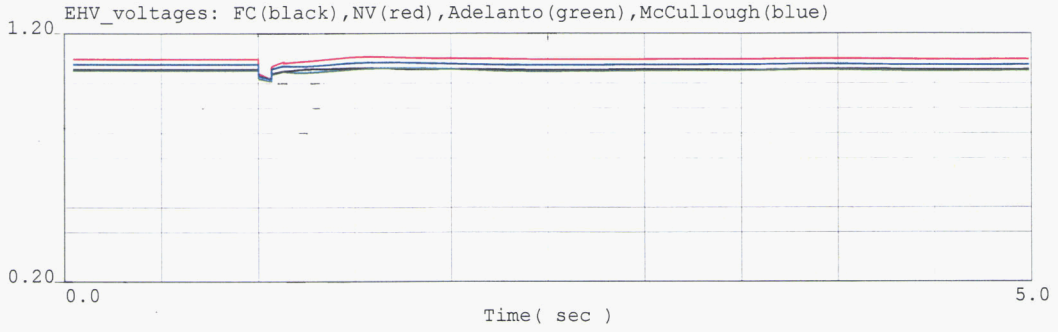

Arizona_voltages: WW(black),PP(red),CG(green),KYX(blue)
1.20
0.20
0.0
5.0
Time(sec)

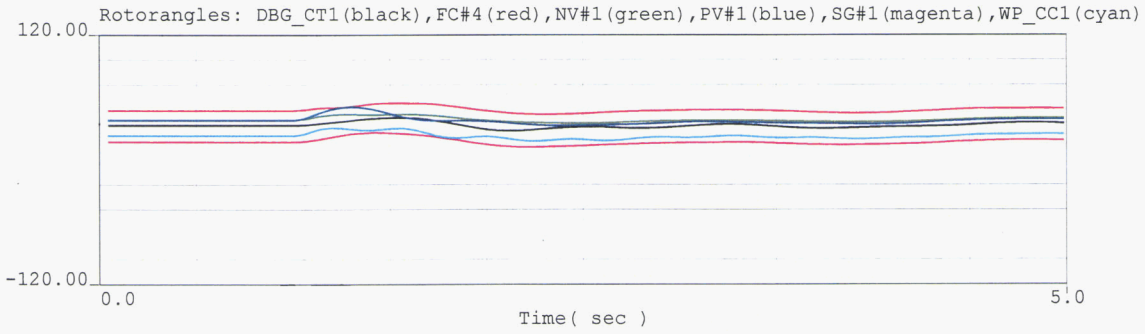

EHV_voltages: FC(black),NV(red),Adelanto(green),McCullough(blue)
1.20
0.20
0.0
5.0
Time(sec)

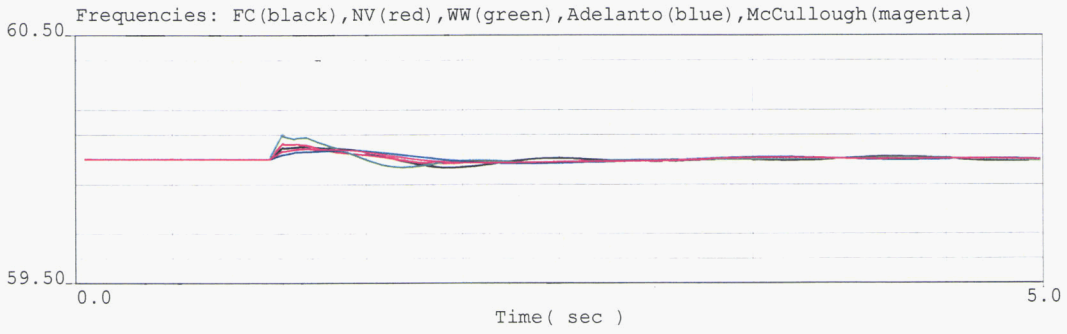

Rotorangles: DBG_CT1(black),FC#4(red),NV#1(green),PV#1(blue),SG#1(magenta),WP_CC1(cyan)
120.00
-120.00
0.0
5.0
Time(sec)


Frequencies: FC(black),NV(red),WW(green),Adelanto(blue),McCullough(magenta)
60.50
59.50
0.0
5.0
Time(sec)

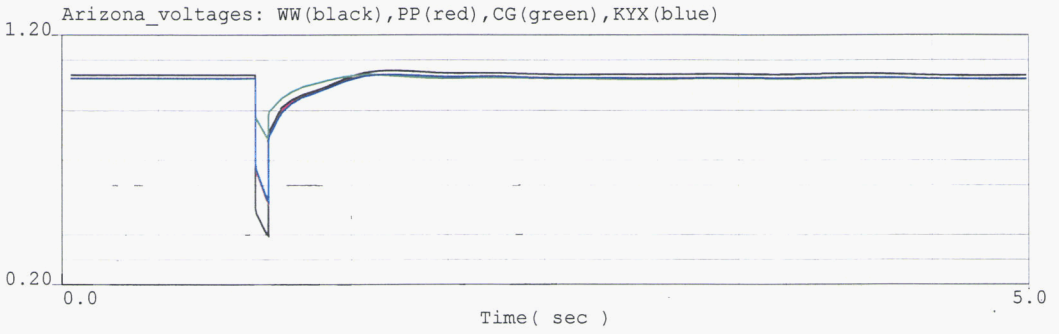


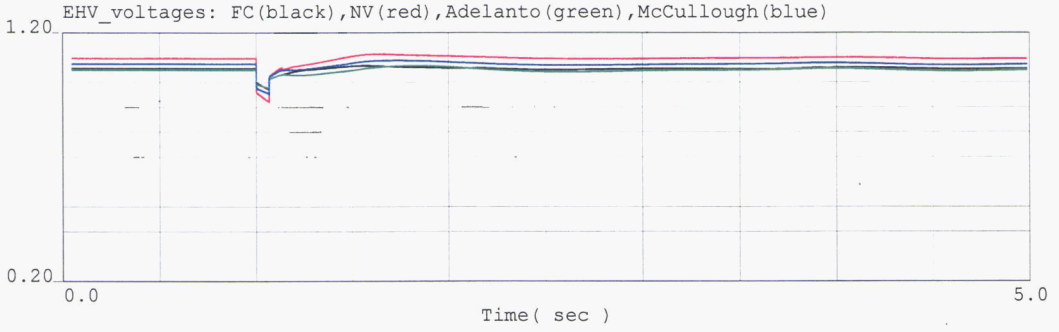


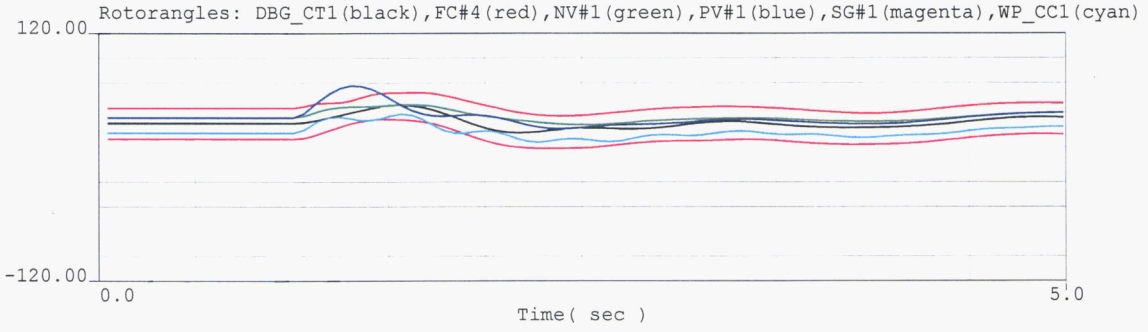


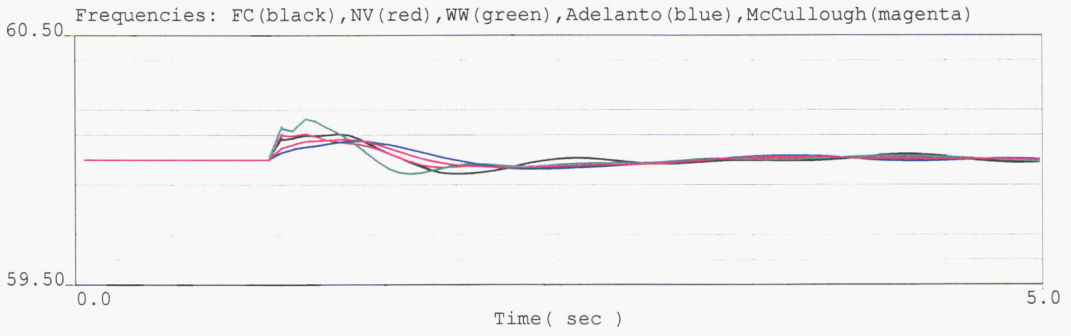


HARQUAHALA JUNCTION FLT HQJ-TS5 LINE OUT
HQJ-TS5 STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-TS5;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

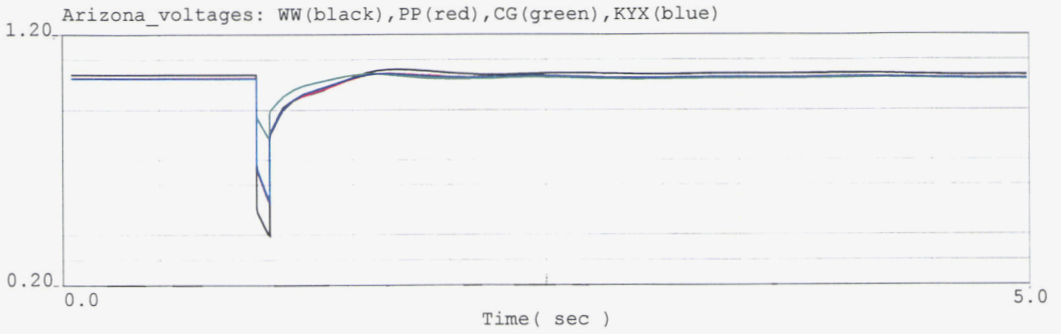


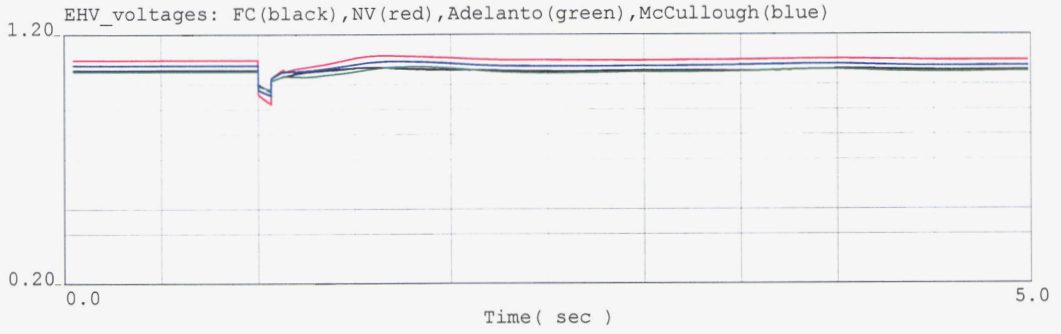


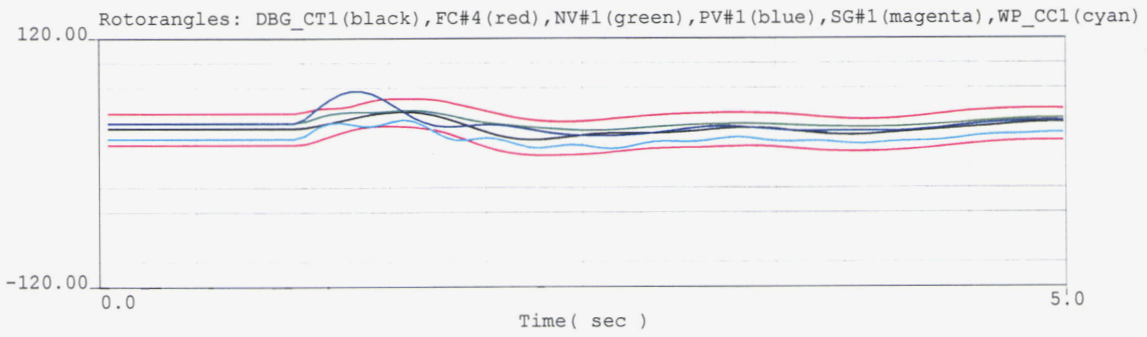


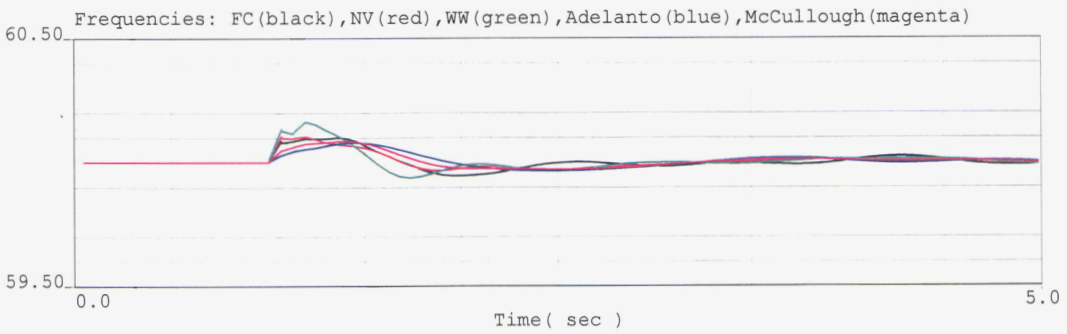


HASSAYAMPA FLT HAAX-HQJ LINE OUT
HQJ-HAAX STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-HAAX;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

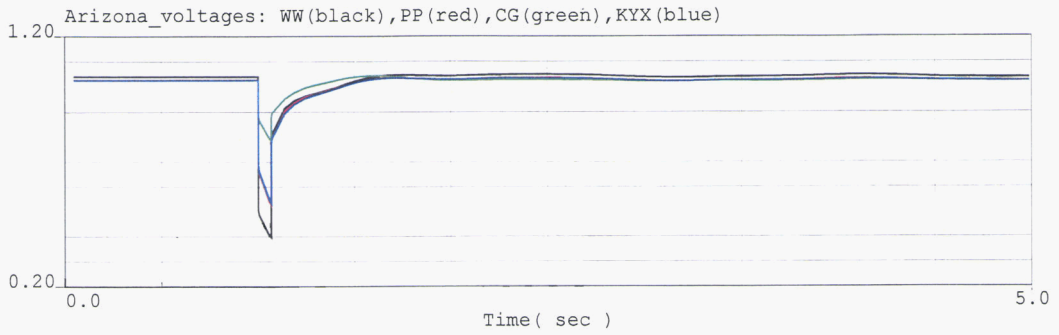


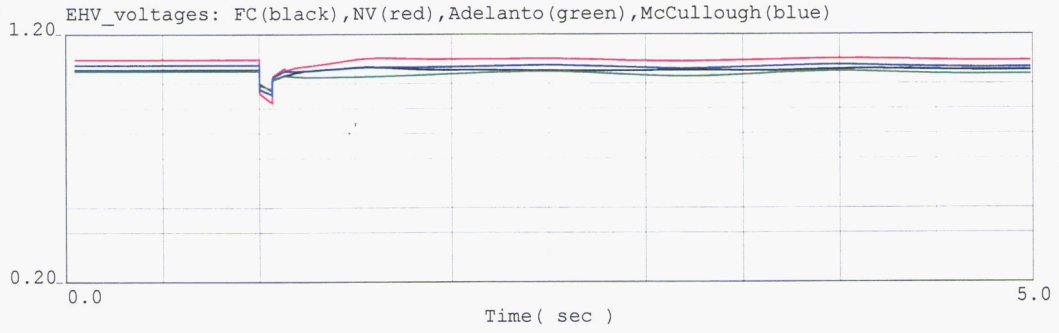


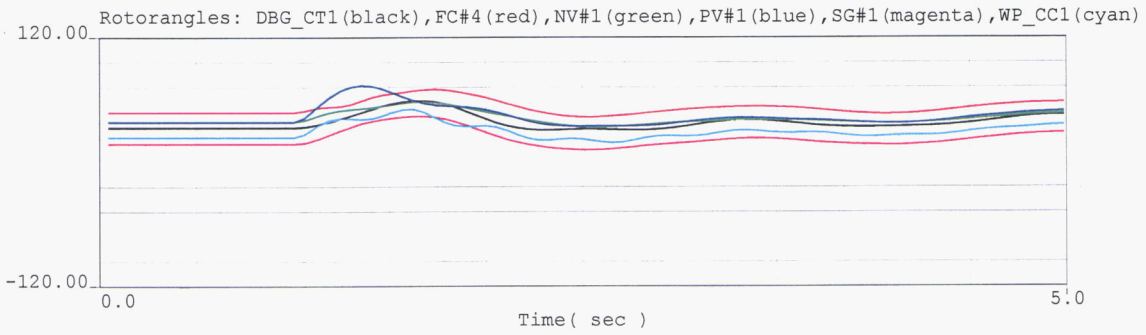


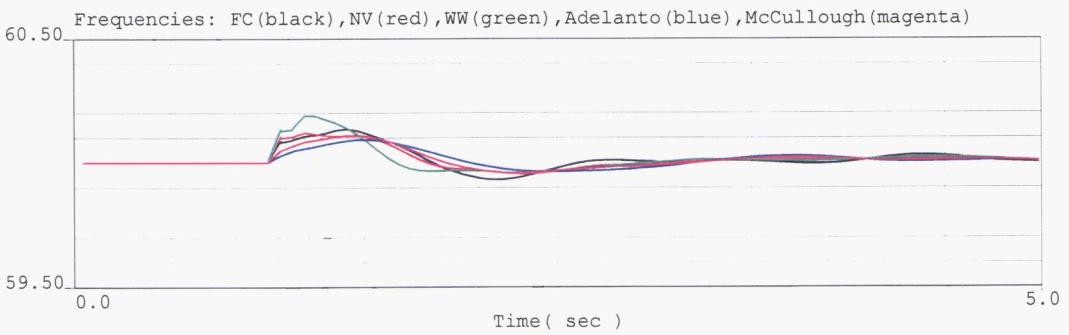


HASSAYAMPA FLT HAAX-JJX LINE OUT
HAAX-JJX STAB; 01/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-JJX;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

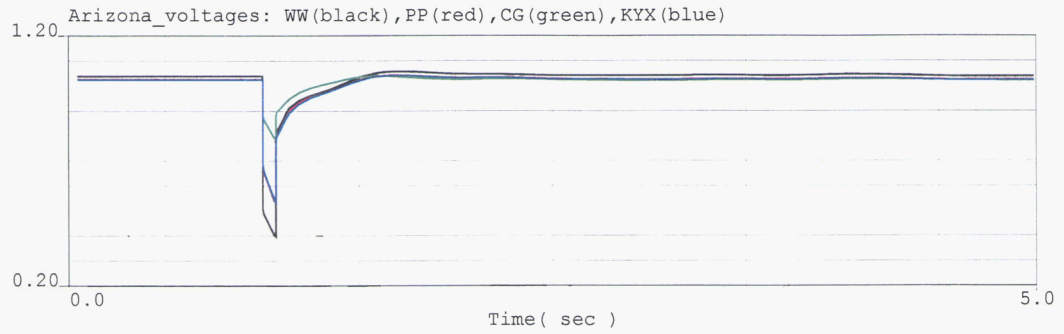


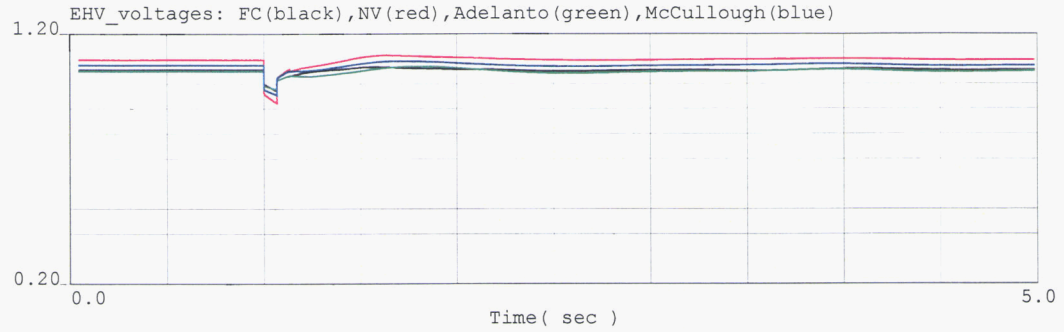


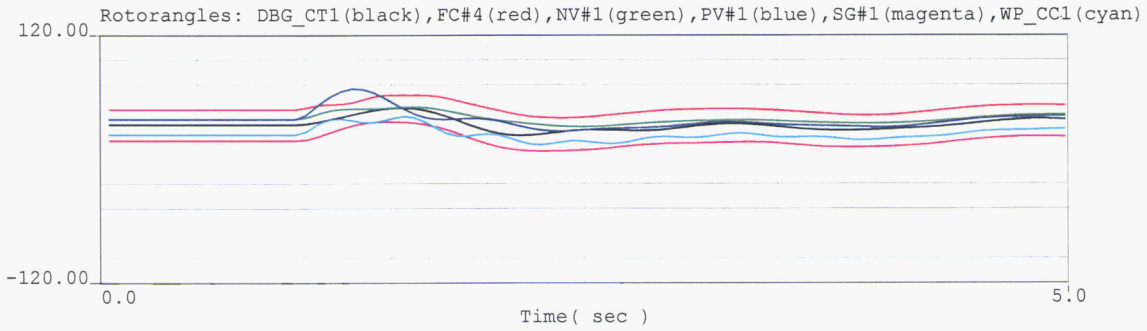


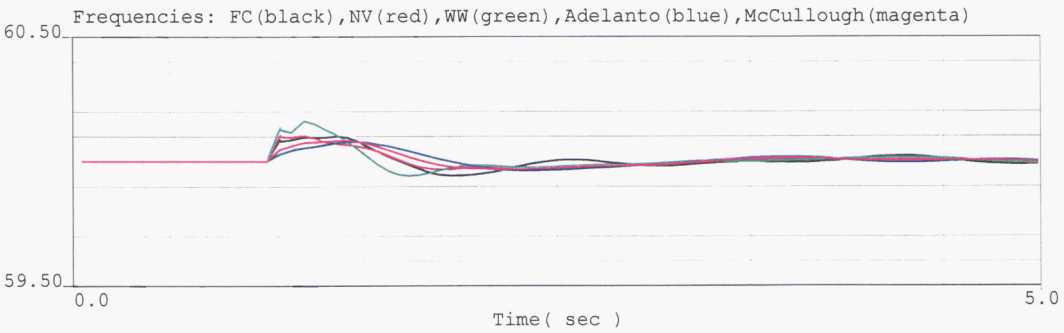


HASSAYAMPA FLT. w/HAAX-NG line out
HAAX-NG STAB; 1/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-NG;4/8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

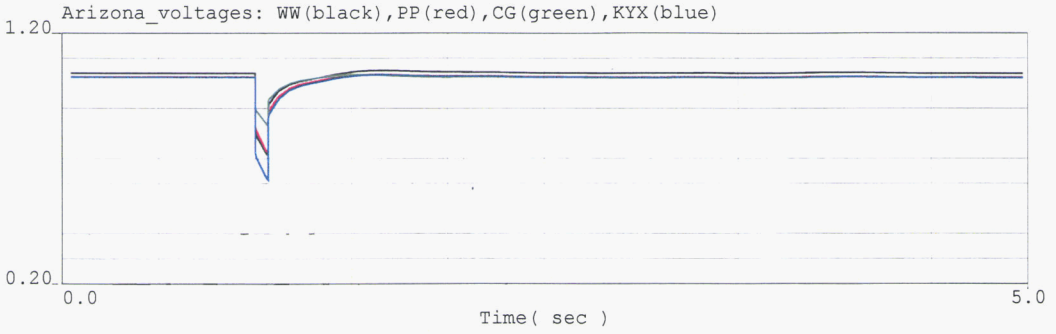


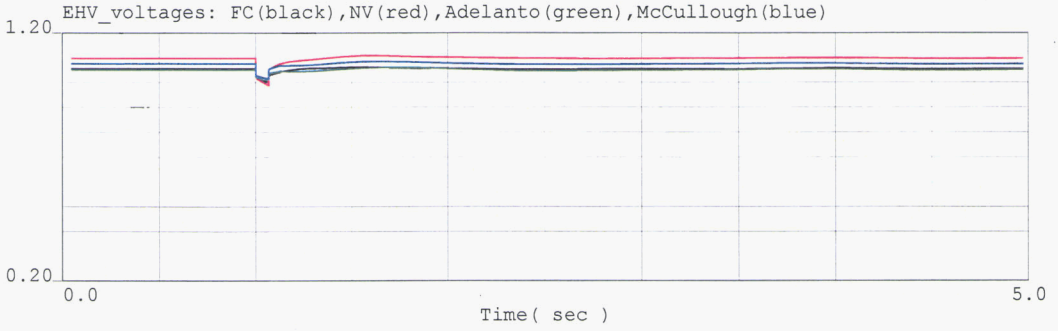


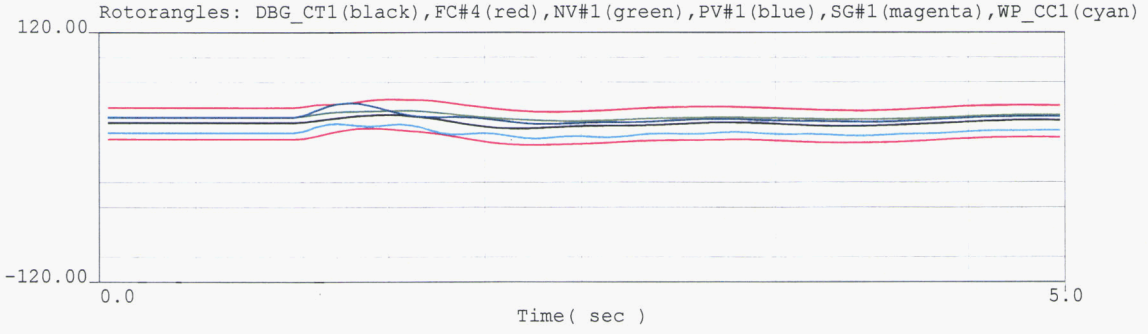


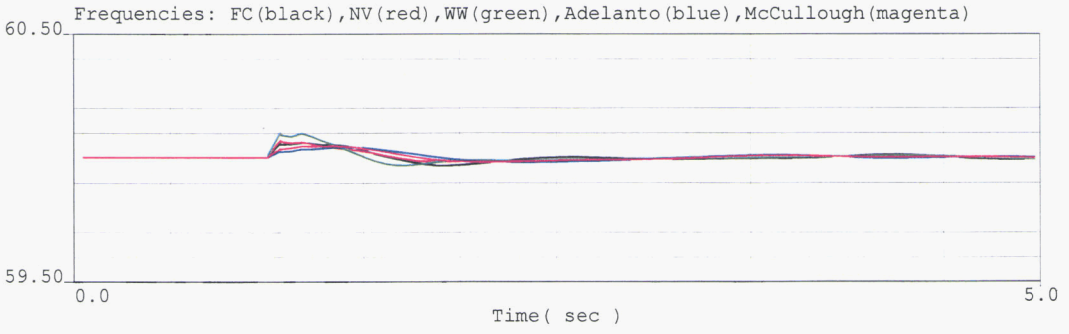


HASSAYAMPA FLT HAAX-RDHK LINE OUT
HAAX-RHK STAB; 01/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-RHK #1;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

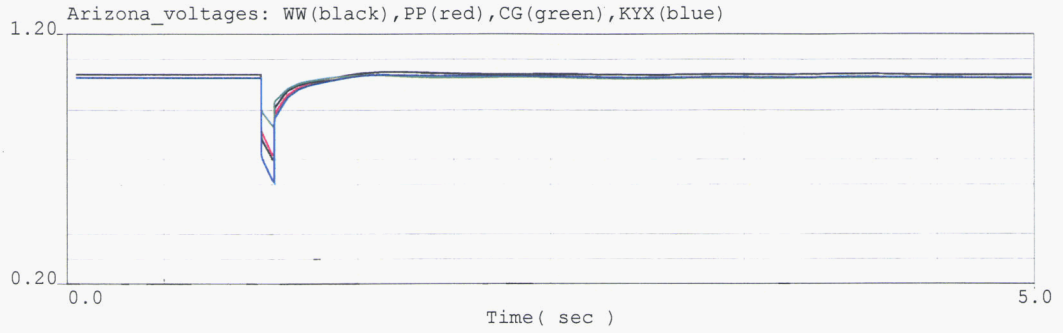


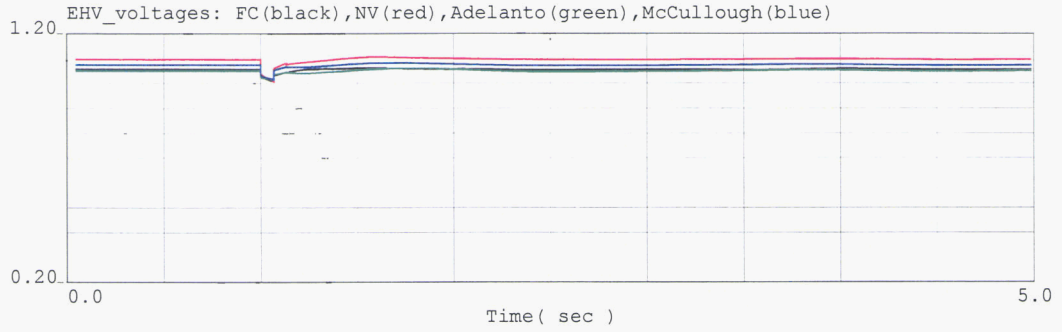


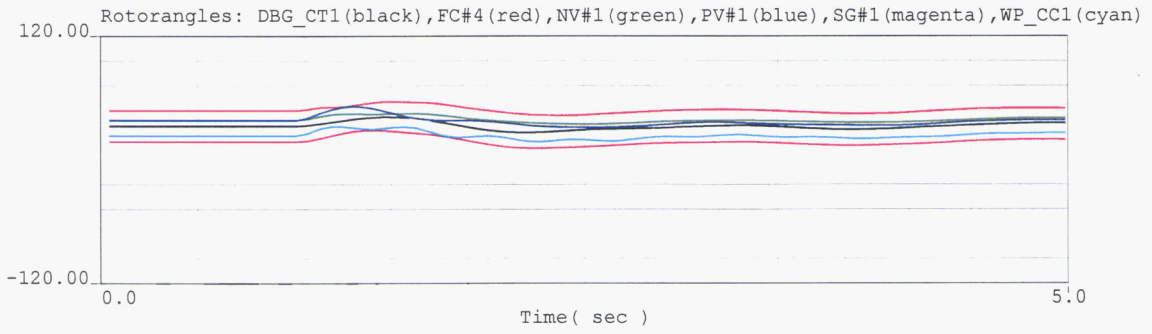


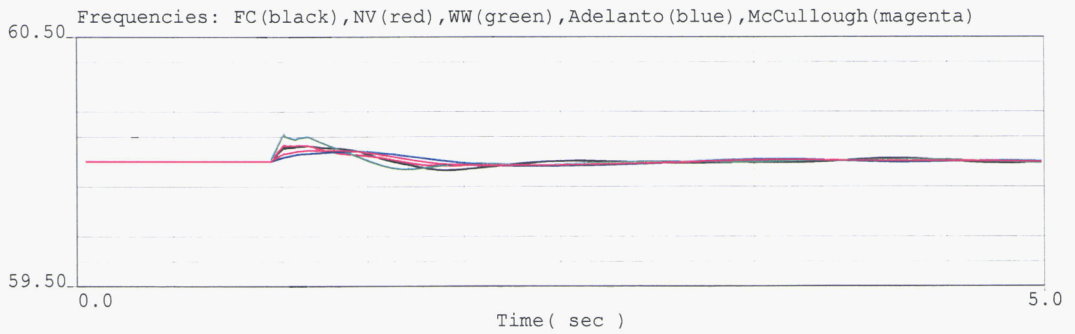


JOJOBA FLT JJX-GR LINE OUT
JJX-GR STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/JJX-GR;8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

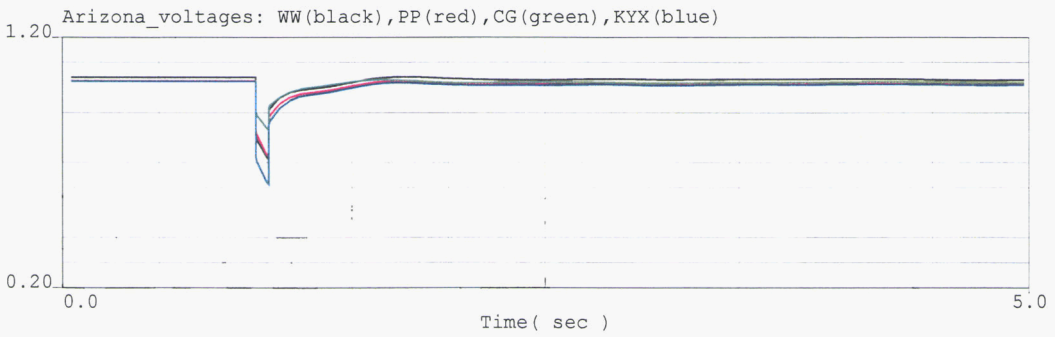


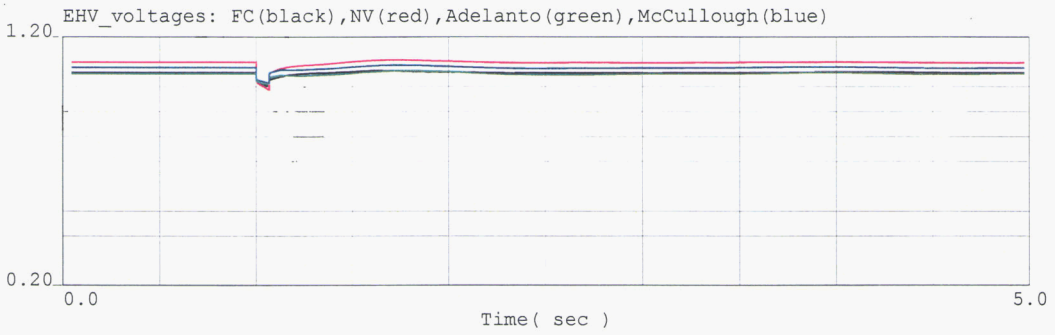


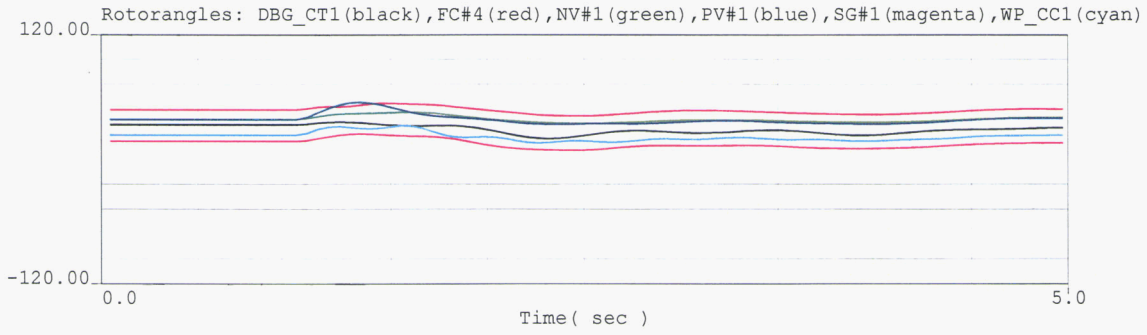


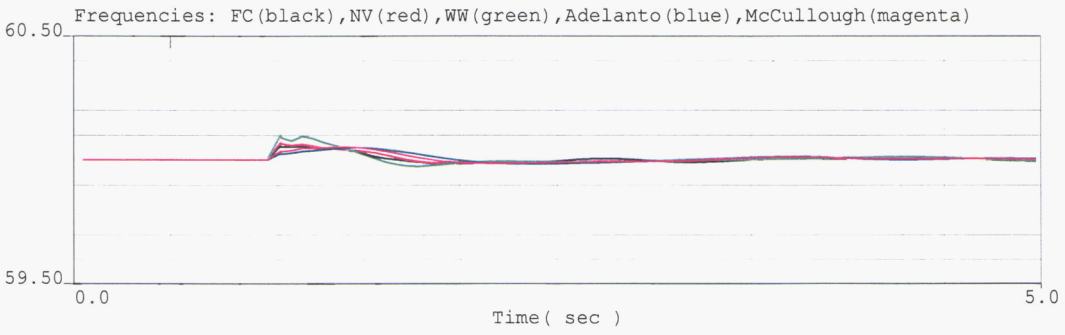


JOJOBA FLT JJX-HAAX LINE OUT
JJX-HAAX STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-JJX;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

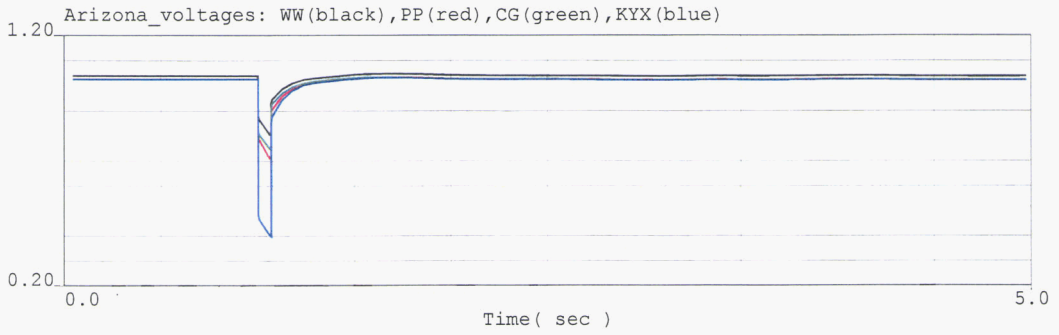


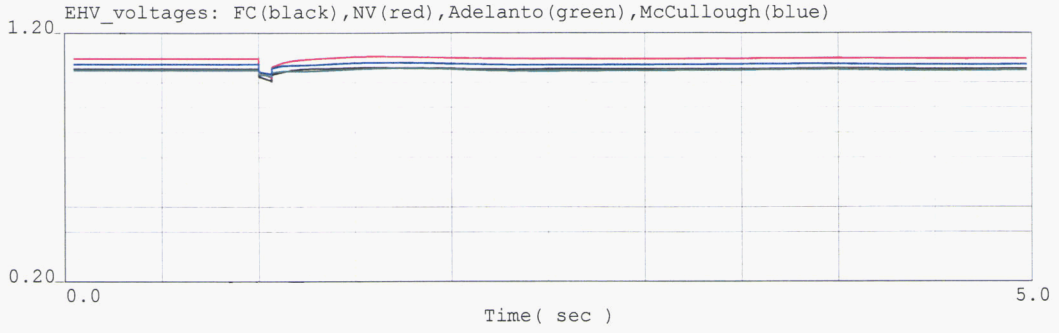


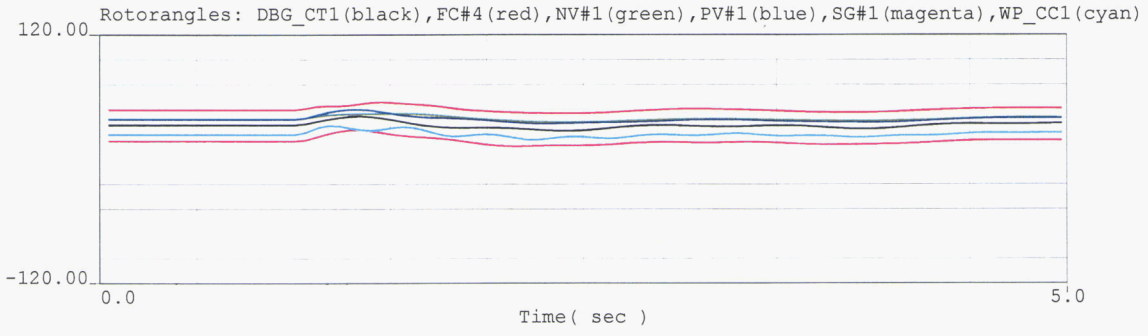


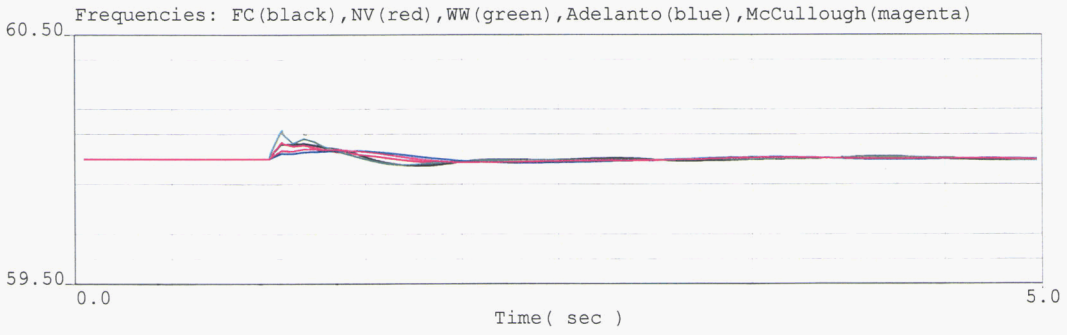


JOJOBA FLT JJX-KYX LINE OUT
JJX-KYX STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/JJX-KYX;8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.







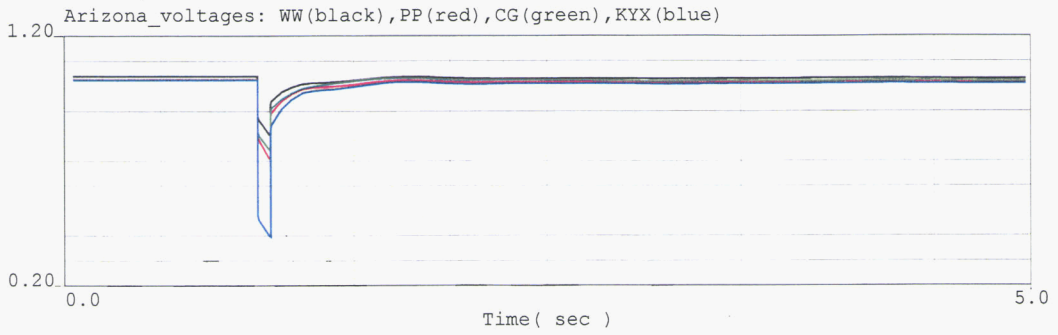


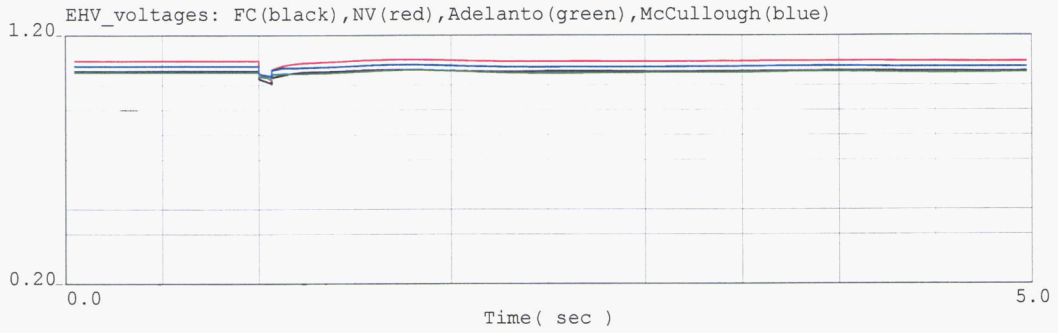
KYRENE FLT KYX-BNX LINE OUT
2010 HS1A APPROVED BASE CASE
AUGUST 24, 2005
KYX-BNX STAB #1; 01/07; T=0 3P FLT KYX500;
4C CLR FLT W/KYX-BNX;2010.dyd;WSCC.bpt

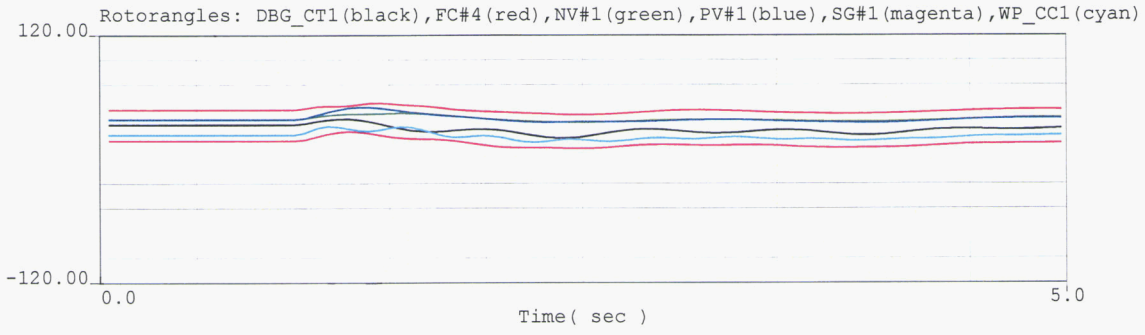
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

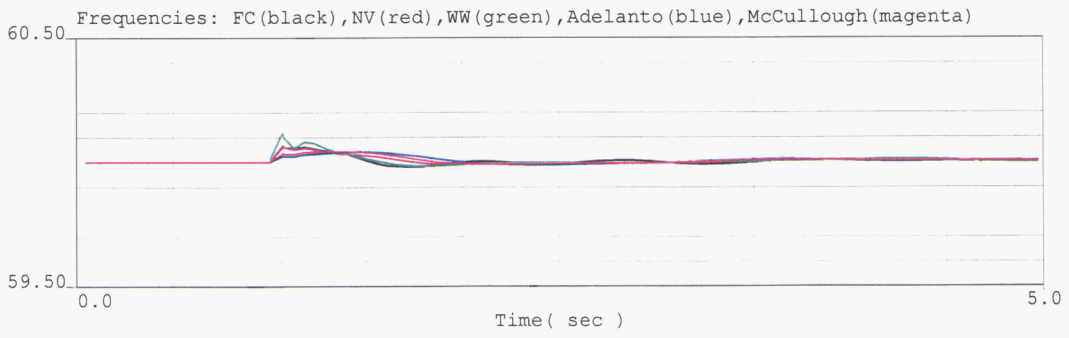
kyx_bnx.chf

c:\upslf152\mypslf
Mon Jan 22 13:09:58 2007

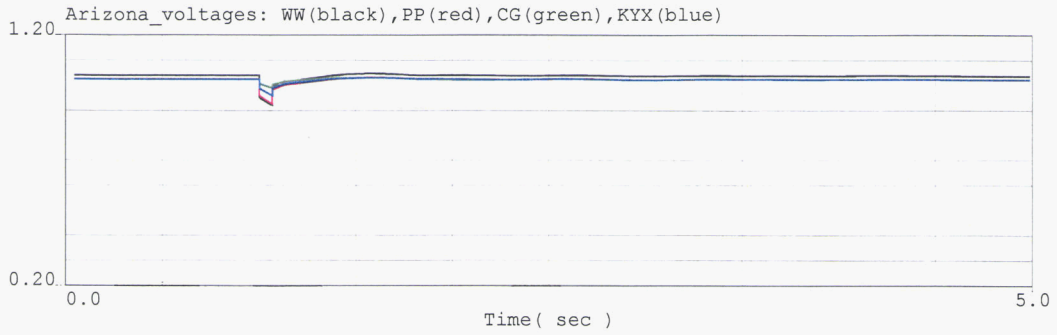


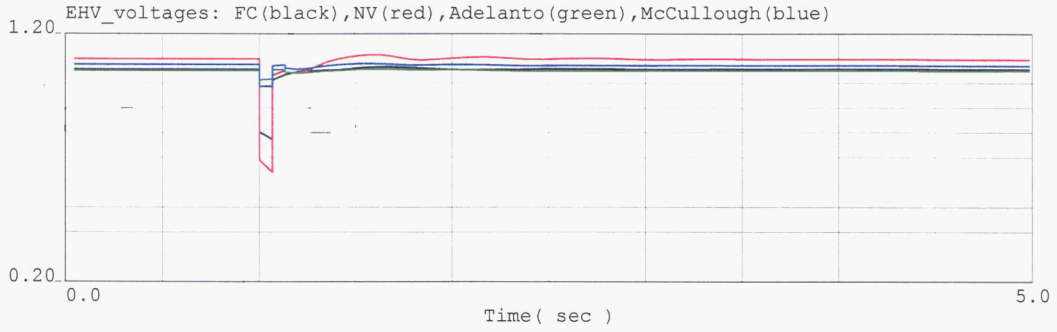


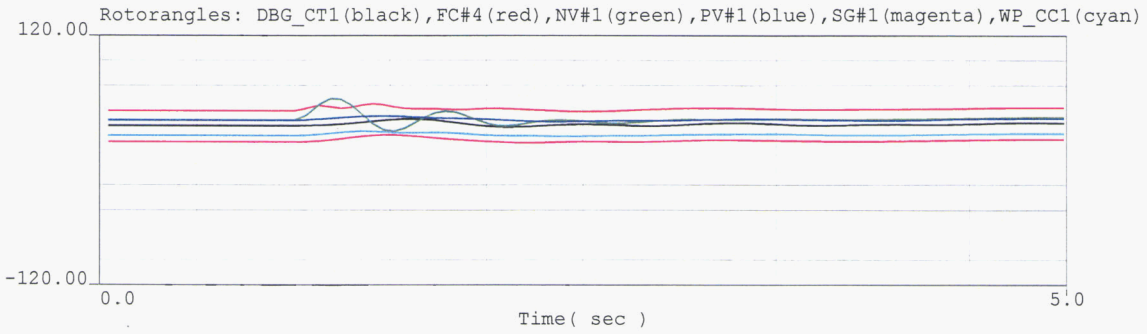


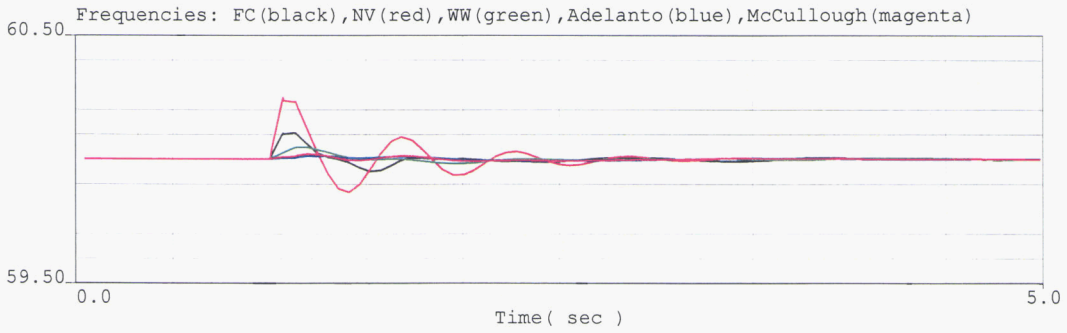


KYRENE FLT KYX-JJX LINE OUT
KYX-JJX STAB #1; 01/07; T=0 3P FLT KYX500;
4C CLR FLT W/KYX-JJX;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

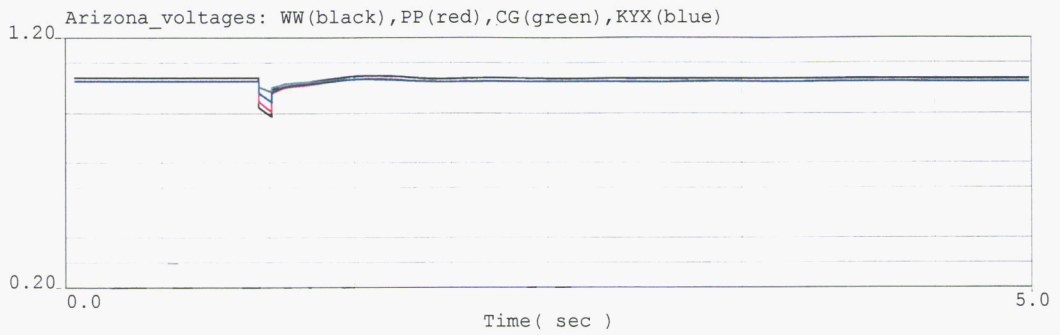


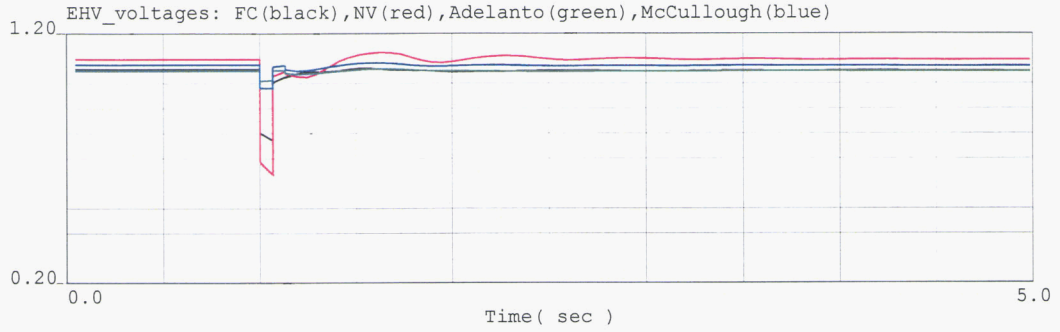


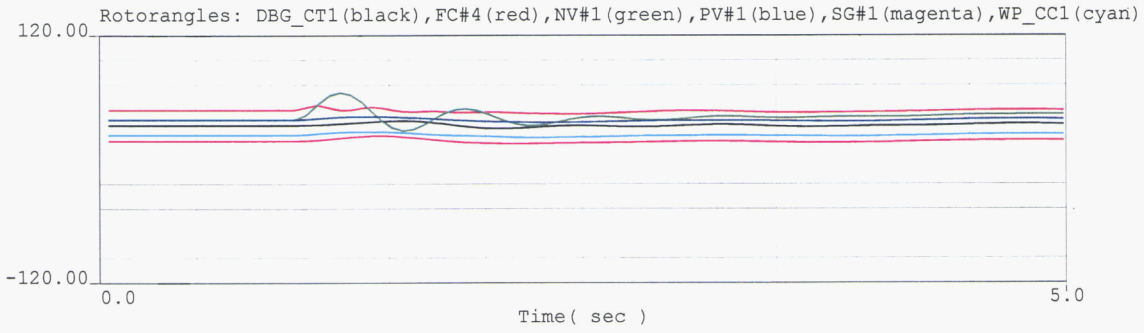


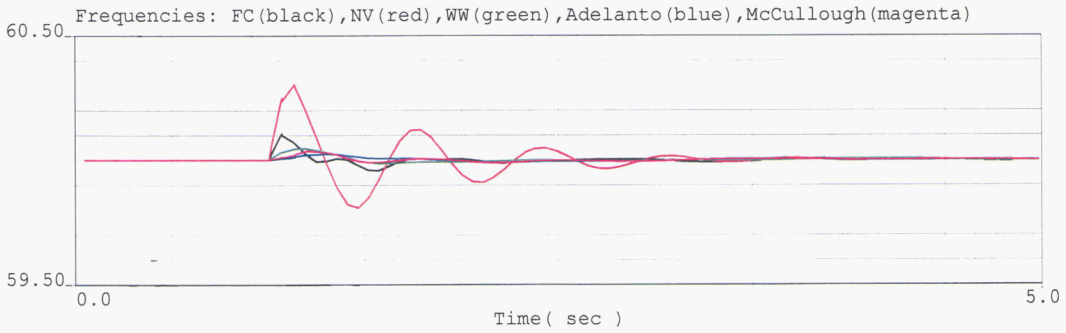


MOENKOPI FLT. MK-EOX line out
MK-EOX STAB; 1/07; T=0 3P FLT MK500;FLSH CAPS;
4C CLR FLT W/MK-EOX;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

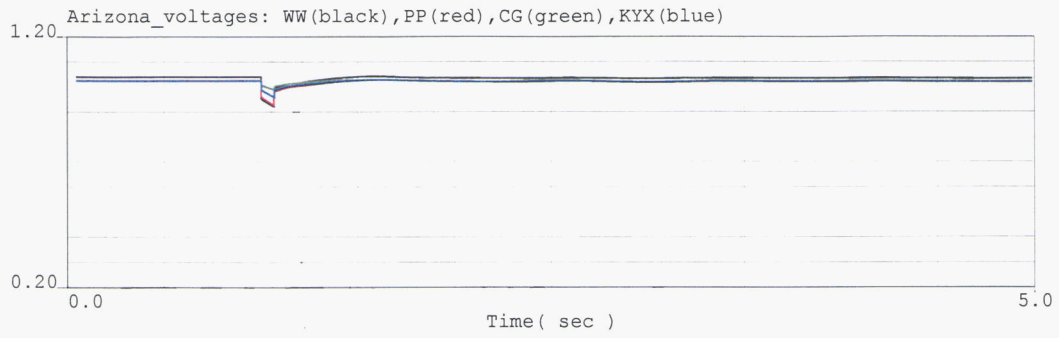


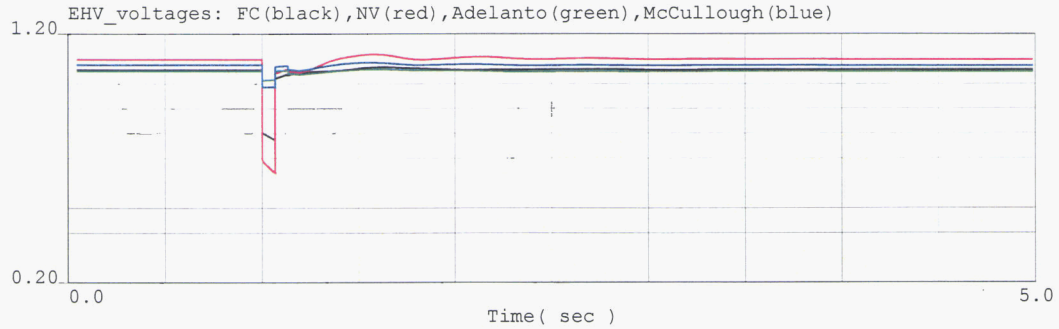


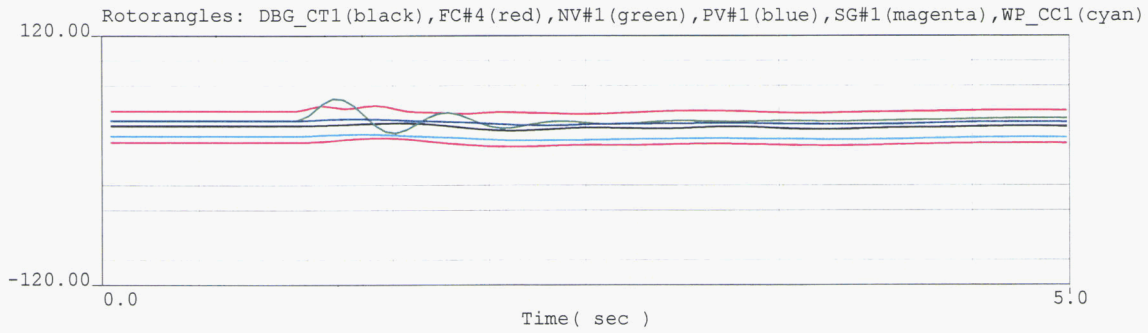


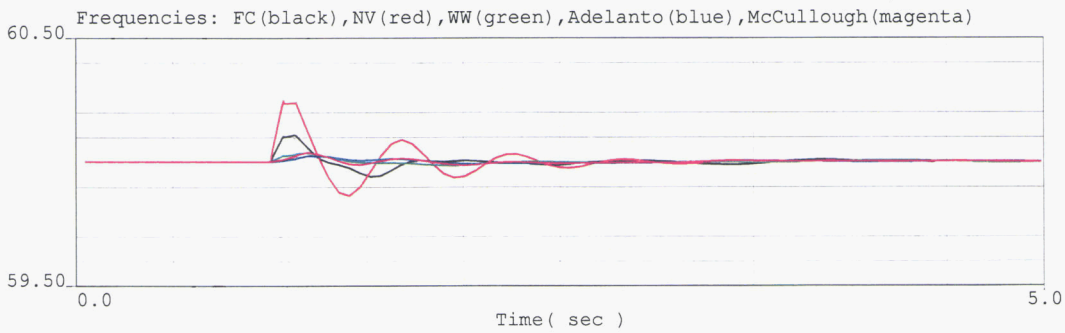


MOENKOPI FLT. MK-NV. line out
MK-NV STAB; 1/07; T=0 3P FLT MK500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/MK-NV;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

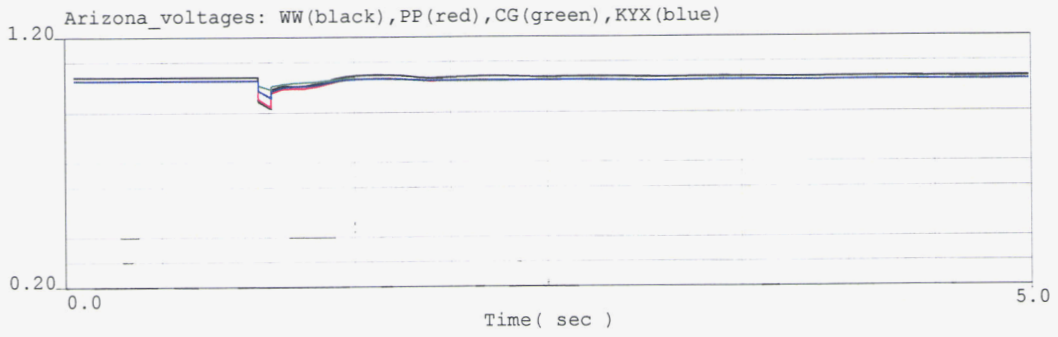


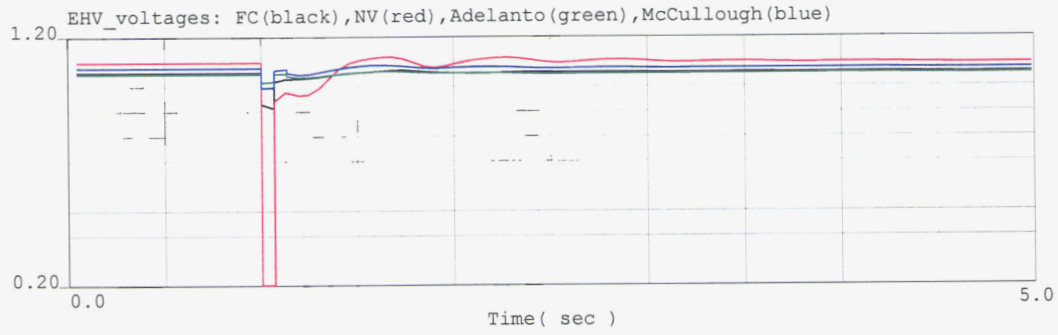


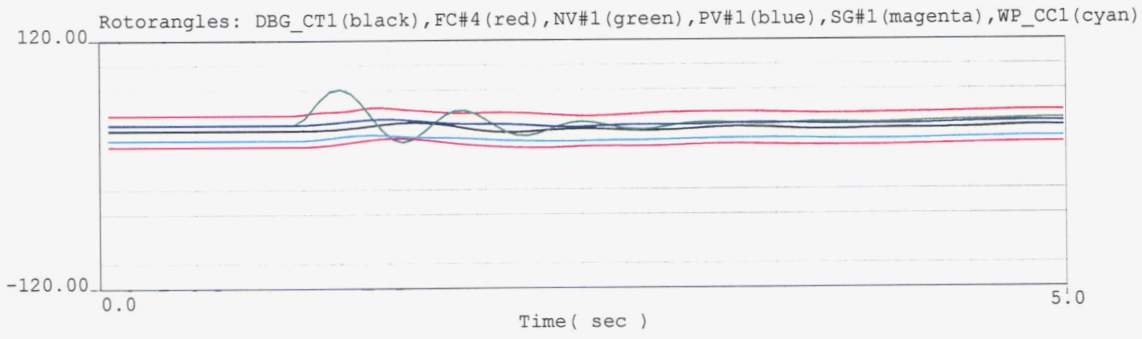


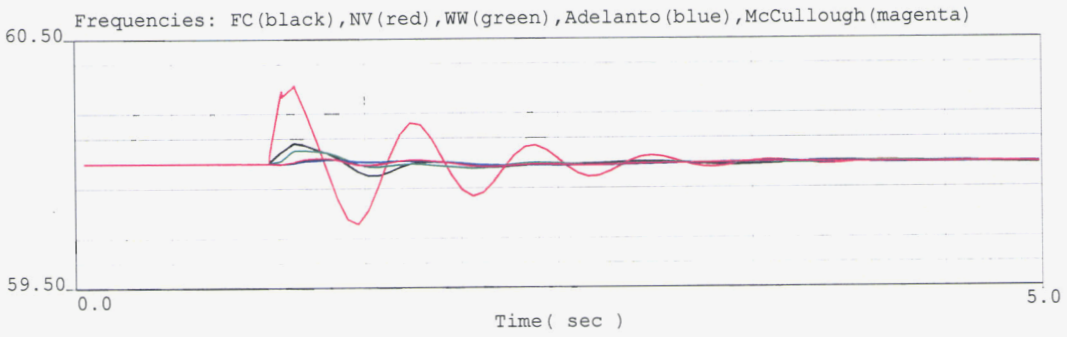


MOENKOPI FLT MK-YV line out
MK-YV STAB; 1/07; T=0 3P FLT MK500;FLSH CAPS;
4C CLR FLT W/MK-YV;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

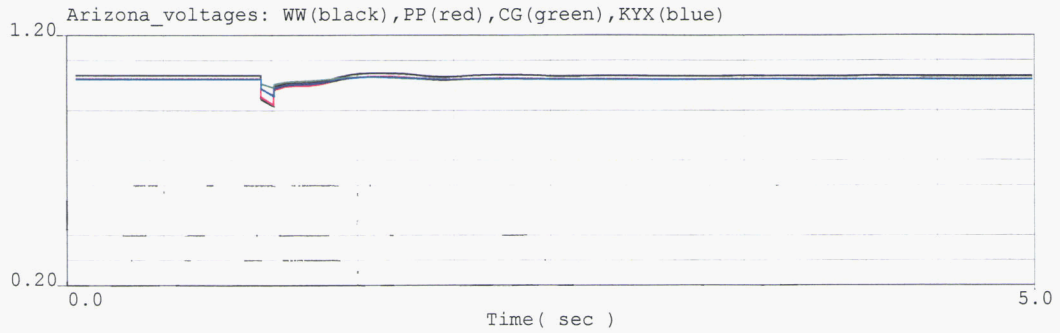


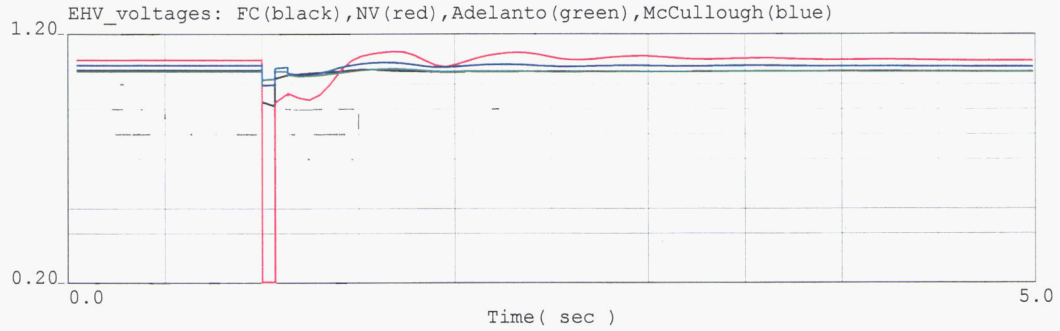


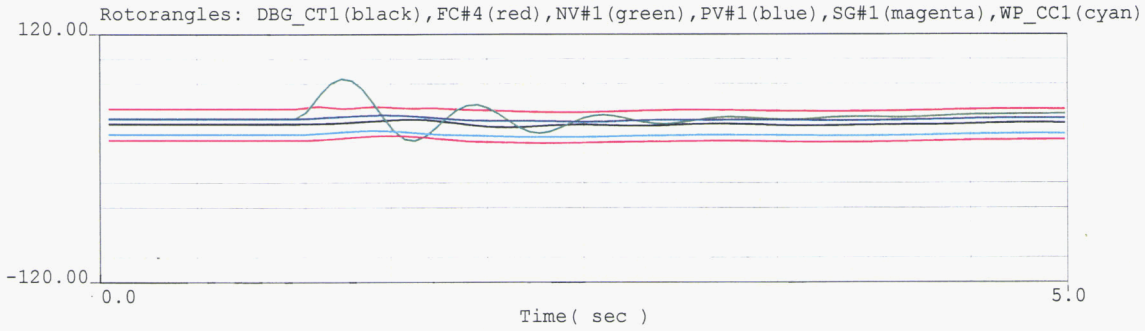


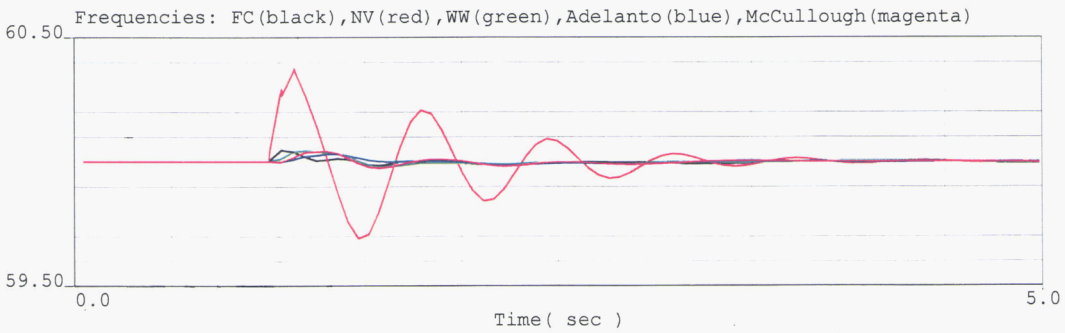


NAVAJO FLT. NV-CYX line out
NV-CYX STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-CYX;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

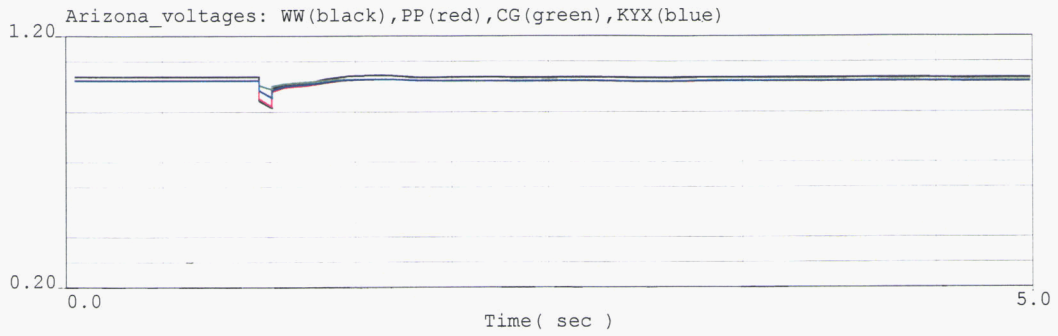


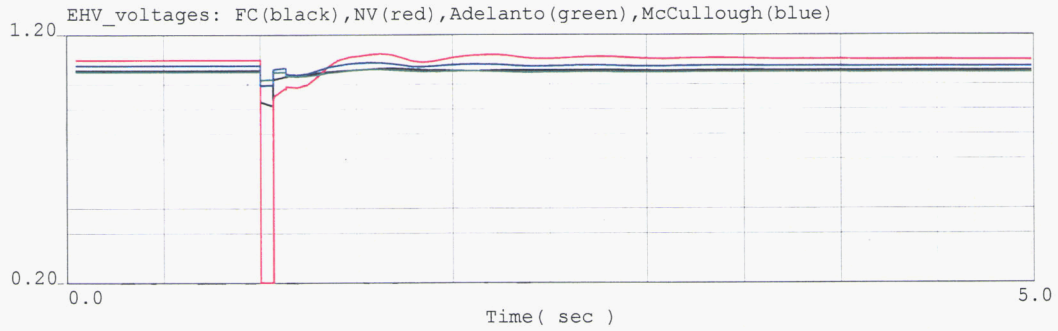


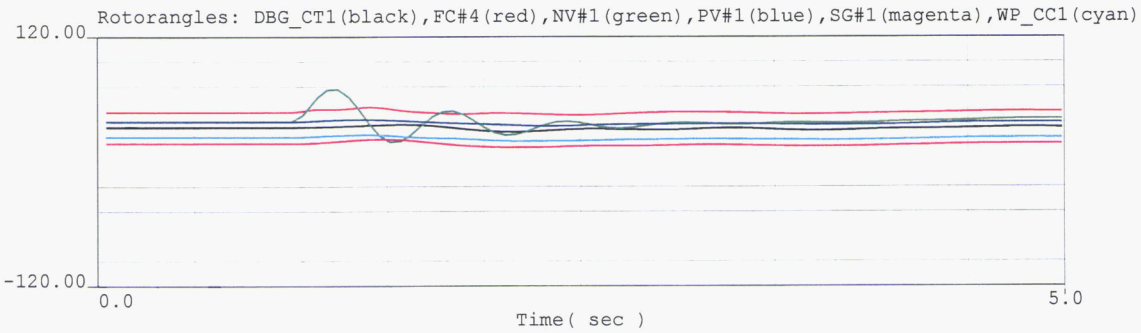


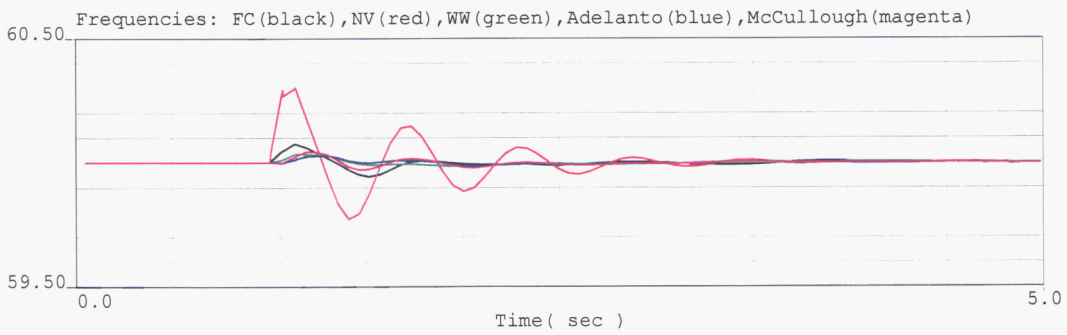


NAVAJO FLT. NV-MK. line out
NV-MK STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-MK;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

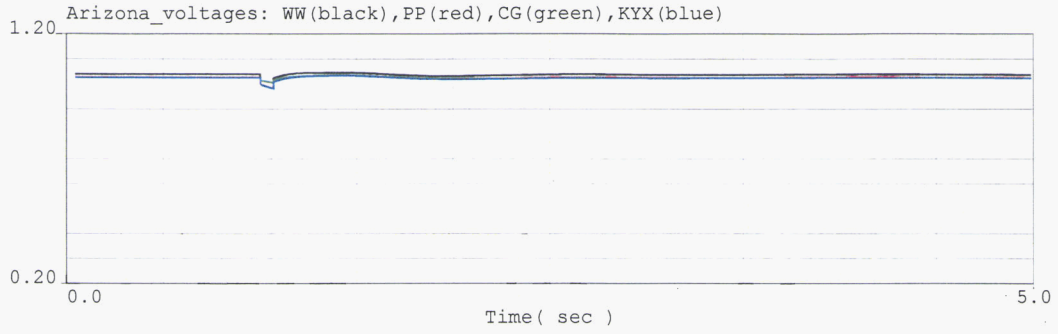


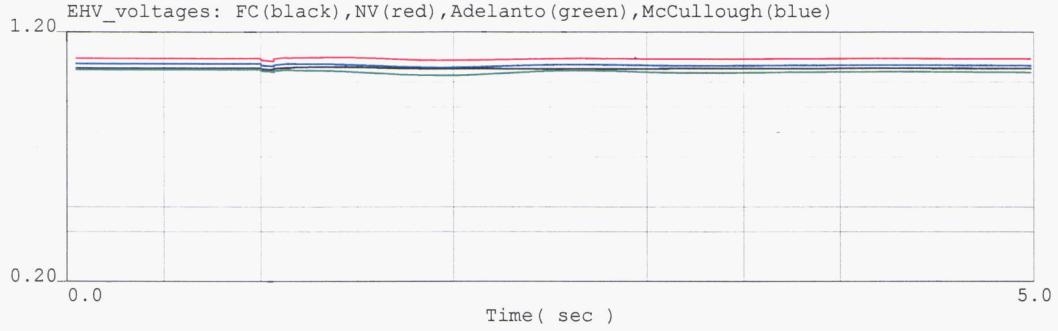


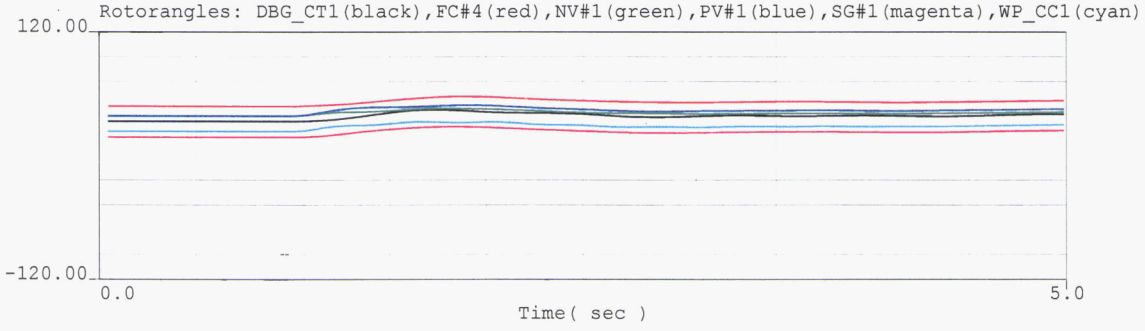


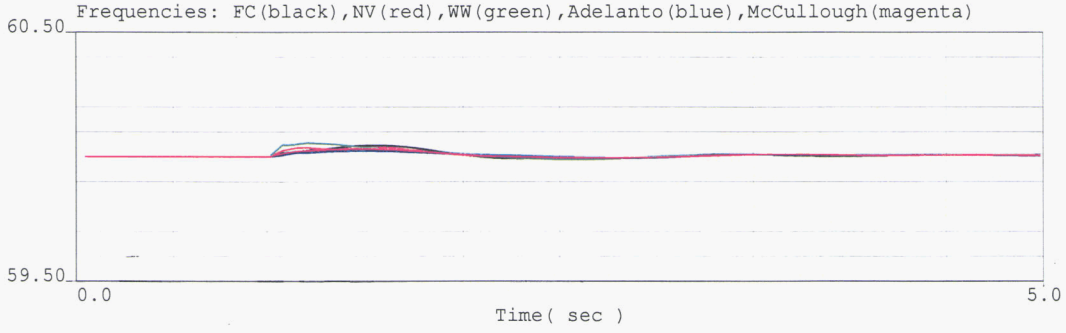


NAVAJO FLT NV-RY LINE OUT
NV-RY STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-RY;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

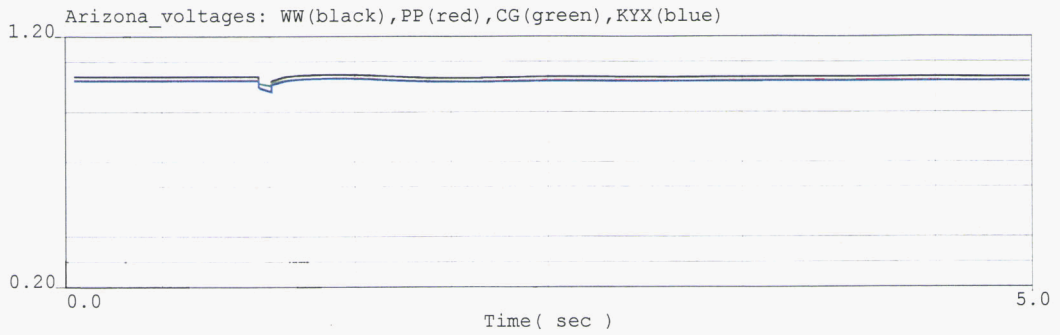


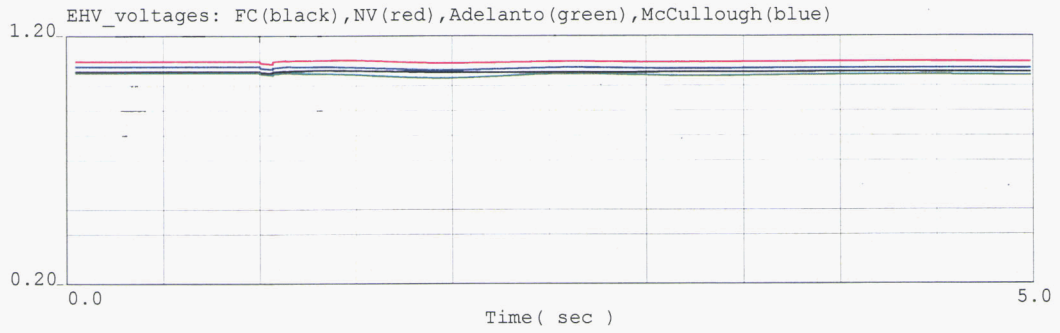


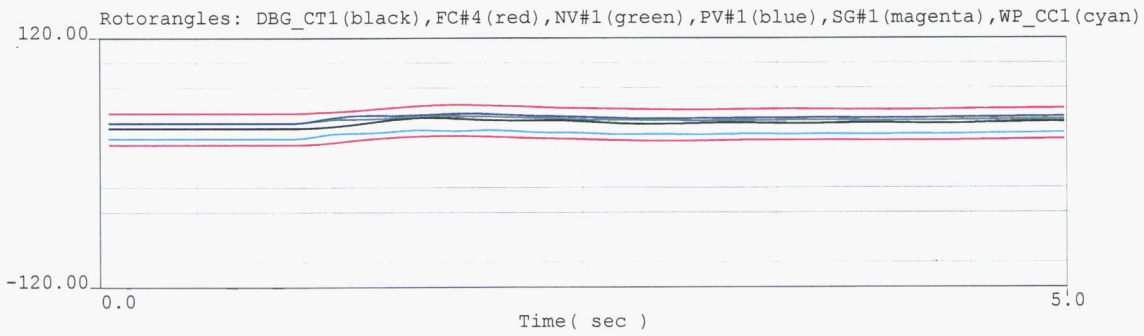


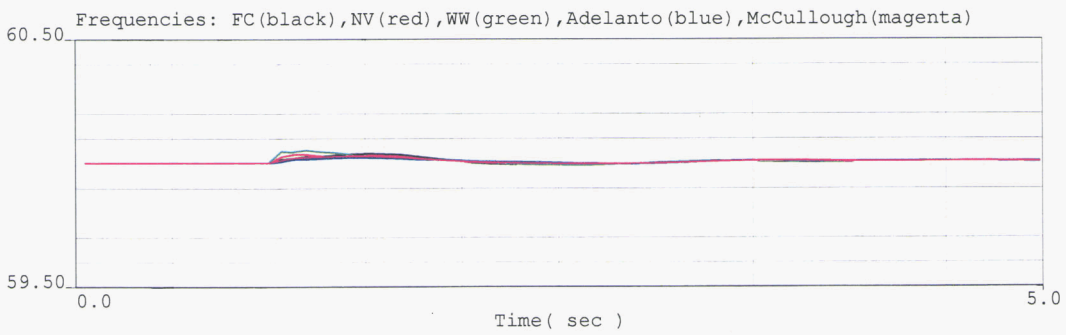


N.GILA FLT NG-HAAX LINE OUT
NG STAB;3 PH FLT NG500KV; FLASH CAPS; 4 CYC CLR FLT;
NG-HAAX OUT;4/8 CYC REIN CAPS;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

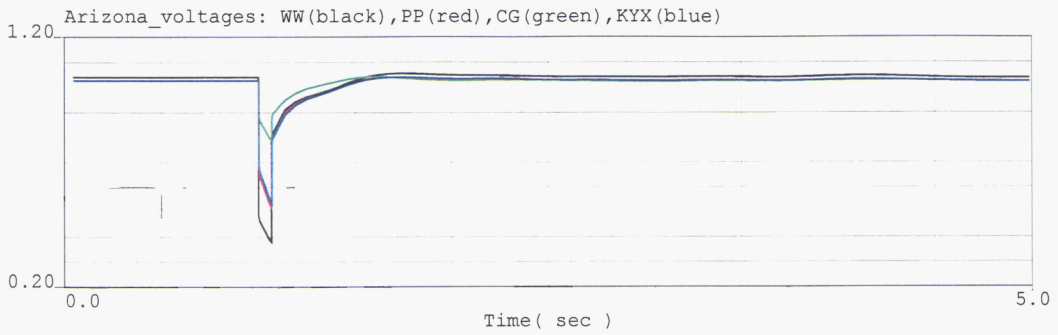


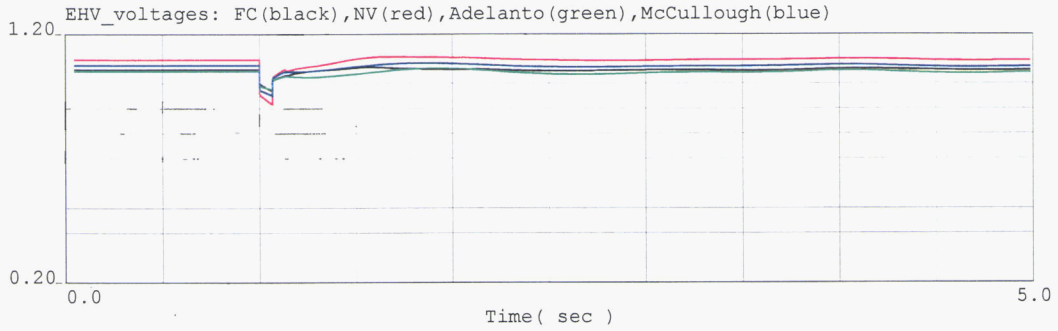


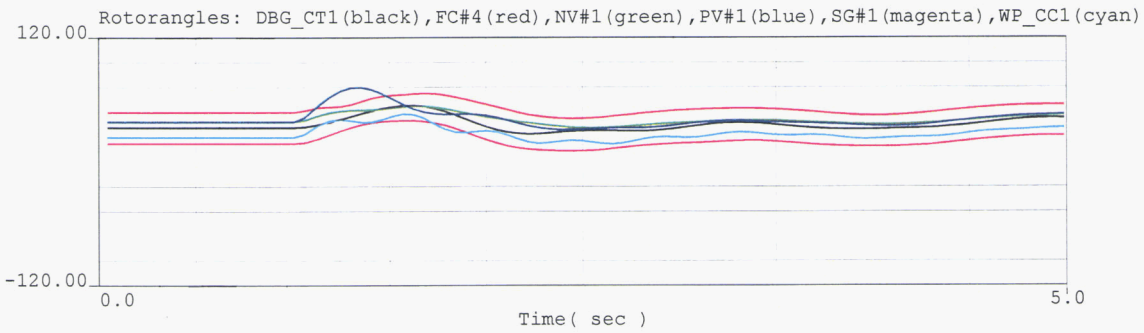


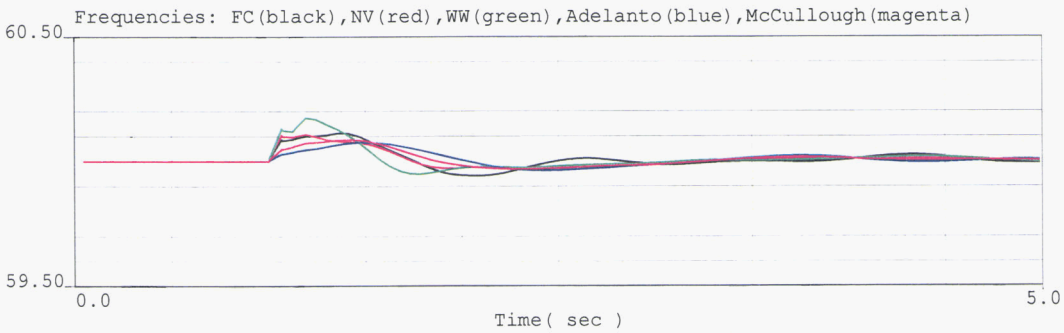


N.GILA FLT NG-IVX. V LINE OUT
NG STAB,3 PH FLT NG500KV;FLASH CAPS;W/4 CYC CLR FLT;
NG-IVX OUT;4/8 CYC REIN CAPS;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

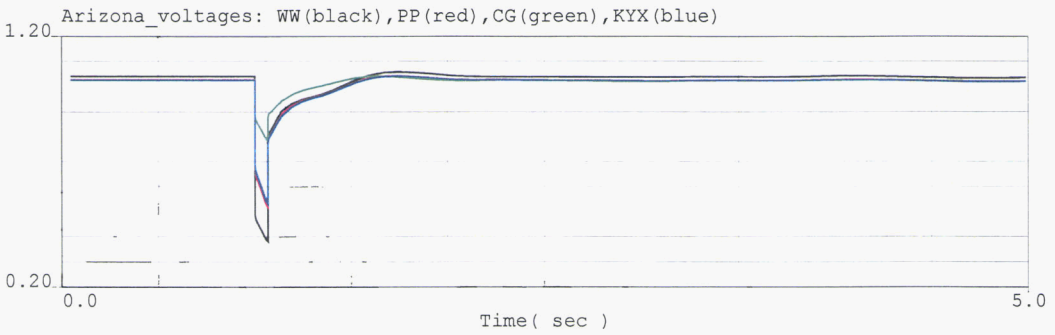


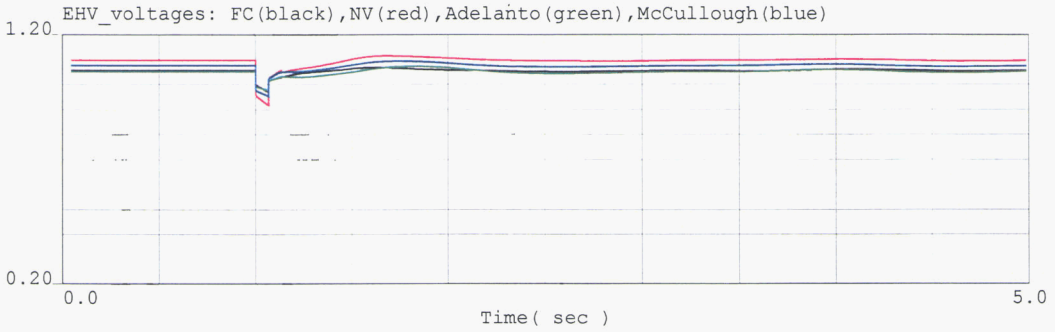


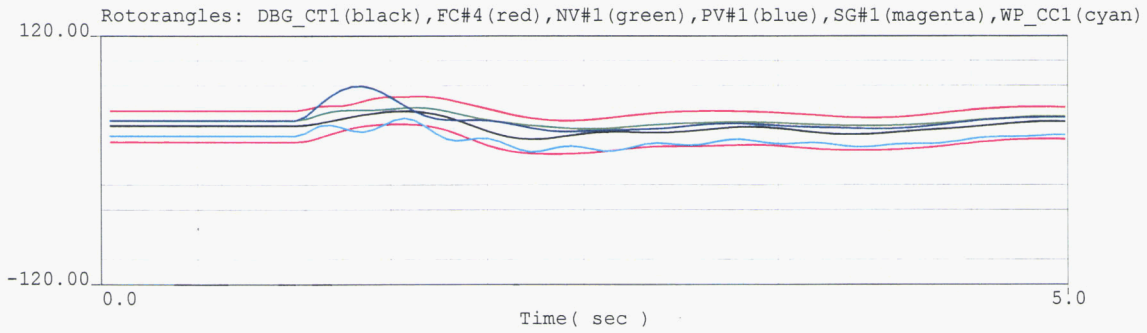


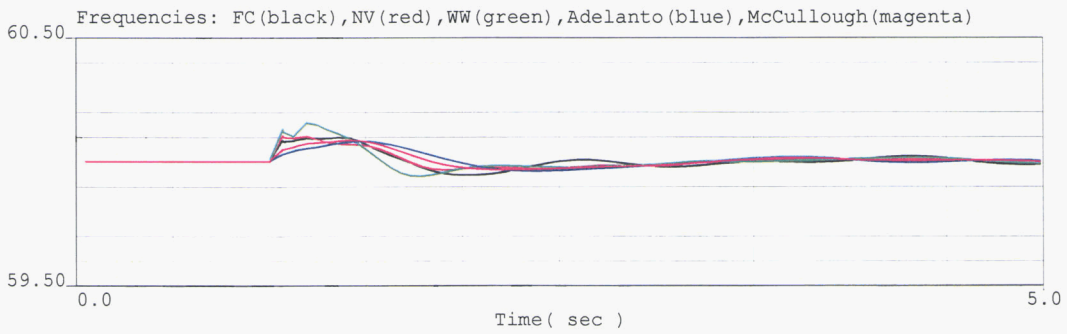


PALO VERDE FLT. w/PLX-DEX line out
PLX-DVX STAB; 1/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-DVX;4/8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

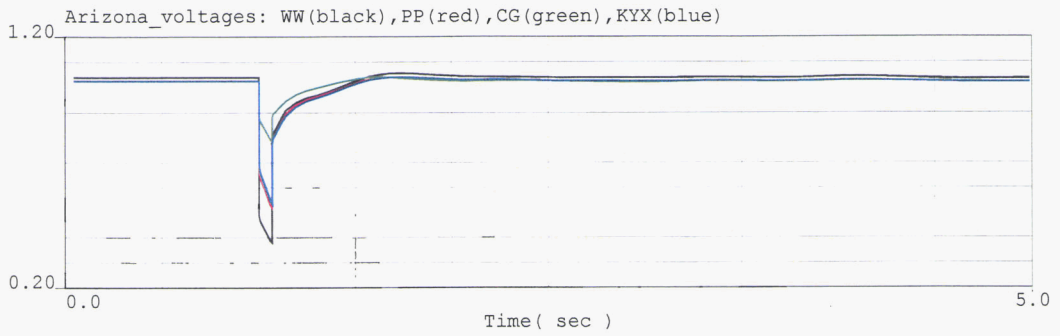


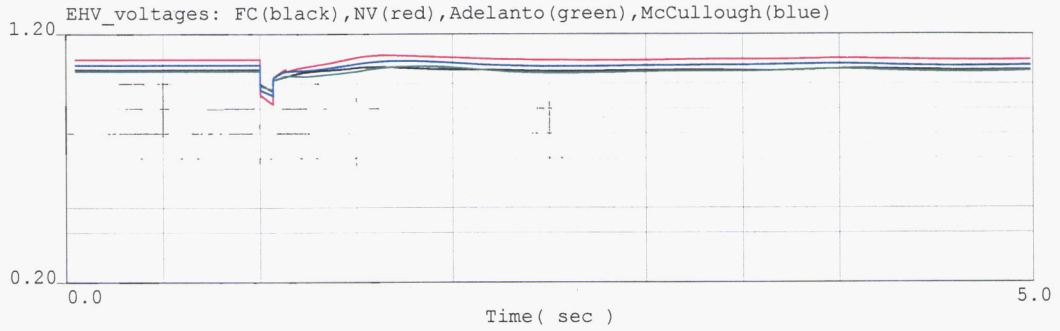


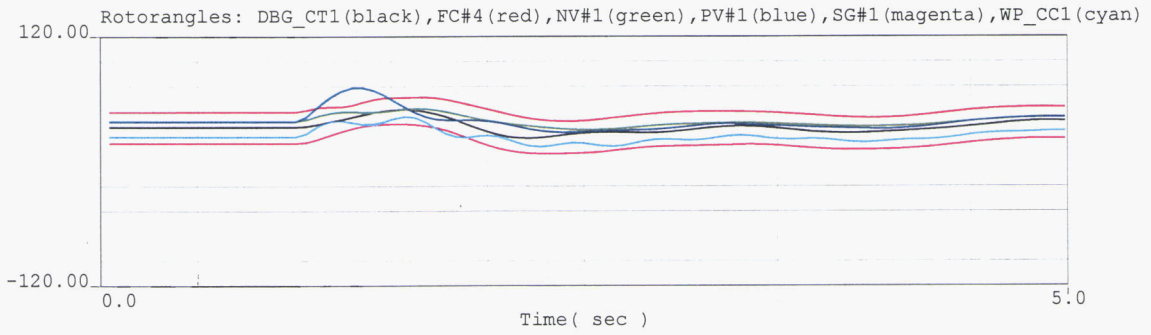


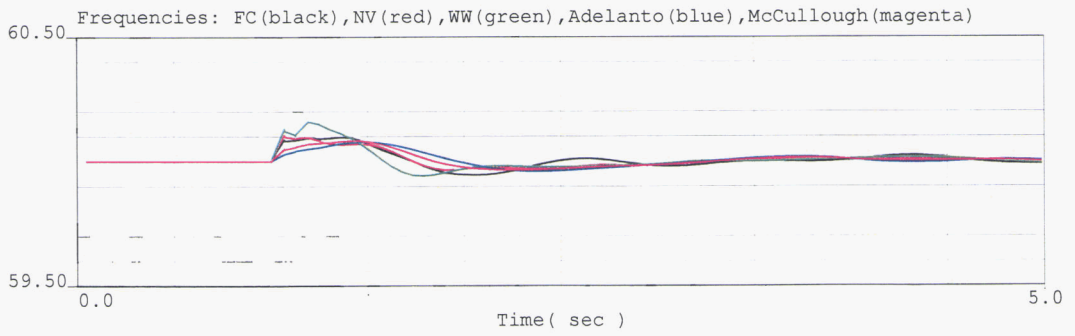


PALO VERDE FLT PLX-RUX LINE OUT
PLX-RUX STAB; 01/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-RUX;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

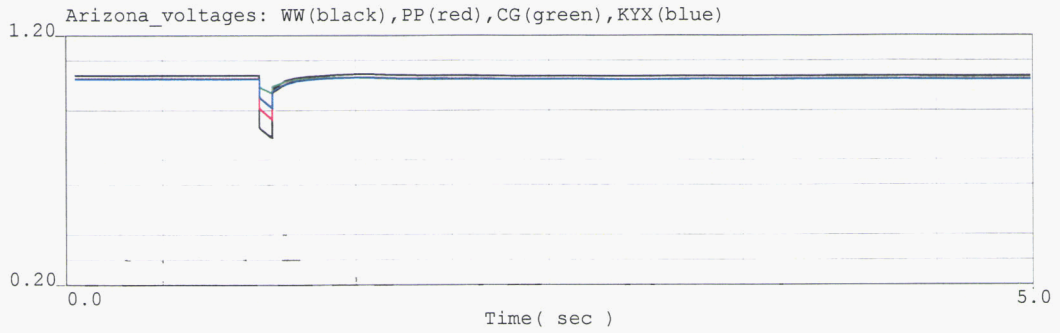


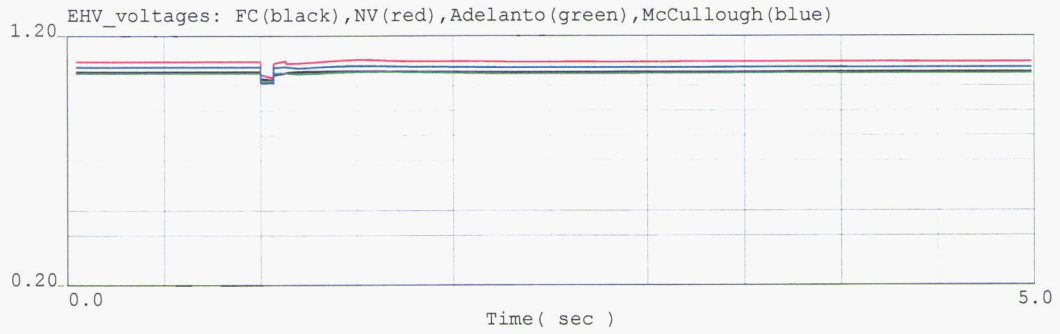


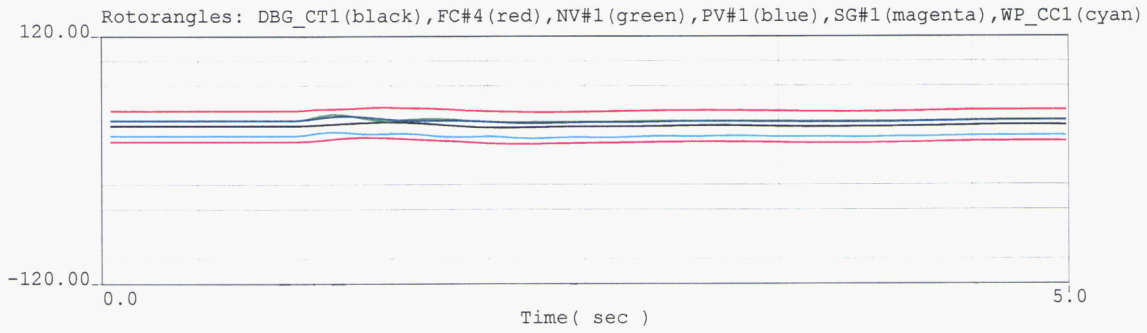


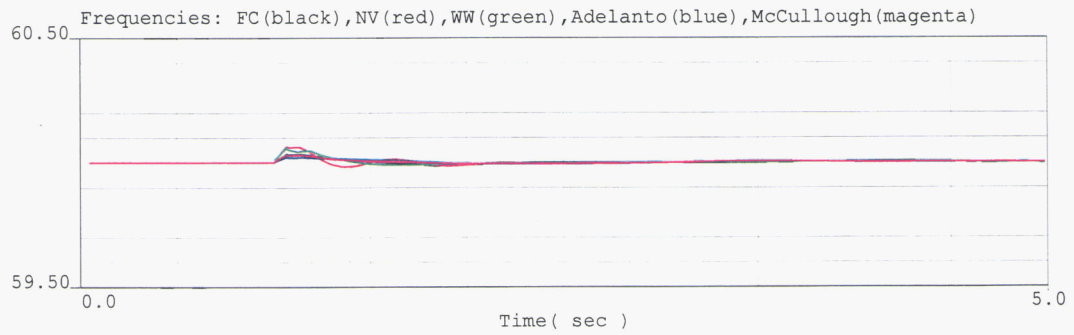


PALO VERDE FLT w/PLX-WW line out
PLX-WW STAB; 1/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-WW;4/8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

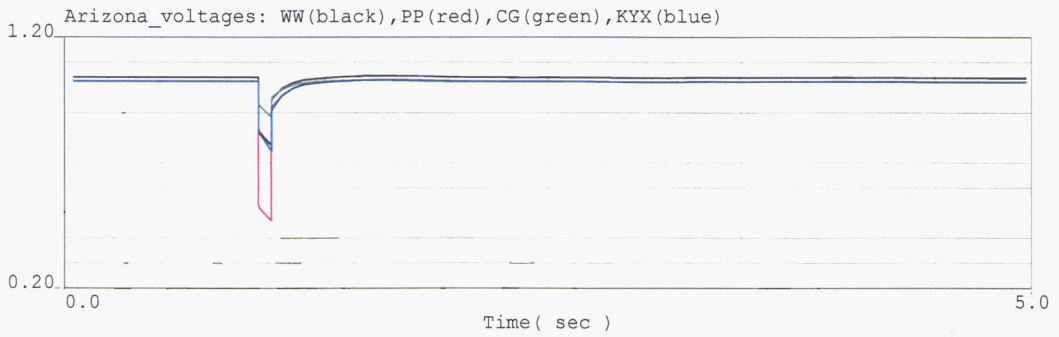


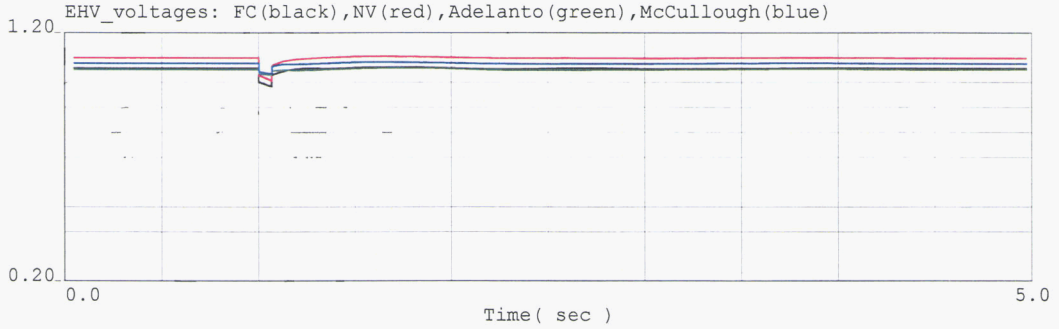


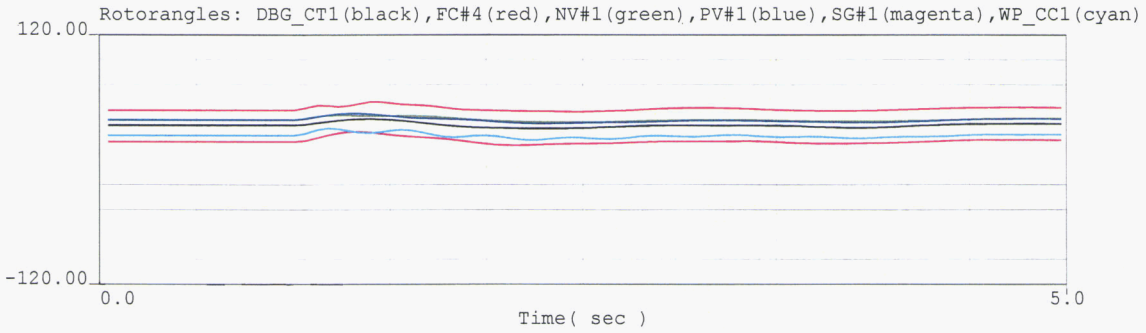


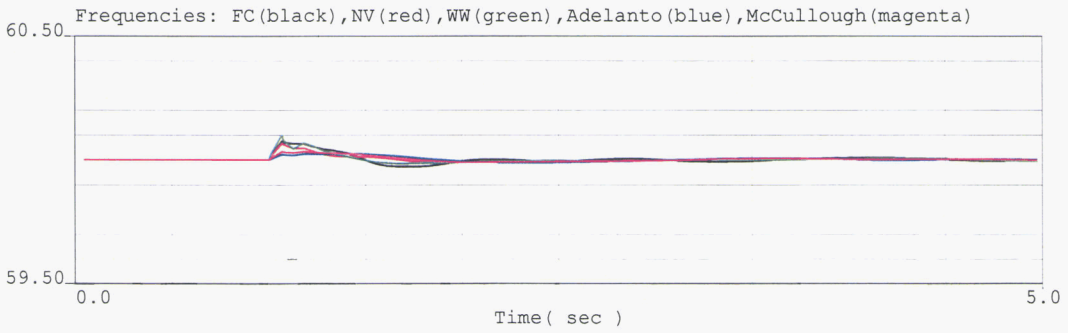


PERKINS FLT PEX-MEX LINE OUT
PEX-MEX STAB; 01/07; T=0 3P FLT PEX500;FLSH CAPS;
4C CLR FLT W/PEX-MEX;8C REIN;2010.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

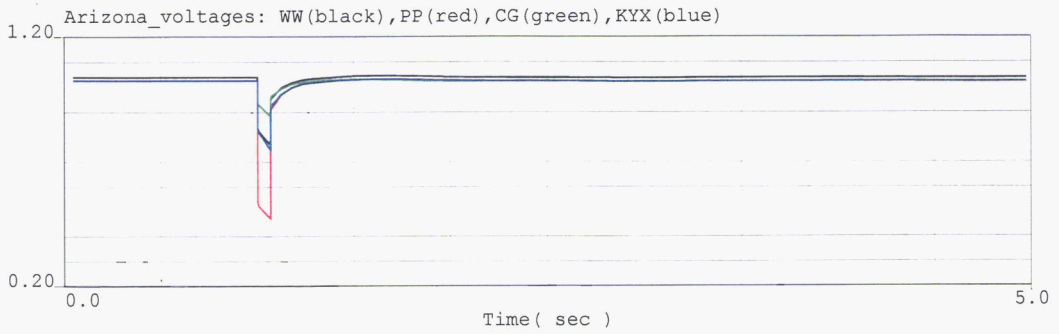


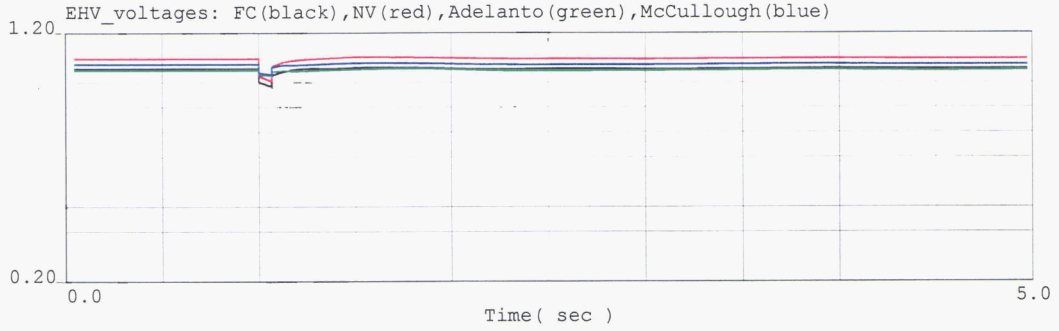


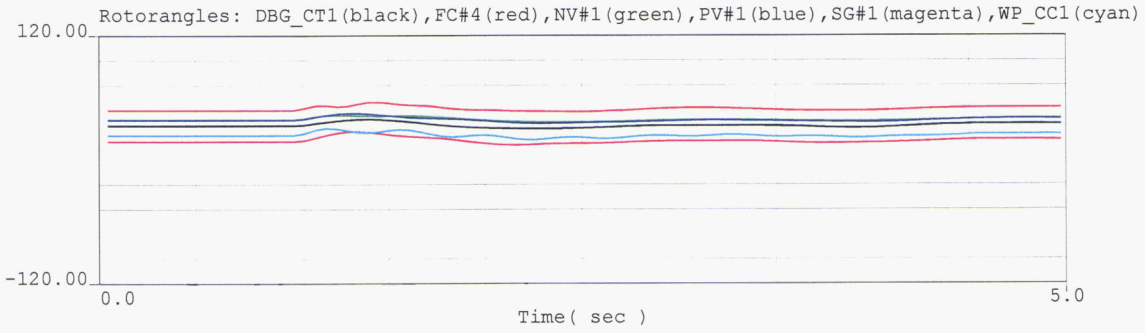


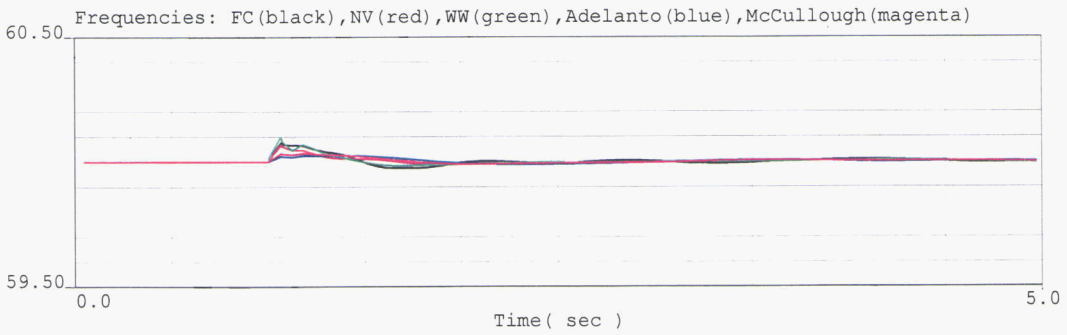


PINNACLE PEAK 345KV FLT PP-CH LINE OUT
2010 HS1A APPROVED BASE CASE
AUGUST 24, 2005
PP-CH STAB; 01/07; T=0 3P FLT PP345;
4C CLR FLT W/PP-CH;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

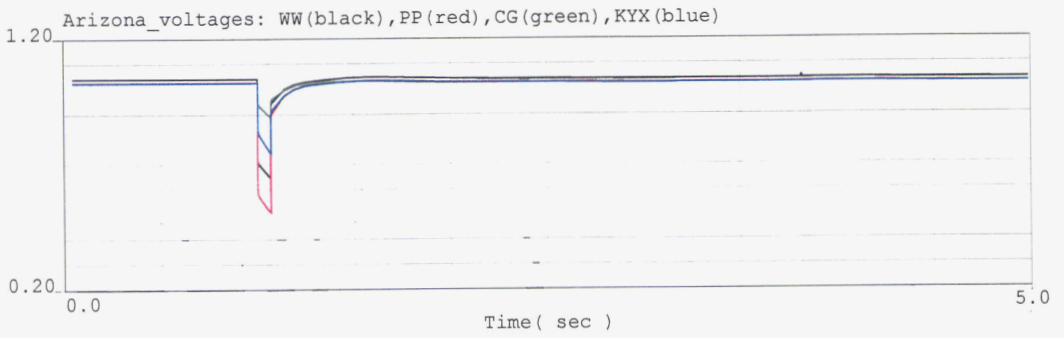


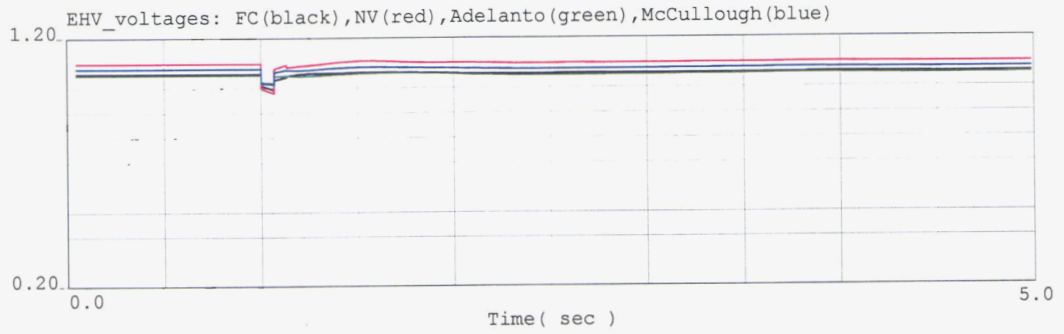


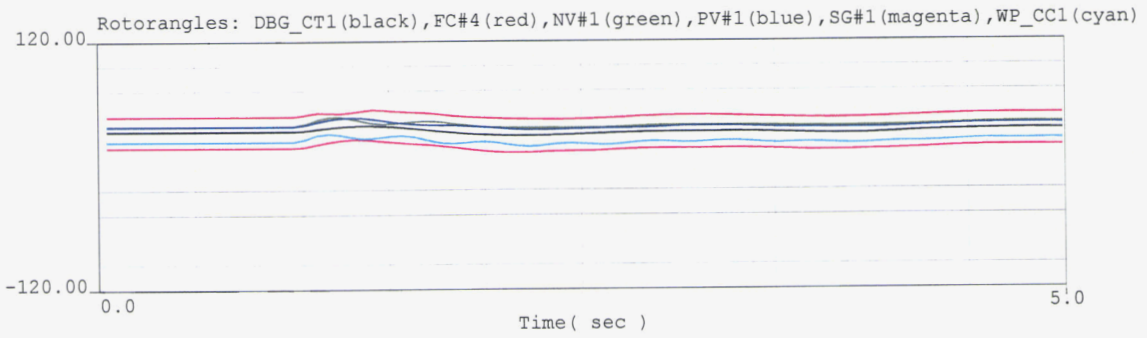


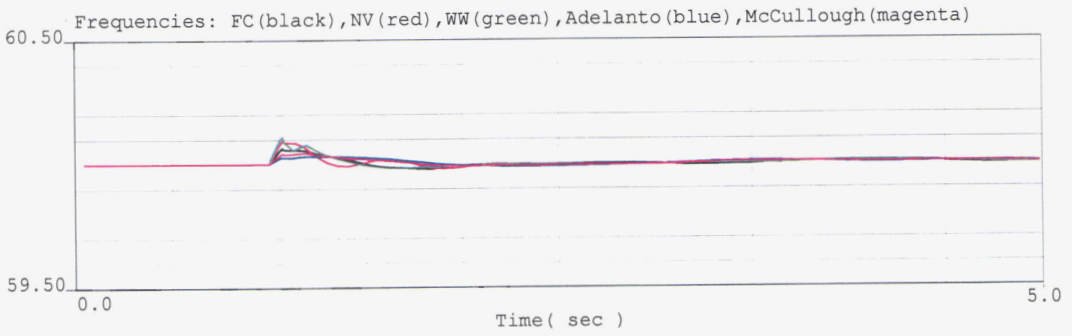


PINNACLE PEAK 345KV FLT PP-PC LINE OUT
PP-PC STAB; 01/07; T=0 3P FLT PP345;
4C CLR FLT W/PP-PC;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

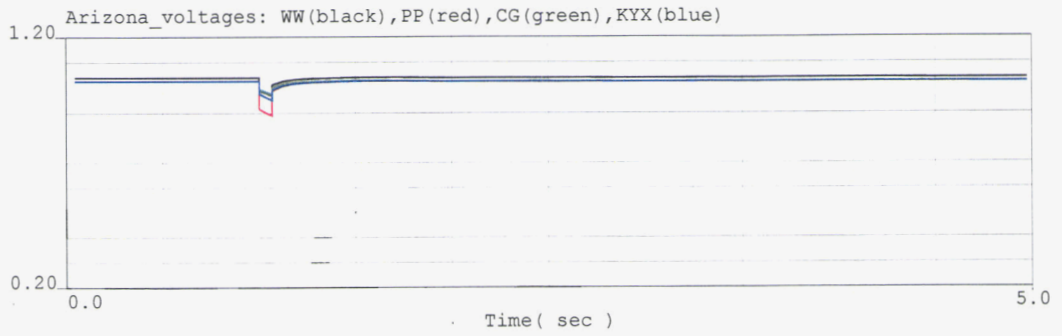


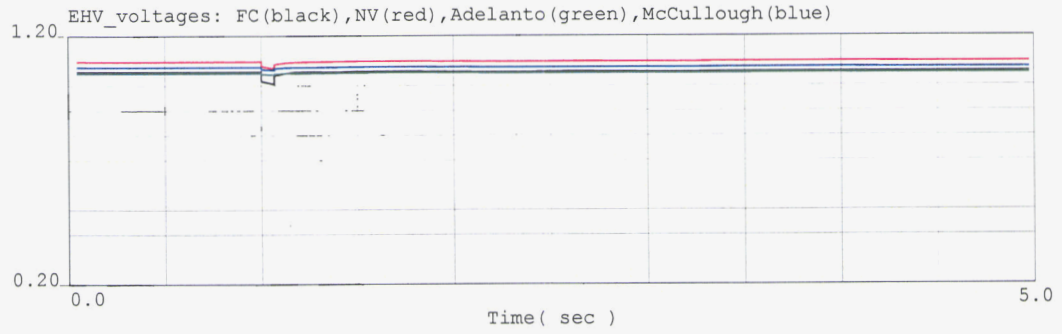


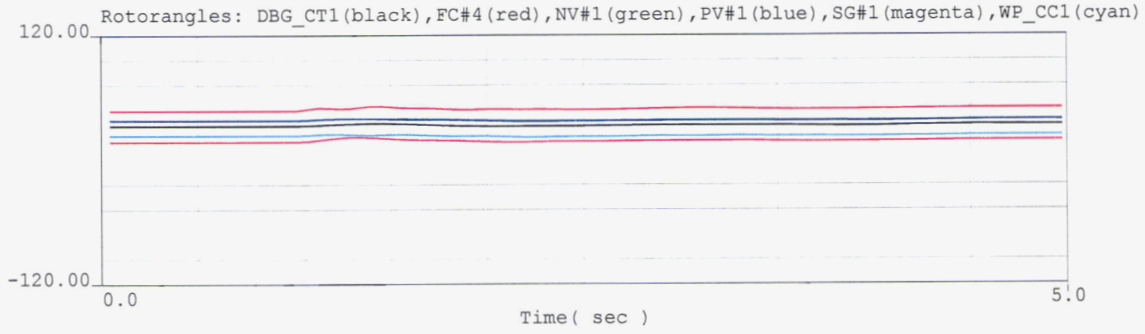


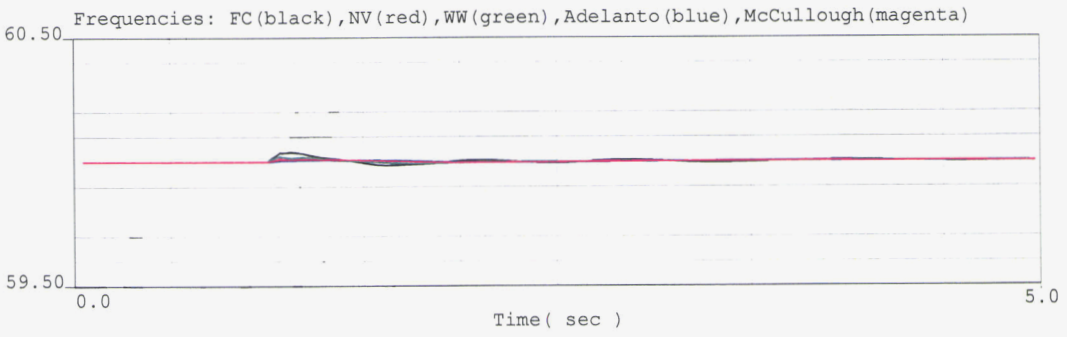


PINNACLE PEAK FLT. PP-TS9 line out
PP-TS9 STAB; 1/07; T=0 3P FLT PP500;FLSH CAPS;
4C CLR FLT W/PP-TS9;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

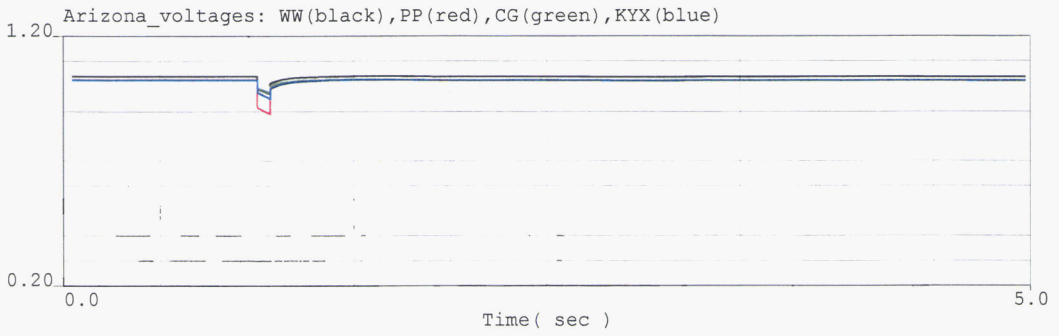


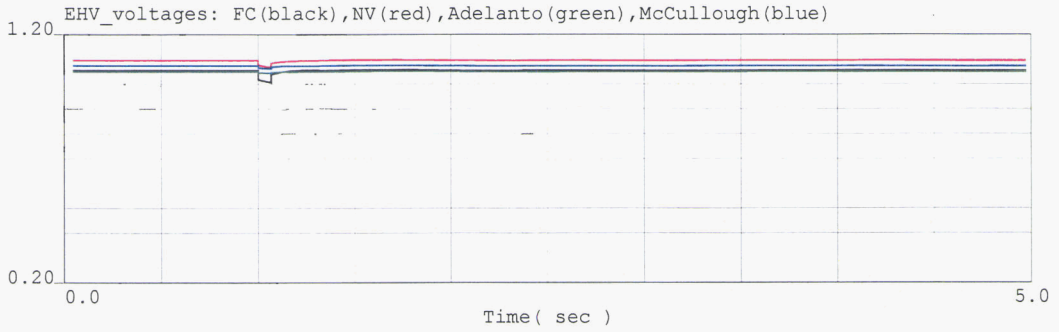


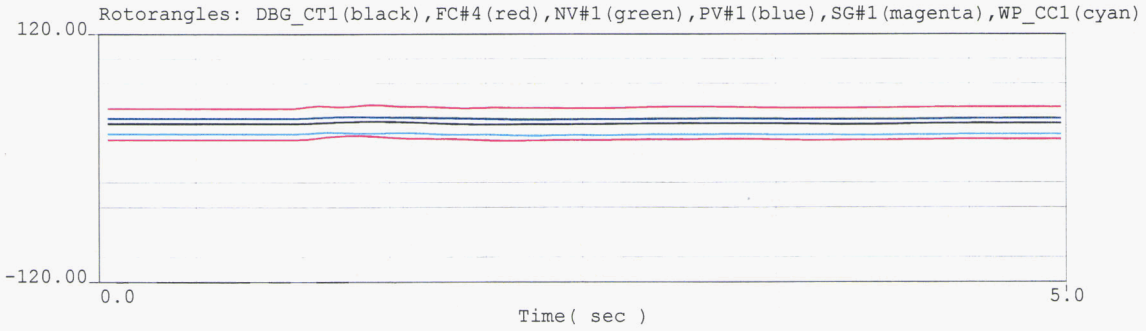


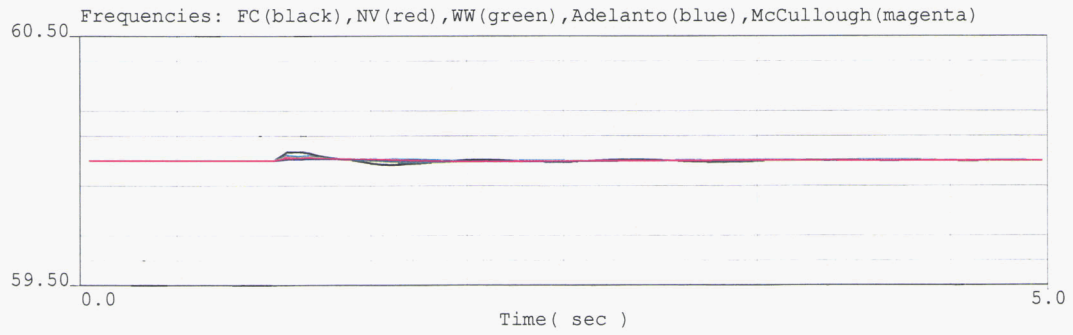


PREACHER CANYON 345KV FLT PC-CH LINE OUT
PC-CH STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/PC-CH;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.









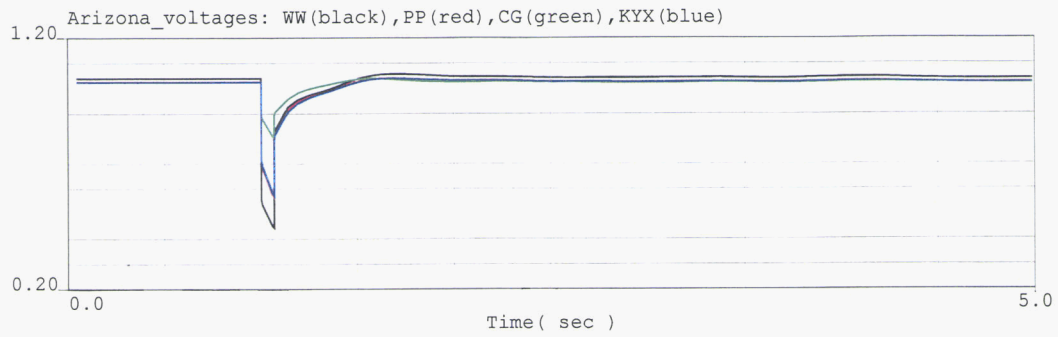
PREACHER CANYON 345KV FLT PC-PP LINE OUT
2010 HS1A APPROVED BASE CASE
AUGUST 24, 2005
PC-PP STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/PC-PP;2010.dyd;WSCC.bpt

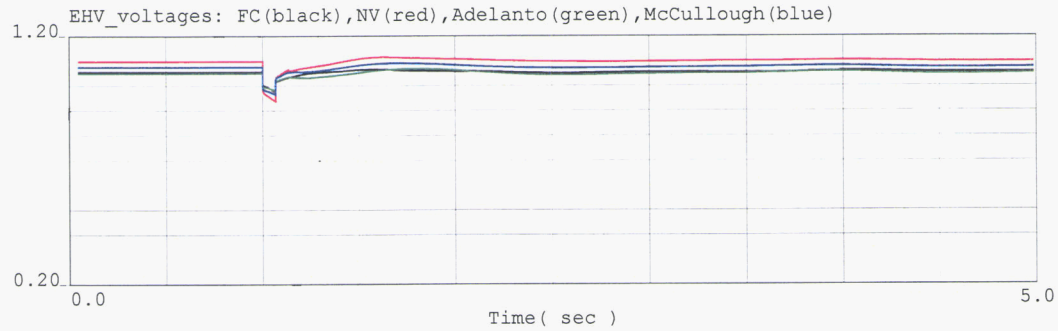
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

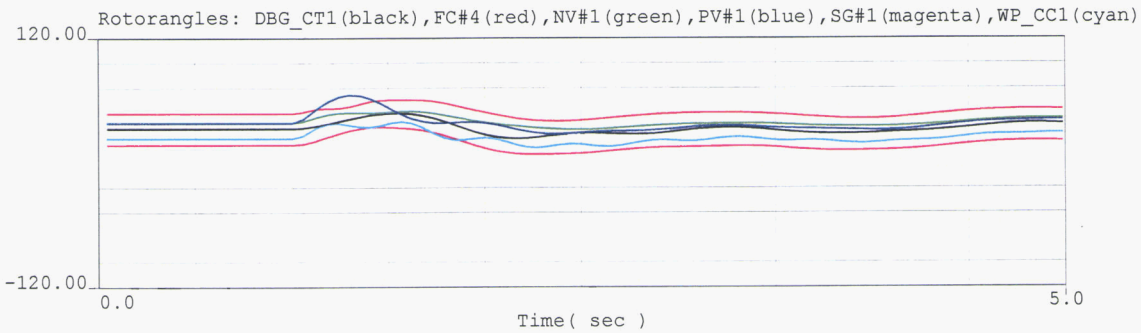
pc_pp.chf

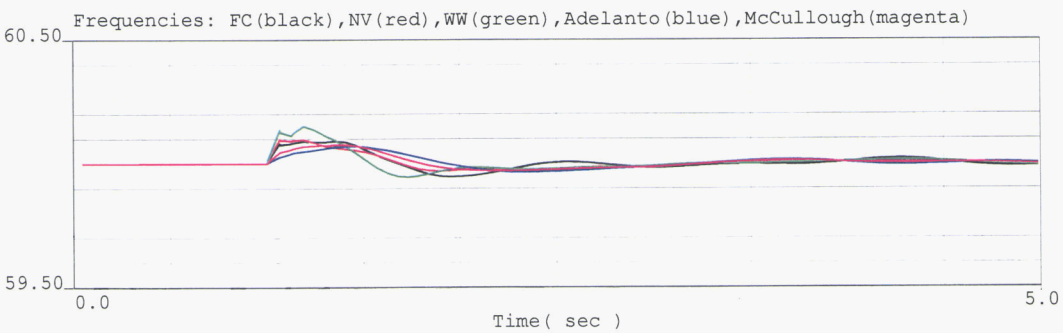
c:\upslf152\mypslf

Mon Jan 22 12:52:45 2007

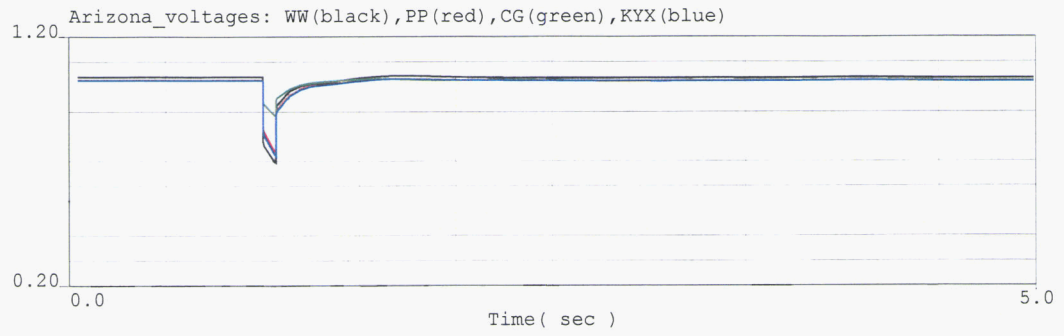


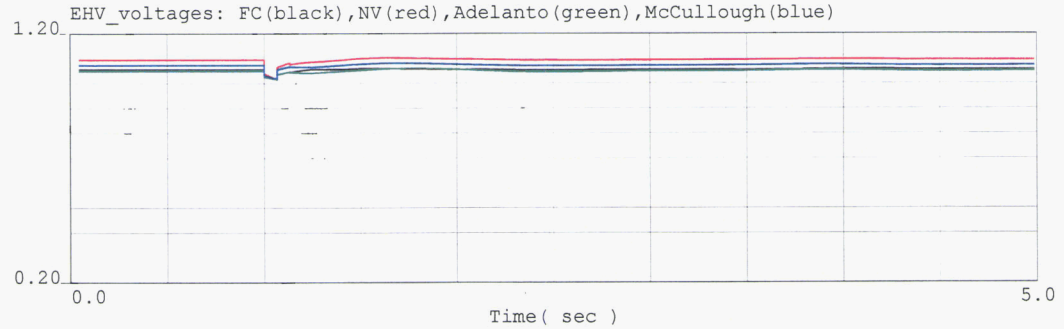


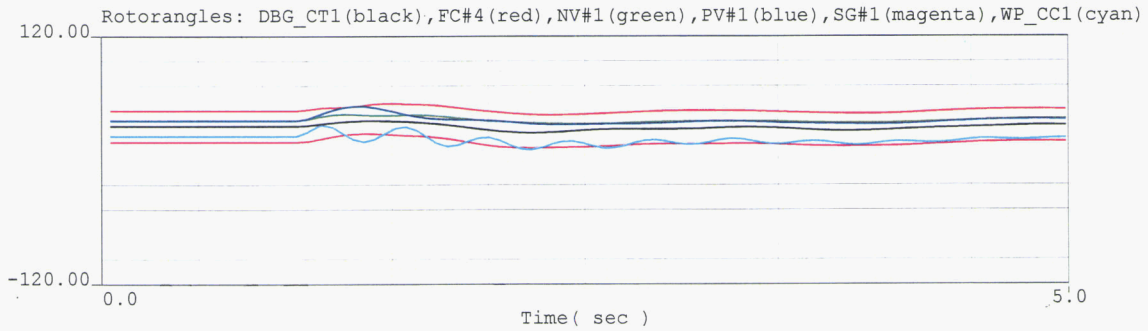


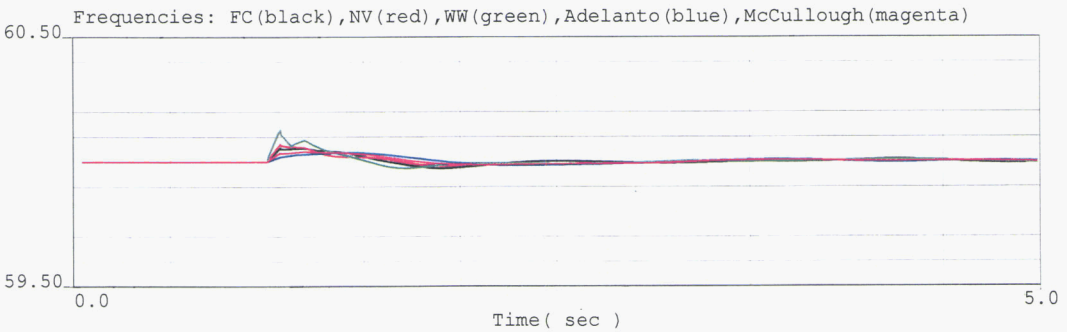


REDHAWK FLT RDHK-HAAX LINE OUT
RHK-HAAX STAB; 01/07; T=0 3P FLT RHK;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RHK-HAAX #1;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

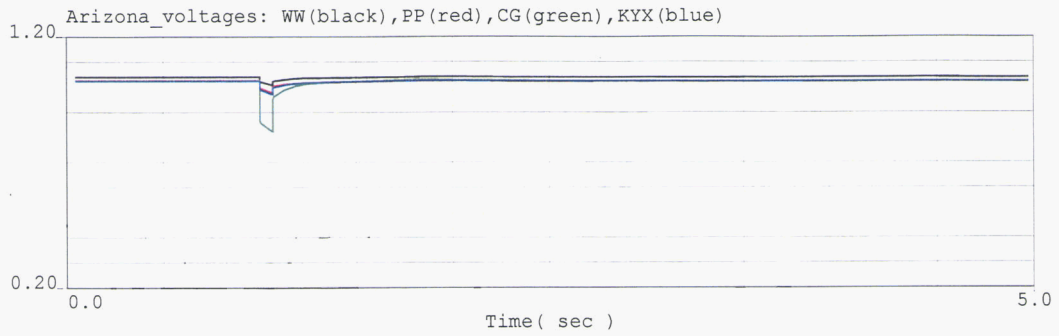


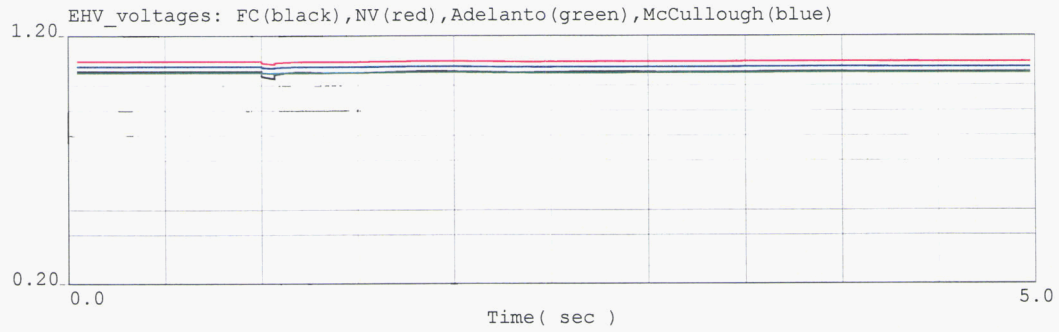


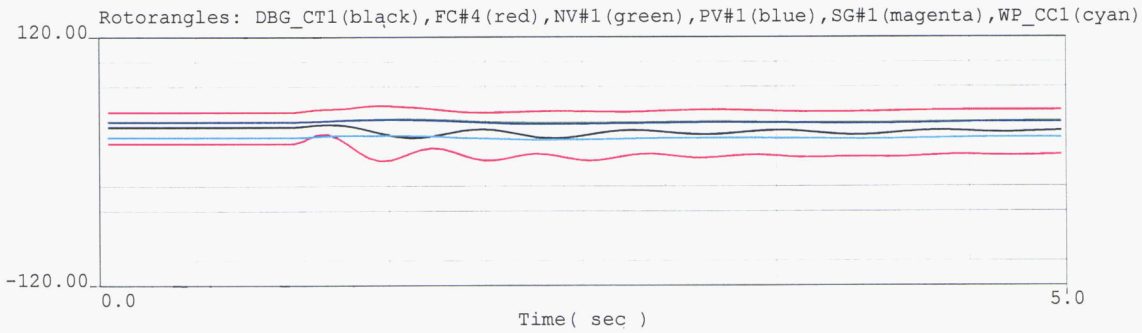


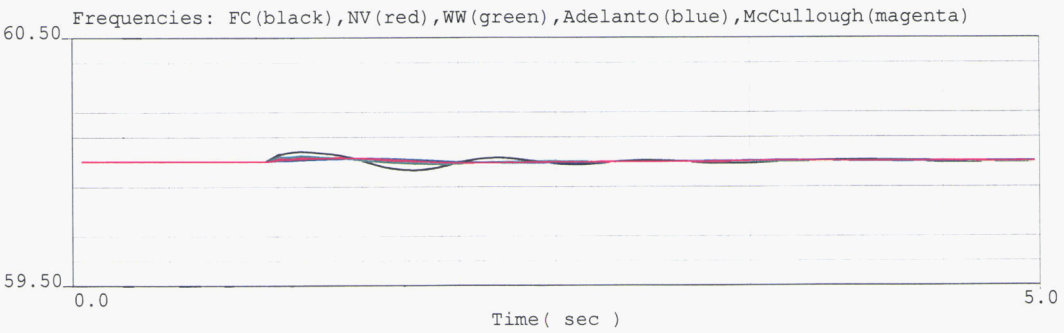


RUDD FLT RUX-PLX LINE OUT
RUX-PLX STAB #1; 01/07; T=0 3P FLT RUX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RUX-PLX;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

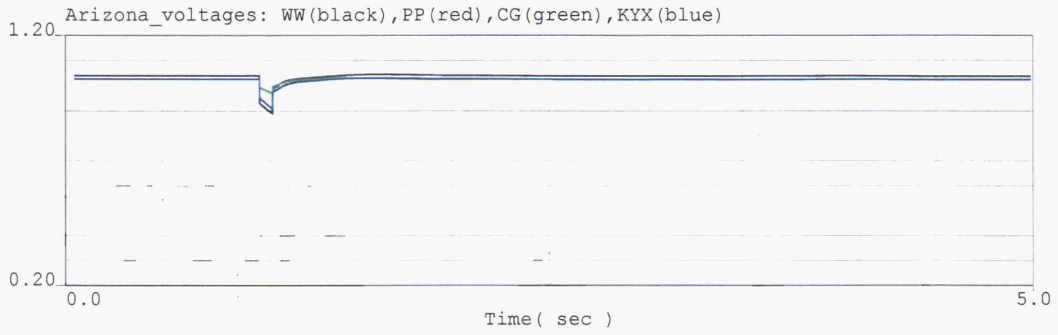


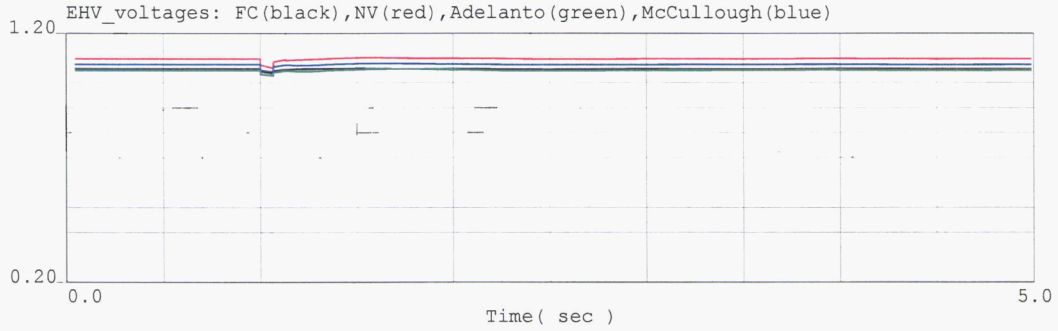


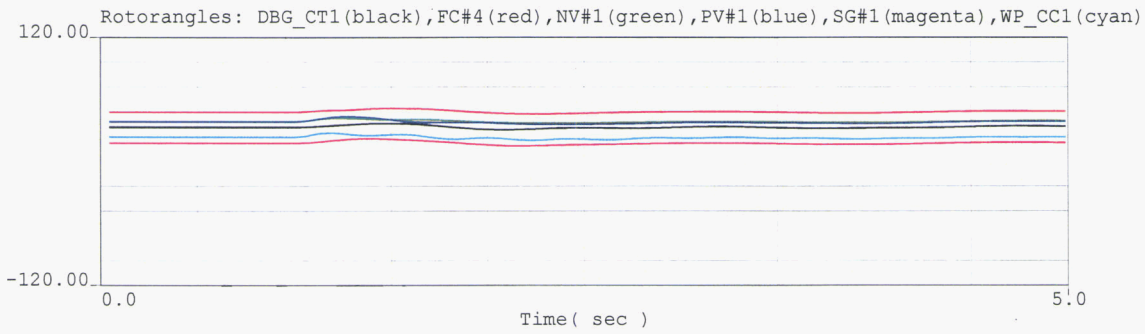


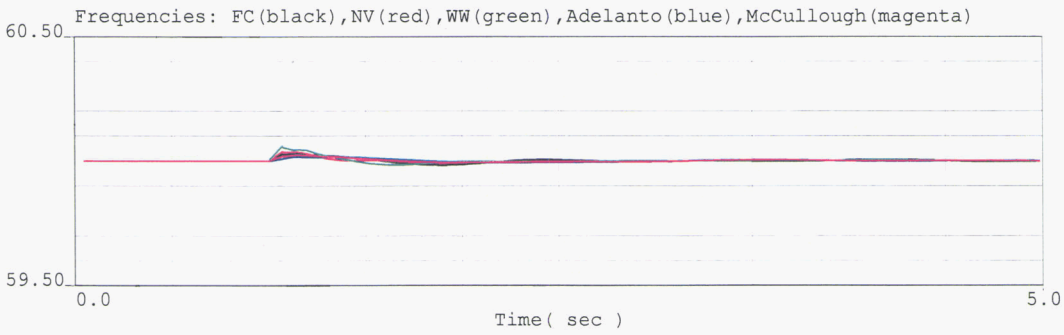


SAGUARO FLT SG-CH LINE OUT
SG-CH STAB; 01/07; T=0 3P FLT SG500;FLSH CAPS;
4C CLR FLT W/SG-CH;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

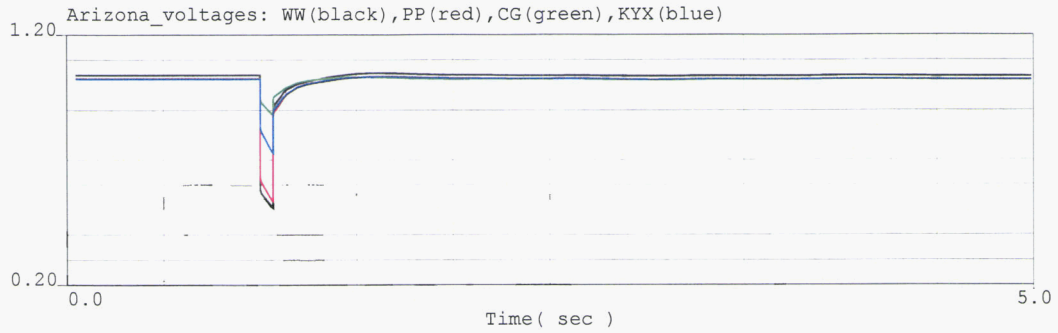


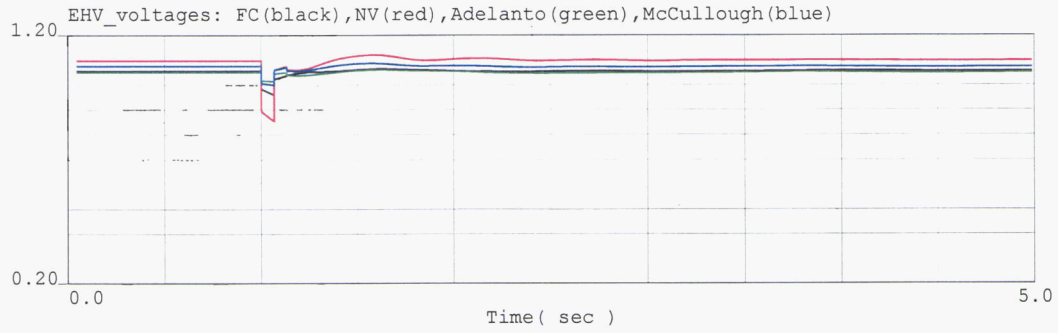


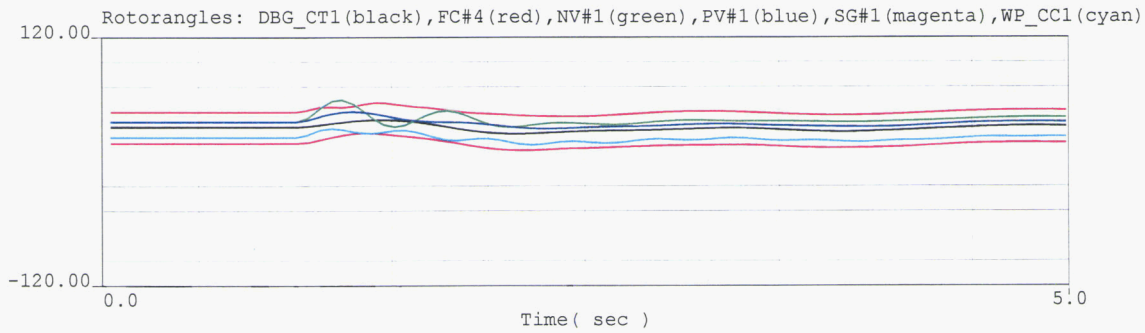


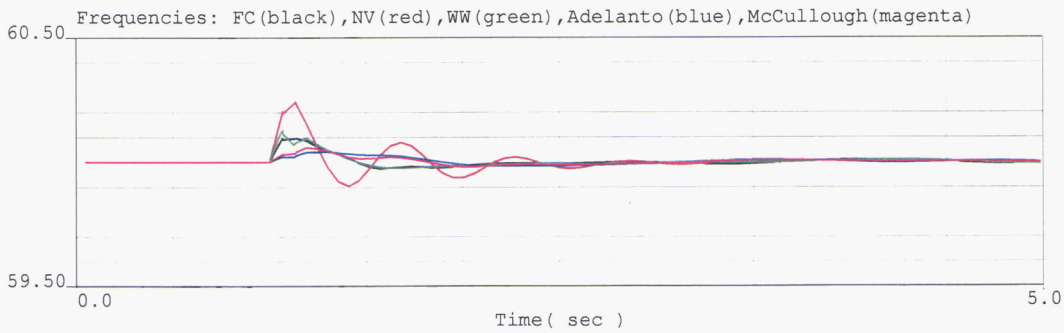


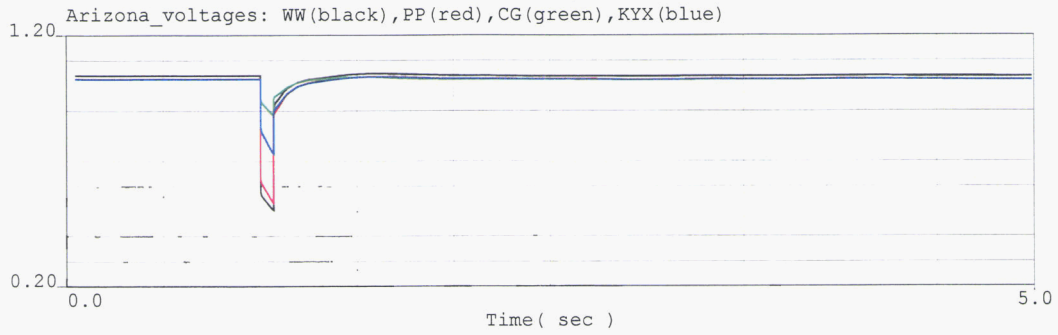
TS5 FLT TS5-HQJ LINE OUT
TS5-HQJ STAB; 01/07; T=0 3P FLT TS5500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/TS5-HQJ;4/8C REIN;2010.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

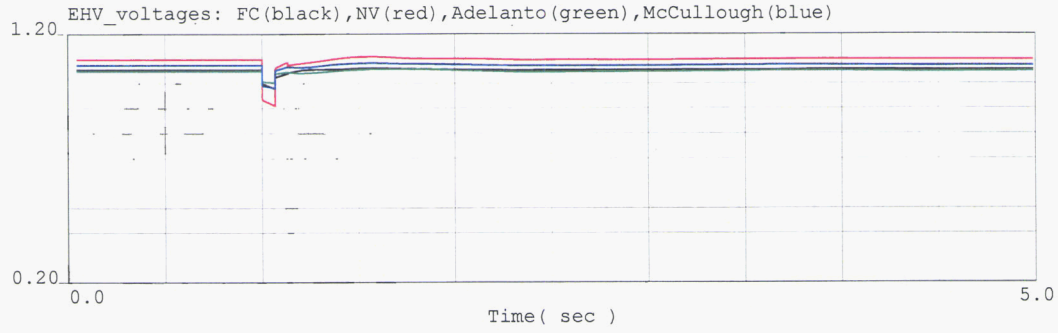

Arizona_voltages: WW(black),PP(red),CG(green),KYX(blue)
1.20
0.20
0.0
5.0
Time(sec)

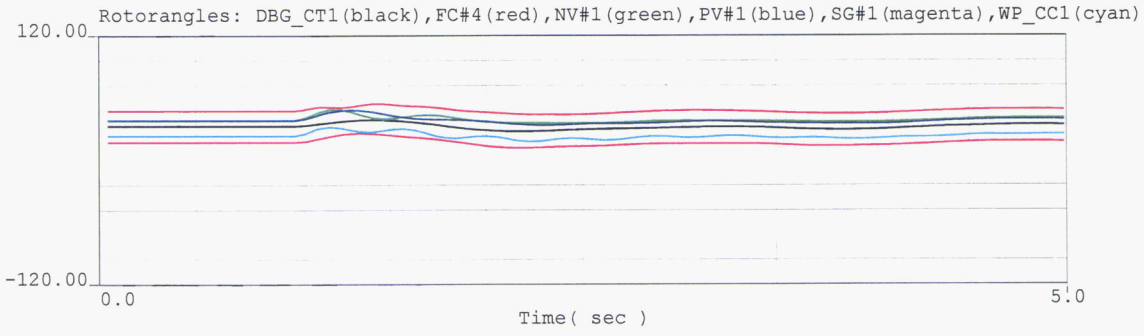

EHV_voltages: FC(black),NV(red),Adelanto(green),McCullough(blue)
1.20
0.20
0.0
5.0
Time(sec)

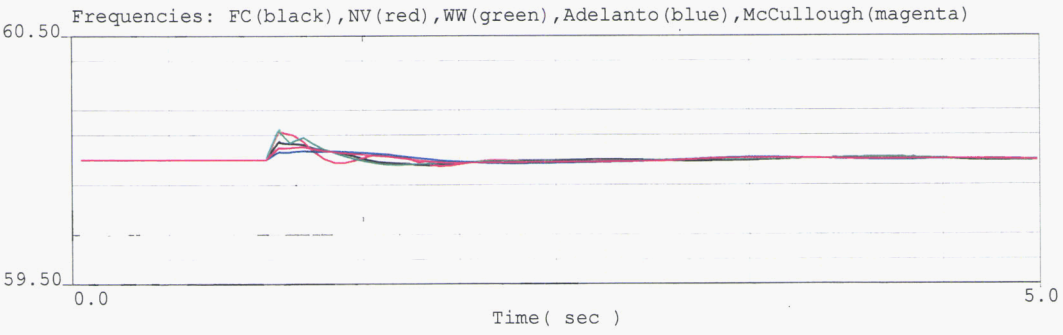

Rotorangles: DBG_CT1(black),FC#4(red),NV#1(green),PV#1(blue),SG#1(magenta),WP_CC1(cyan)
120.00
-120.00
0.0
5.0
Time(sec)


Frequencies: FC(black),NV(red),WW(green),Adelanto(blue),McCullough(magenta)
60.50
59.50
0.0
5.0
Time(sec)

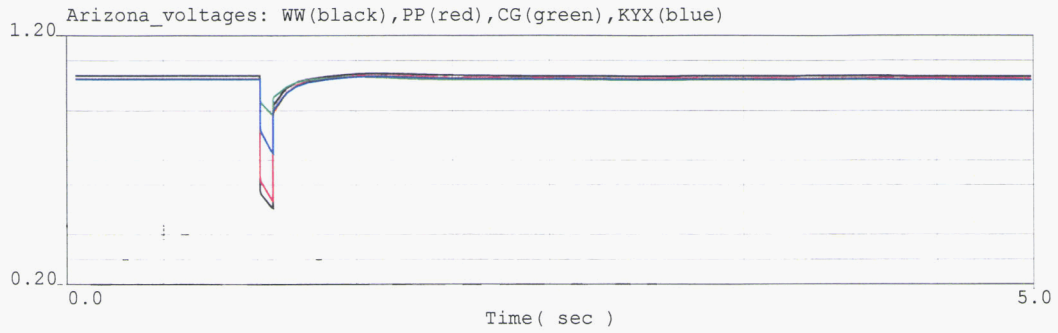


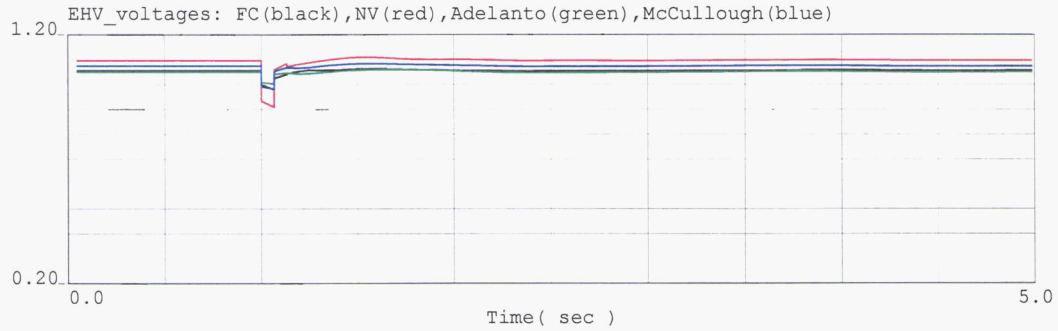


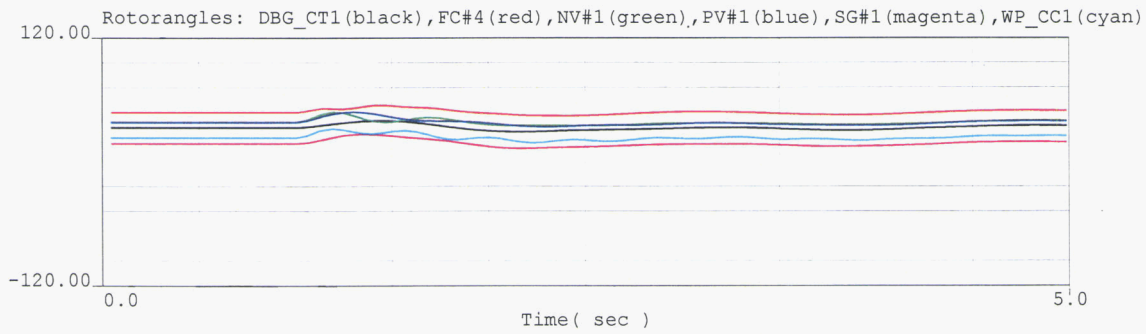


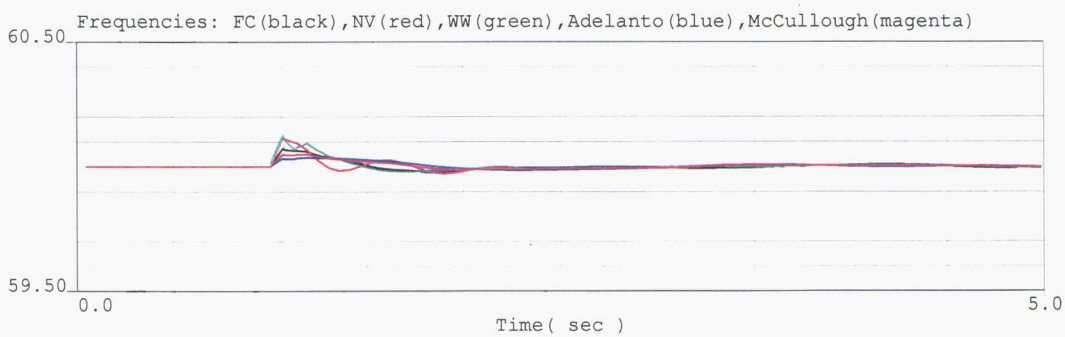


RACEWAY FLT. RY-PP line out
RY-PP STAB; 1/07; T=0 3P FLT RY500;FLSH CAPS;
4C CLR FLT W/RY-PP;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

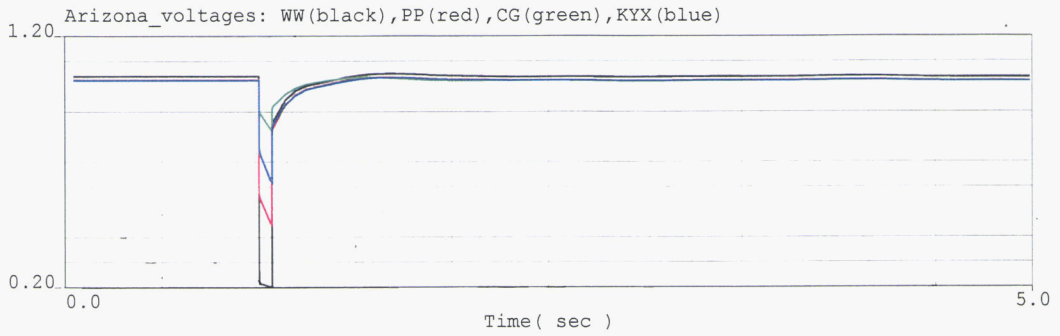


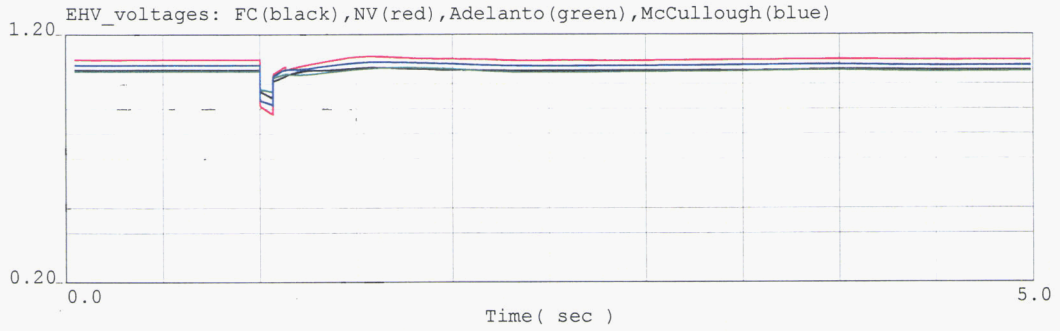


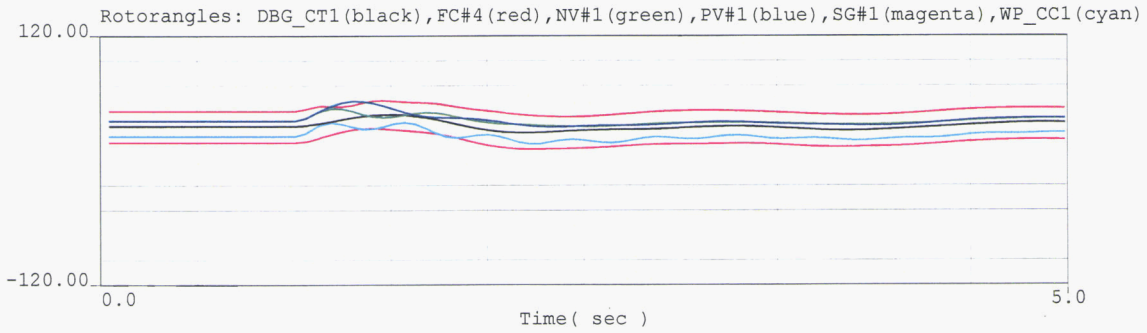


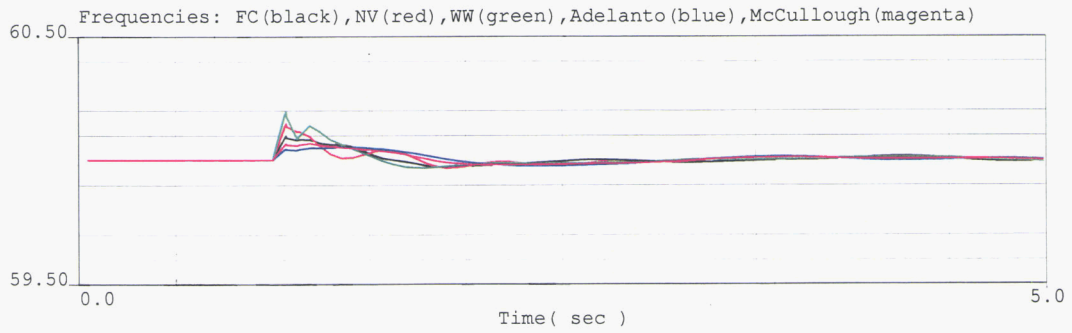


RACEWAY FLT. RY-WW line out
RY-WW STAB; 1/07; T=0 3P FLT RY500;FLSH CAPS;
4C CLR FLT W/RY-WW;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

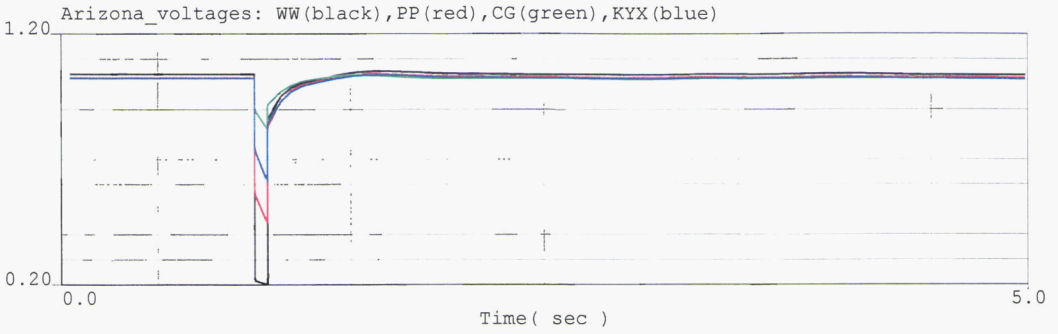


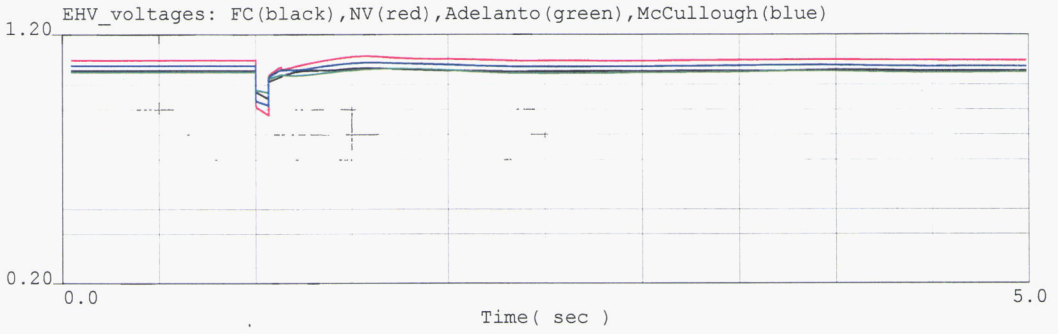


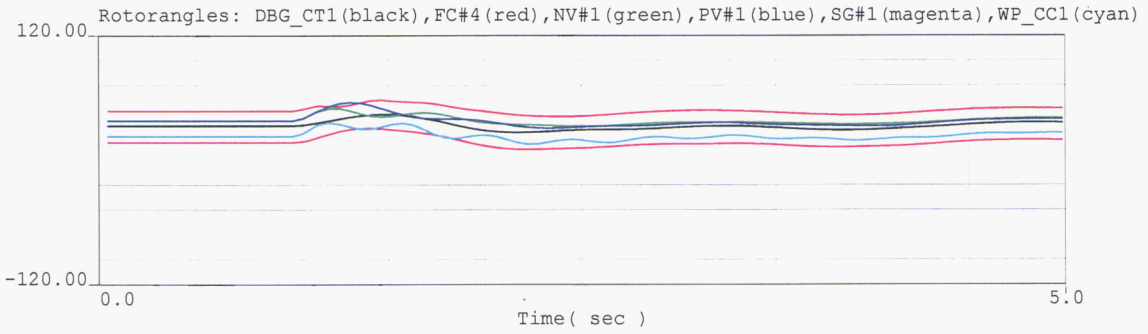


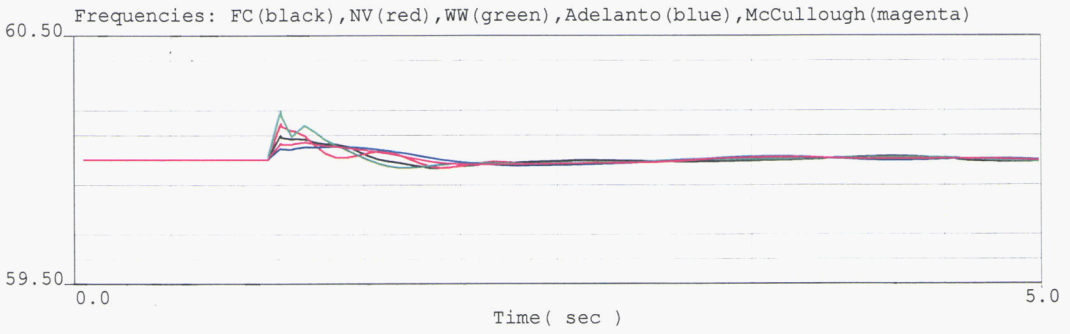


WESTWING FLT. WW-PLX line out
WW-PLX STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-PLX;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

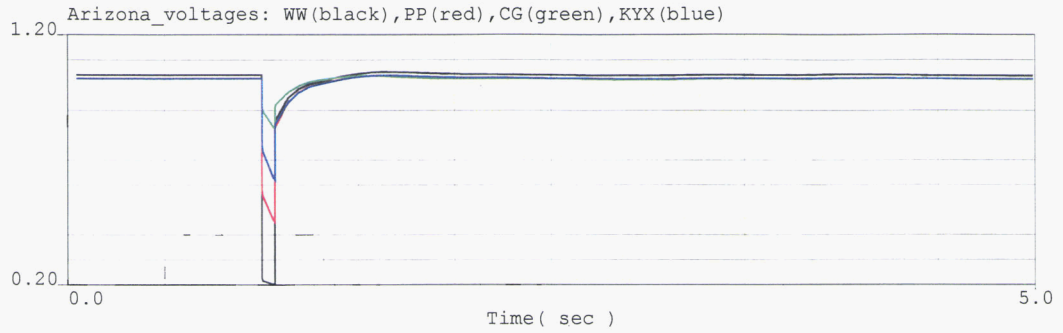


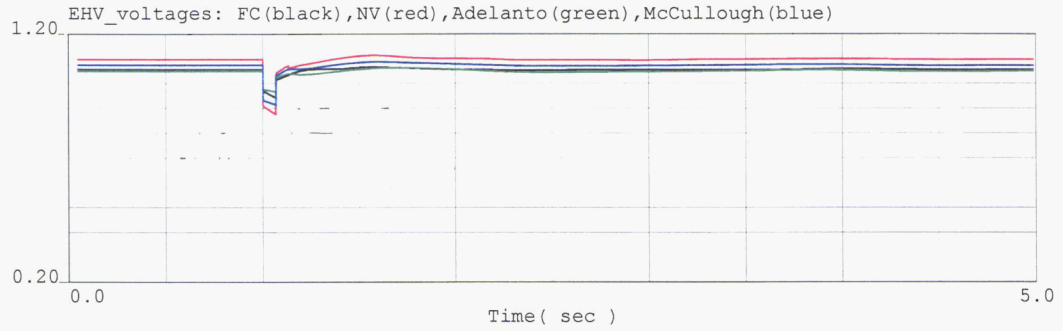


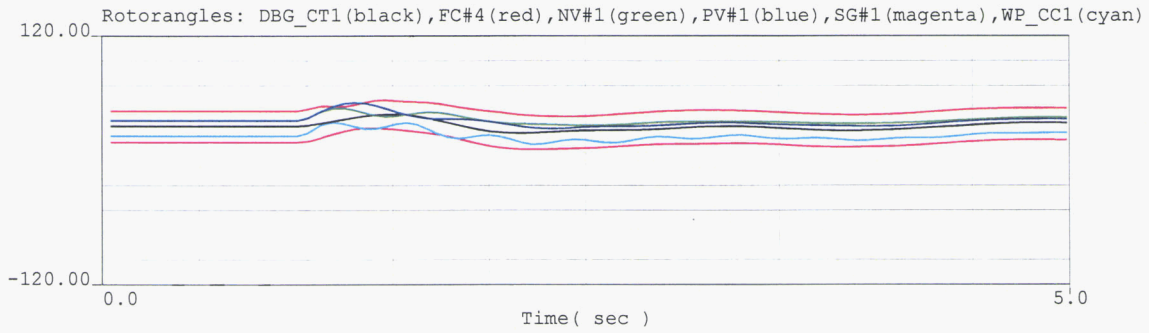


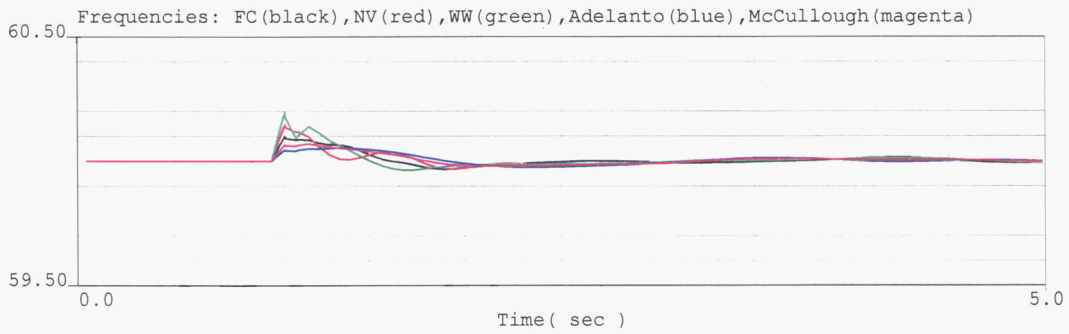


WESTWING FLT. WW-RY line out
WW-RY STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-RY;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

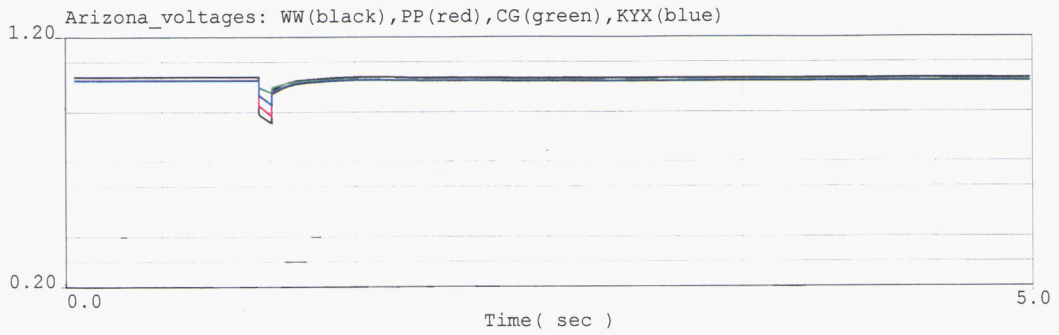


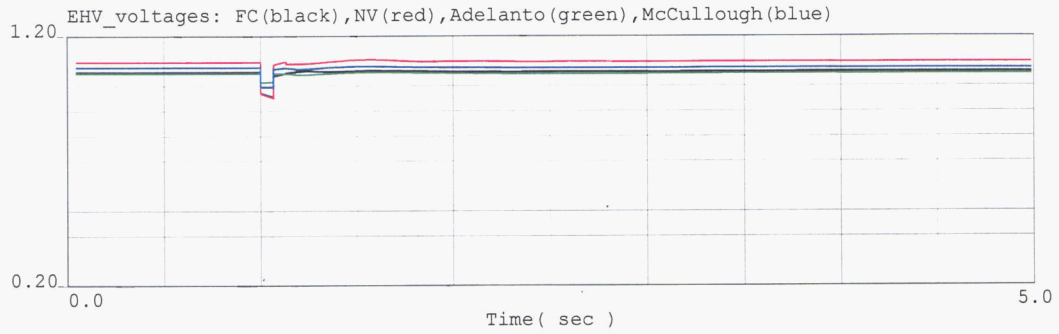


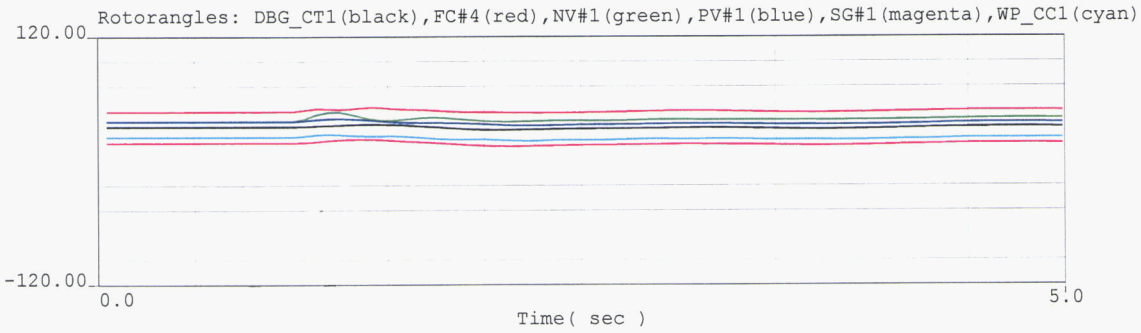


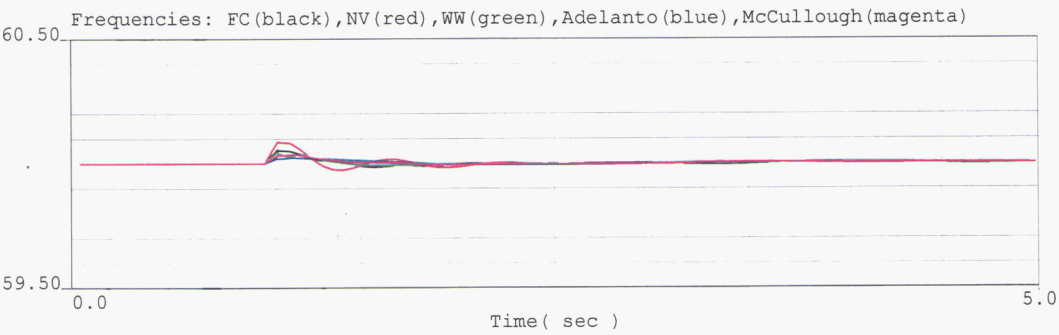


WESTWING FLT. WW-YP line out
WW-YP STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-YP;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

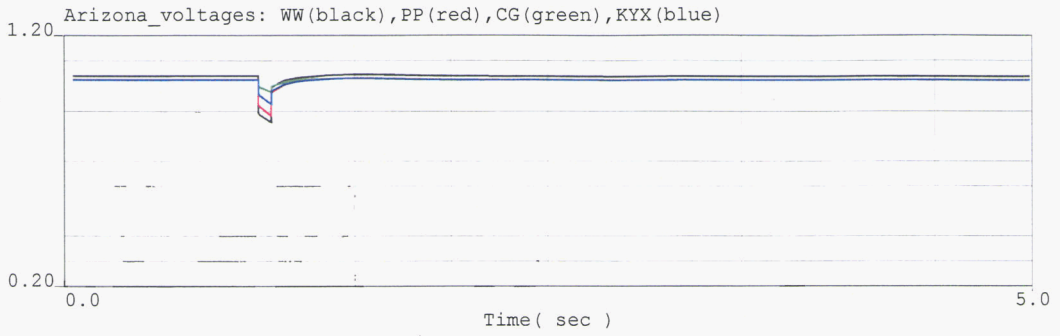


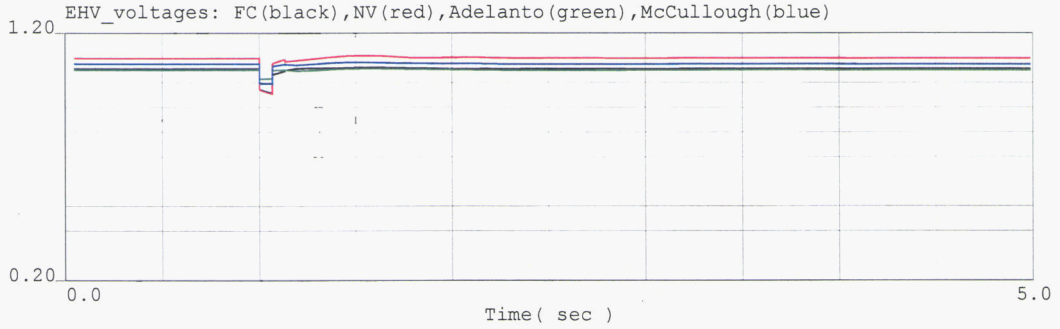


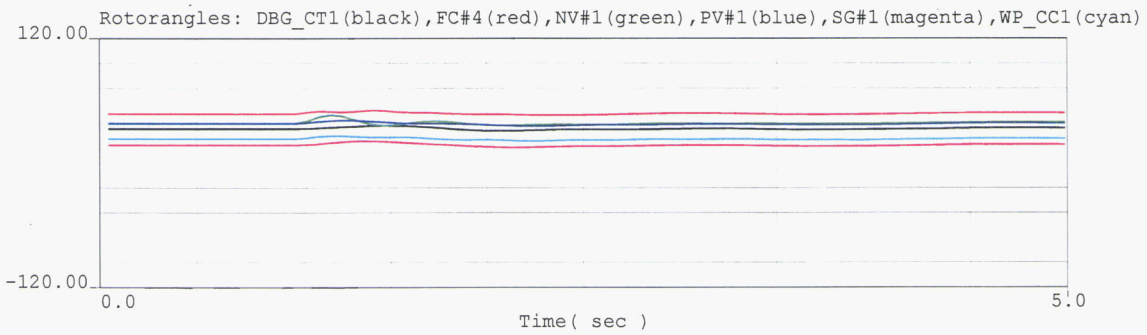


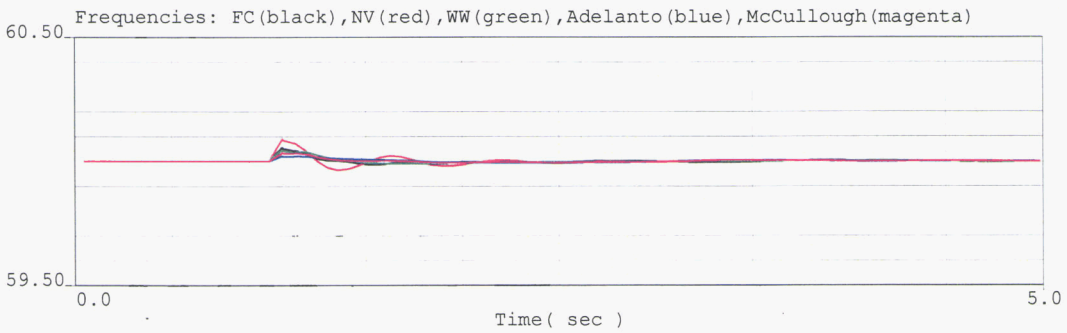


YAVAPAI FLT. YP-MK line out
YP STAB; 1/07; T=0 3P FLT YP500;FLSH CAPS;
4C CLR FLT W/YP-MK;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.









YAVAPAI FLT. YP-WW line out
YP STAB; 1/07; T=0 3P FLT YP500;FLSH CAPS;
4C CLR FLT W/YP-WW;8C REIN;2010.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW ARE ADDED.

APPENDIX C

2016
Stability Plots

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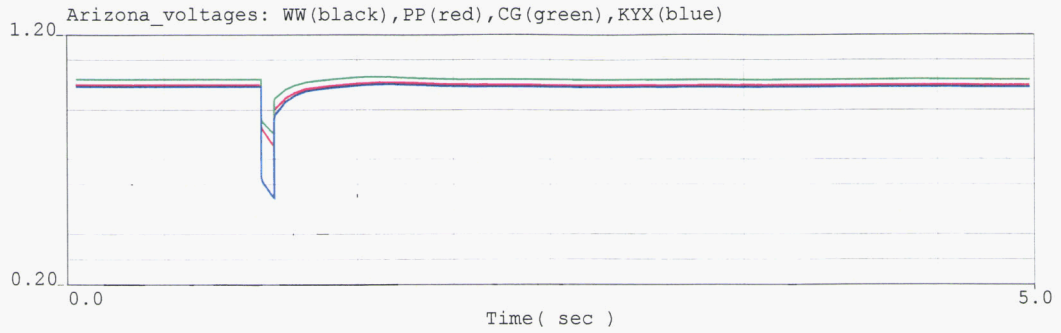
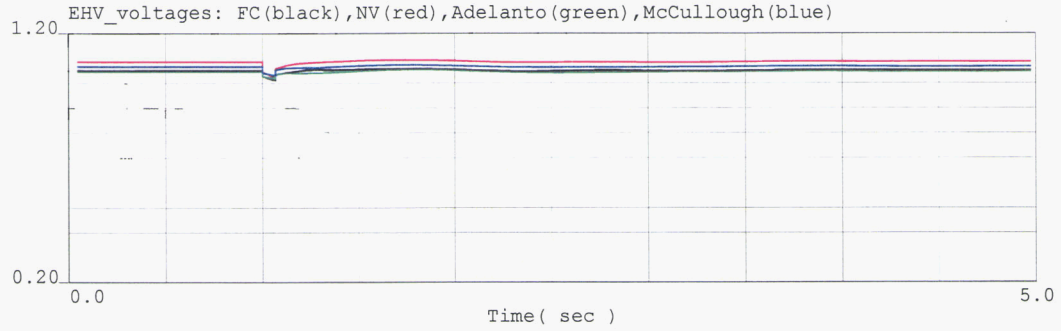
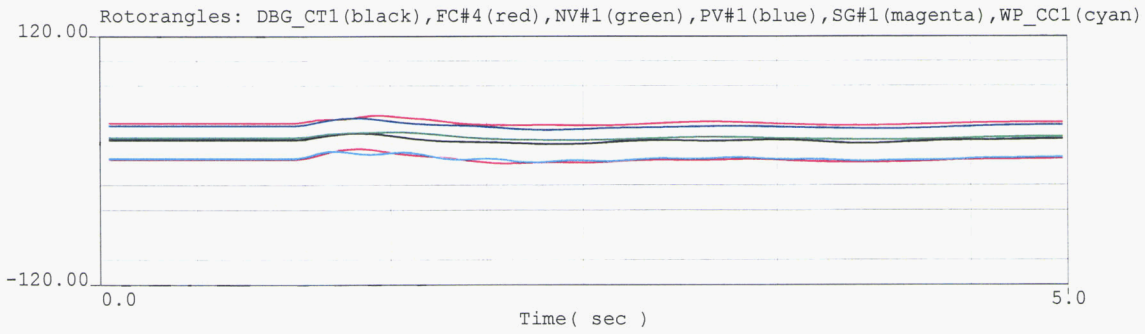
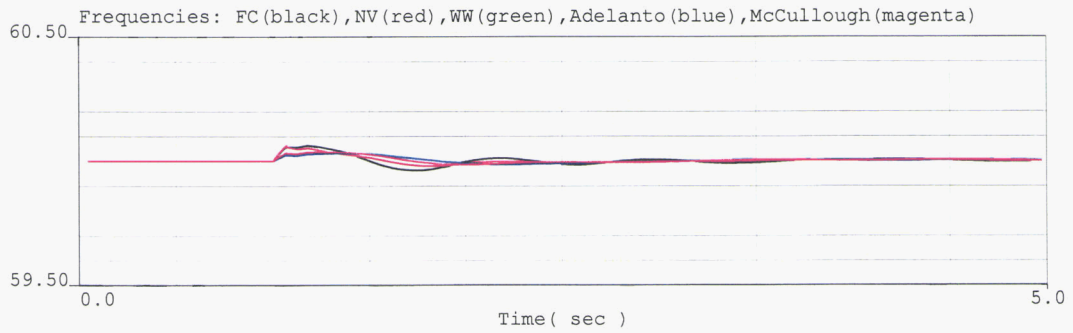
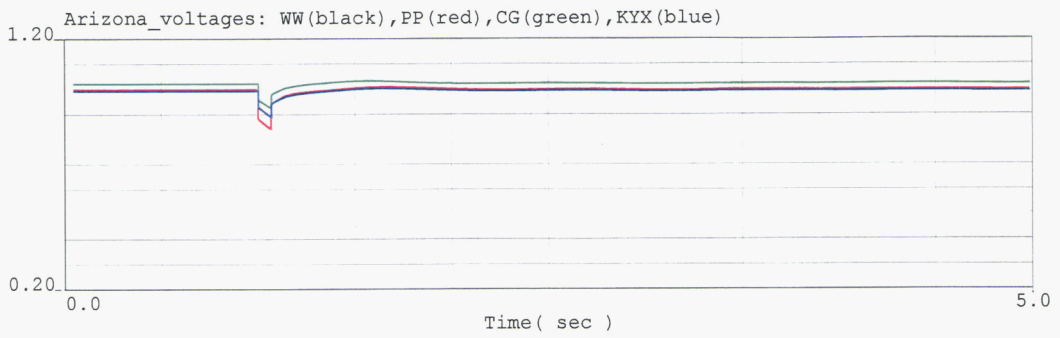


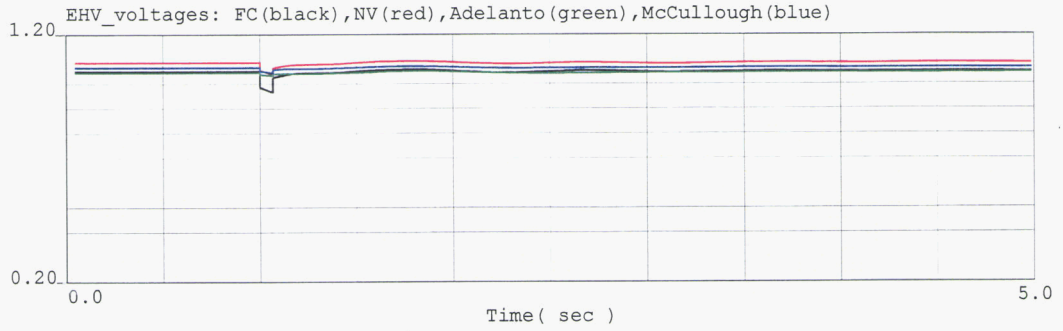


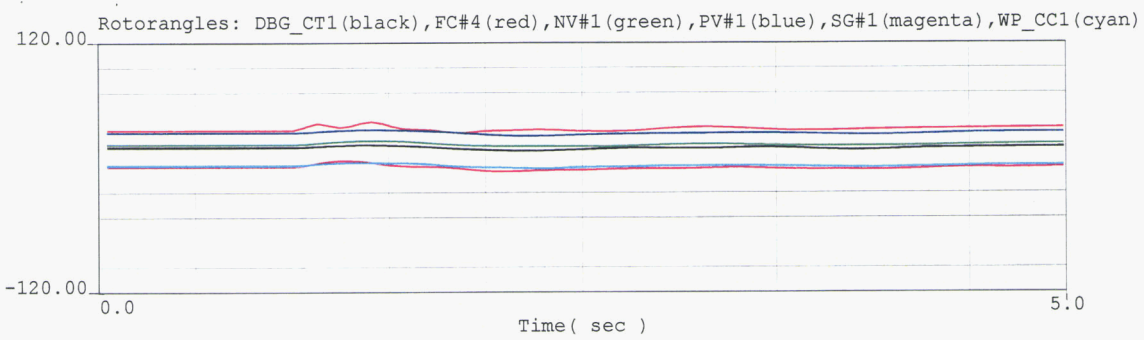


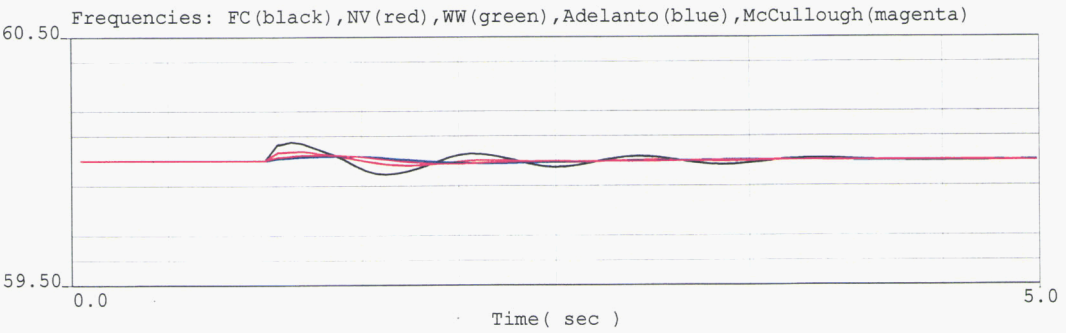


BROWNING FLT BNX-KYX LINE OUT
BNX-KYX STAB #1; 01/07; T=0 3P FLT BNX500;
4C CLR FLT W/BNX-KYX;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

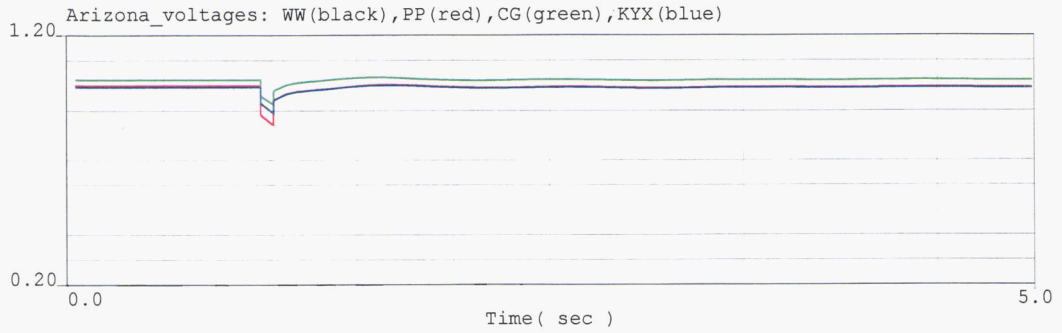


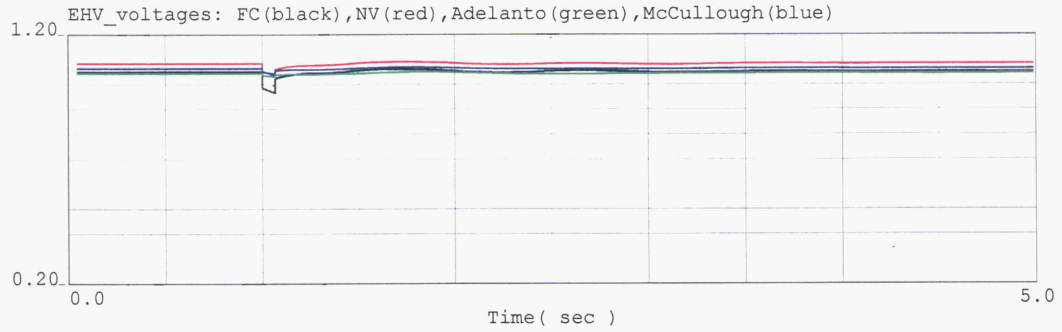


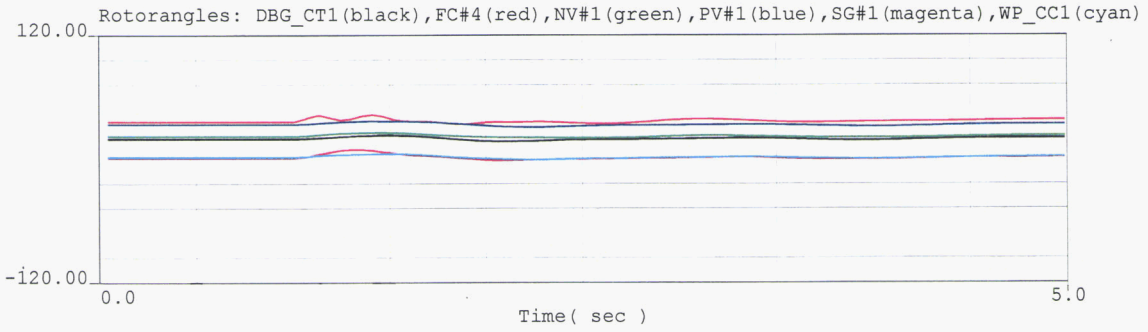


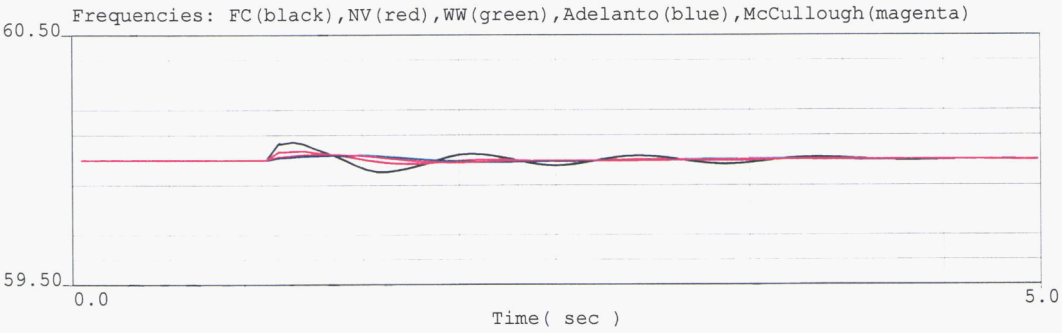


CHOLLA FLT CH-FC LINE OUT
CH-FC STAB; 01/07; T=0 3P FLT CH345;FLSH CAPS;
4C CLR FLT W/CH-FC #1;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

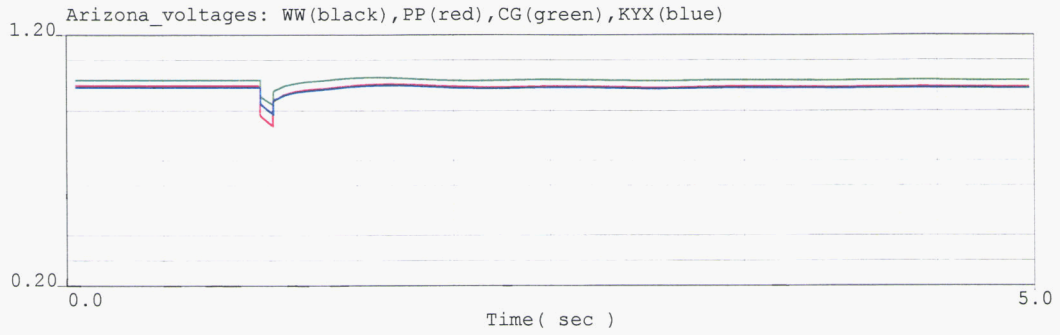


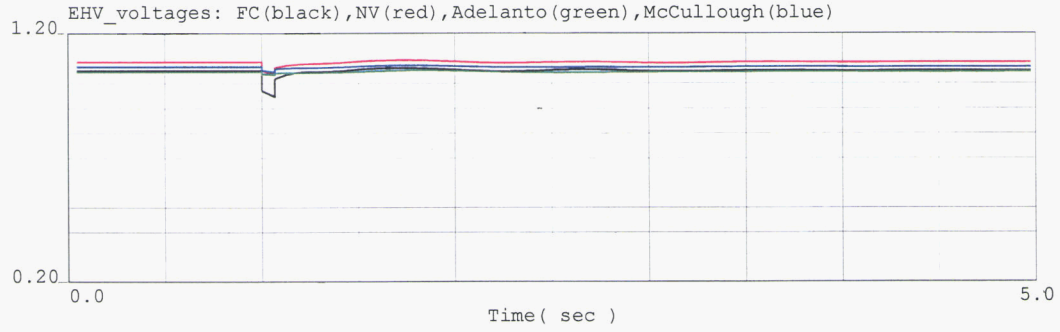


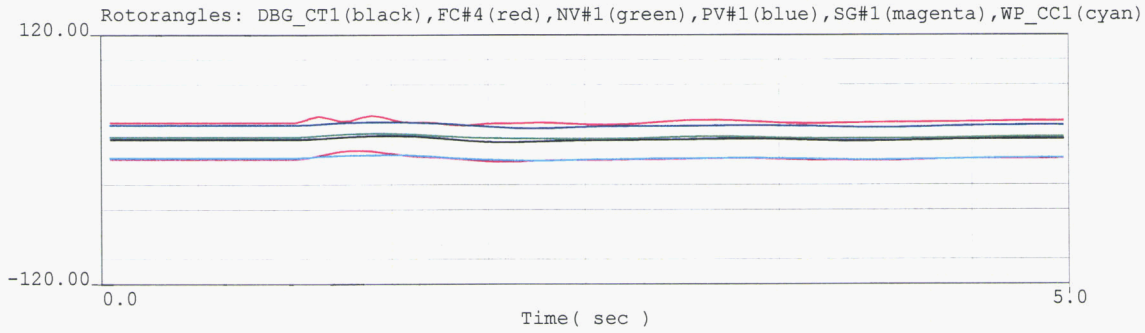


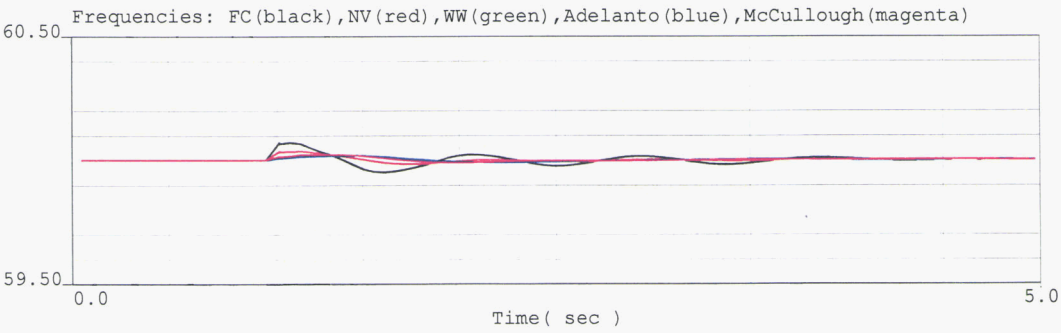


CHOLLA FLT CH-PP LINE OUT
CH-PP STAB; 01/07; T=0 3P FLT CH345;FLSH CAPS;
4C CLR FLT W/CH-PP #1;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

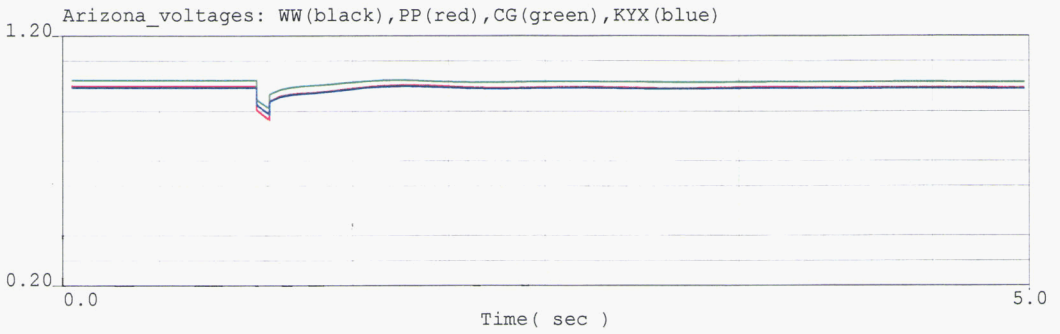


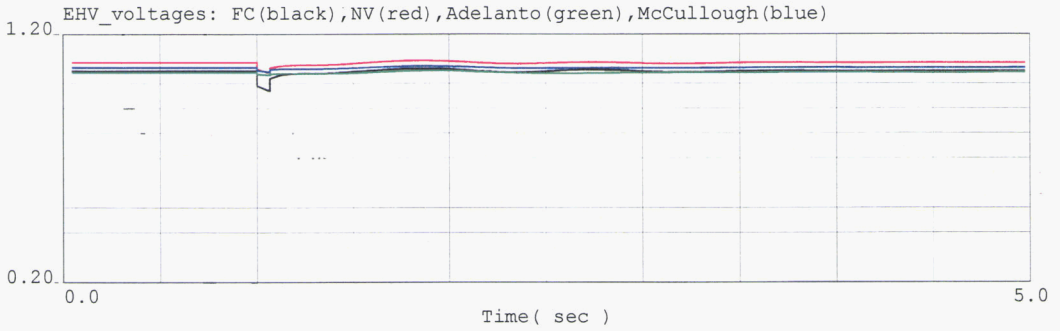


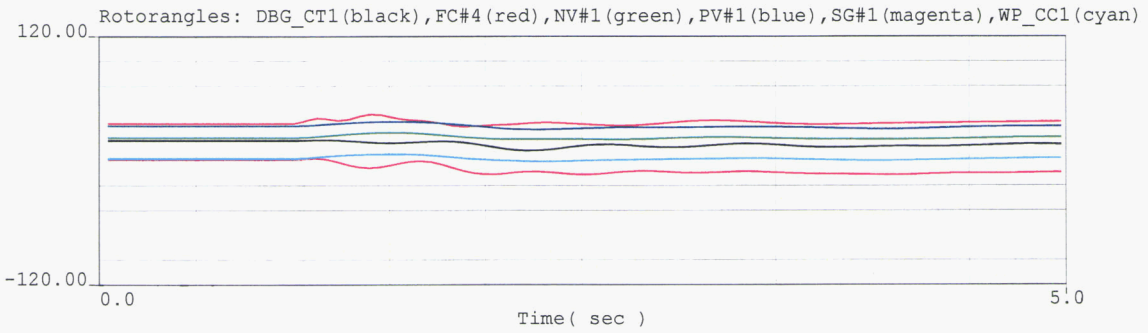


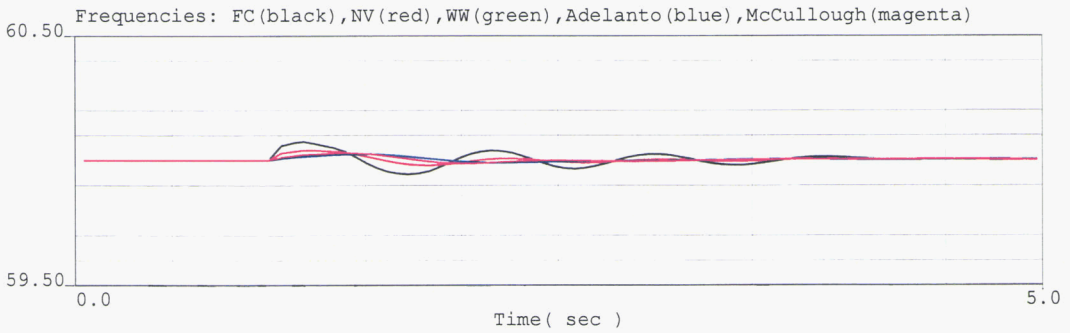


CHOLLA 345KV FLT CH-PC LINE OUT
CH-PC STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/CH-PC;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

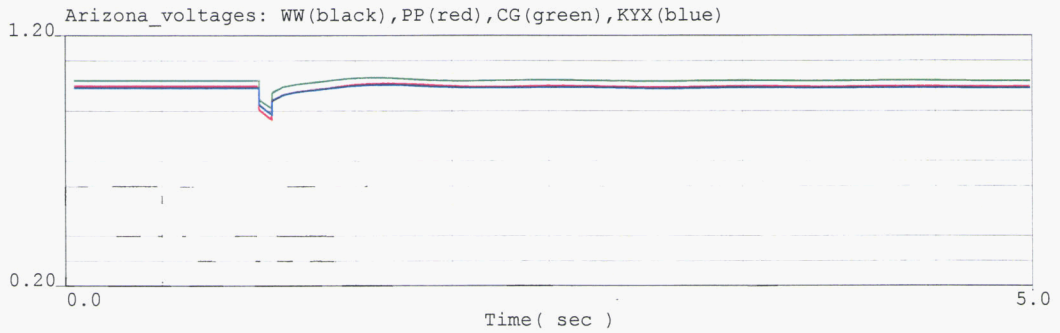


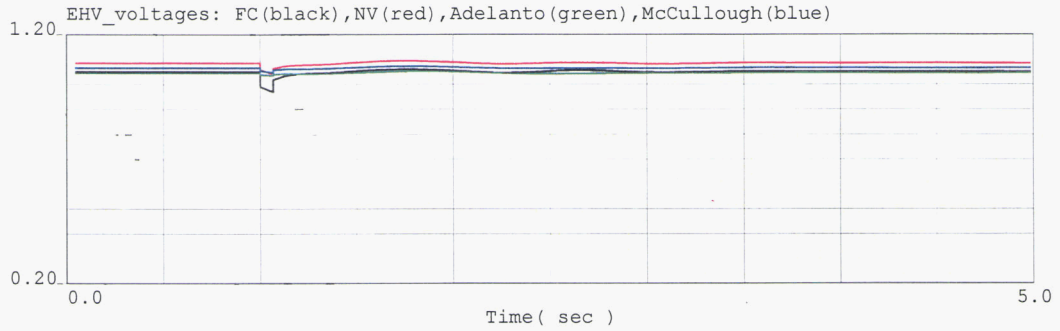


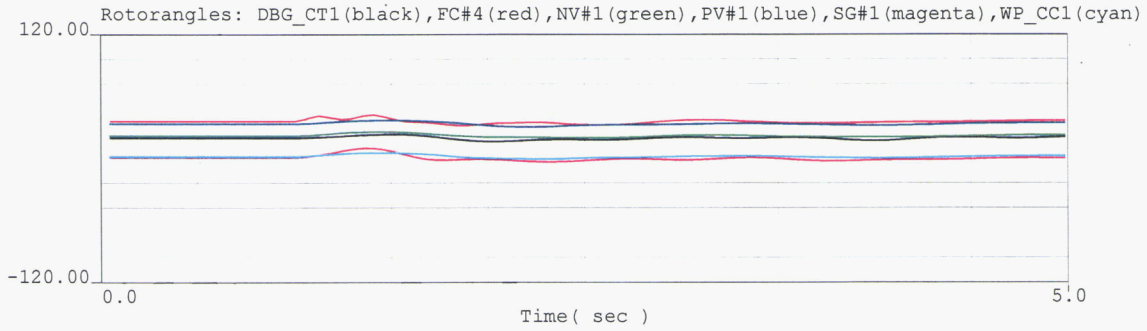


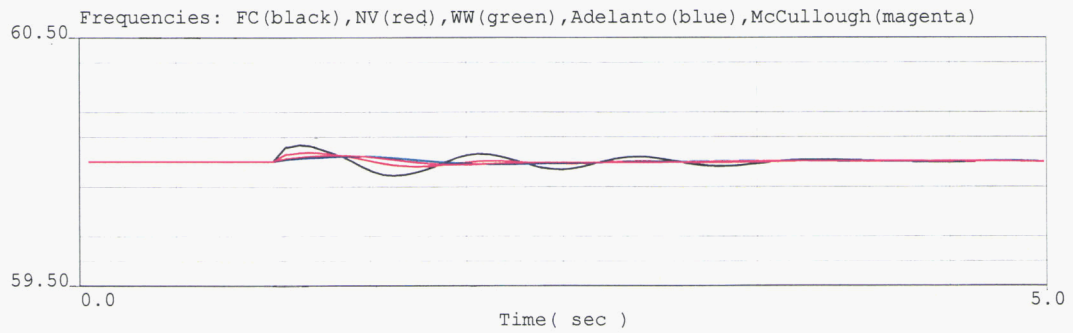


CHOLLA 500KV FLT CH-SG LINE OUT
CH-SG STAB; 1/07; T=0 3P FLT CH500;FLASH CAPS;
4C CLR FLT W/CH-SG;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

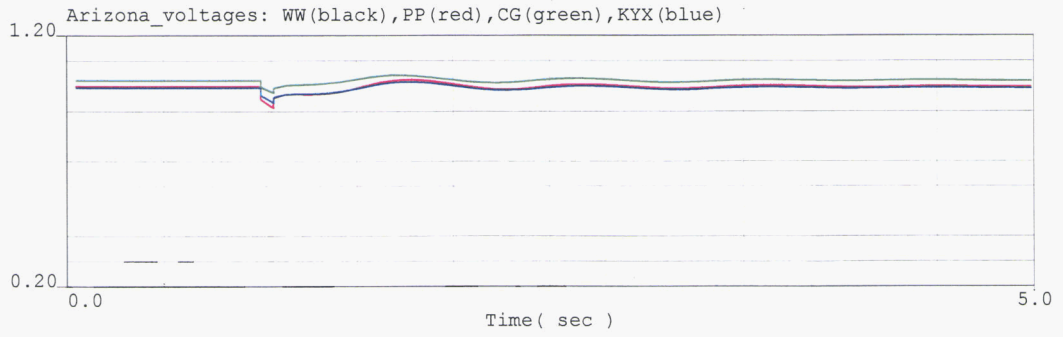


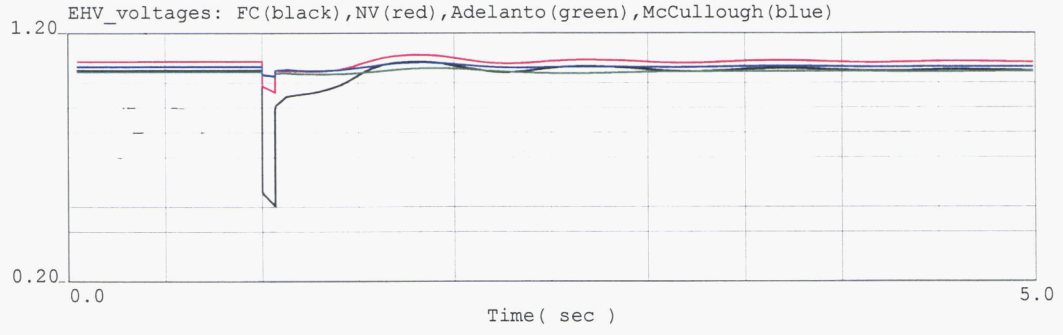


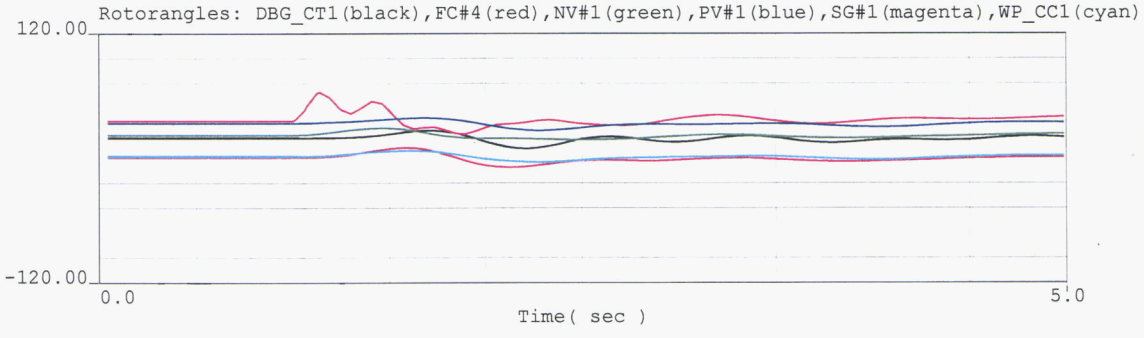


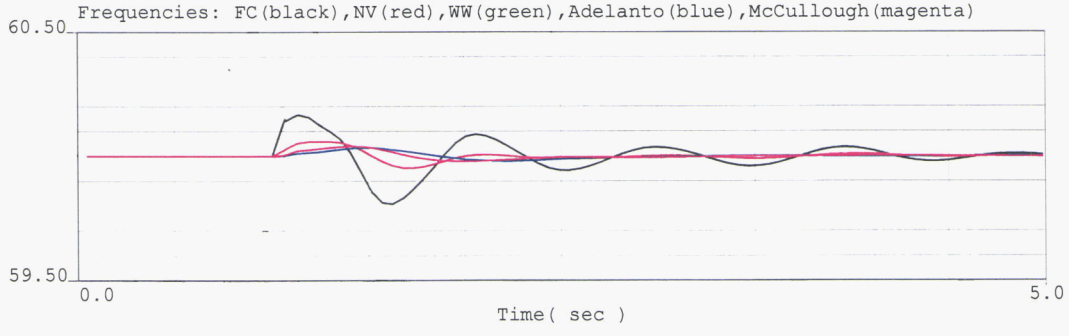


CHOLLA 500KV FLT CH-SN LINE OUT
CH-SN STAB; 1/07; T=0 3P FLT CH500; FLASH CAPS;
4C CLR FLT W/CH-SN;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

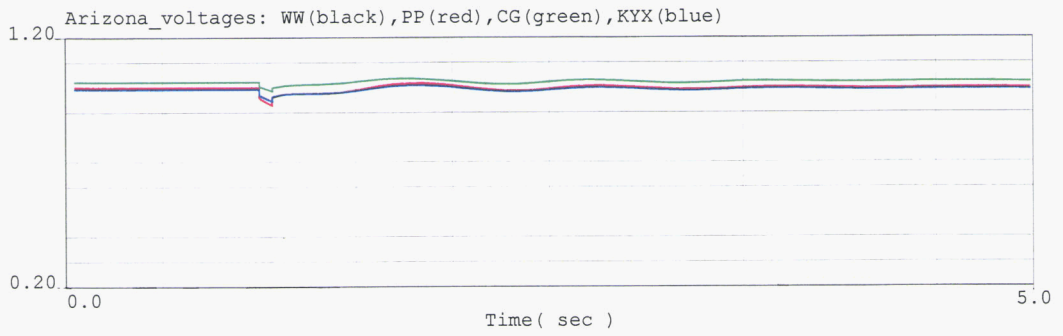


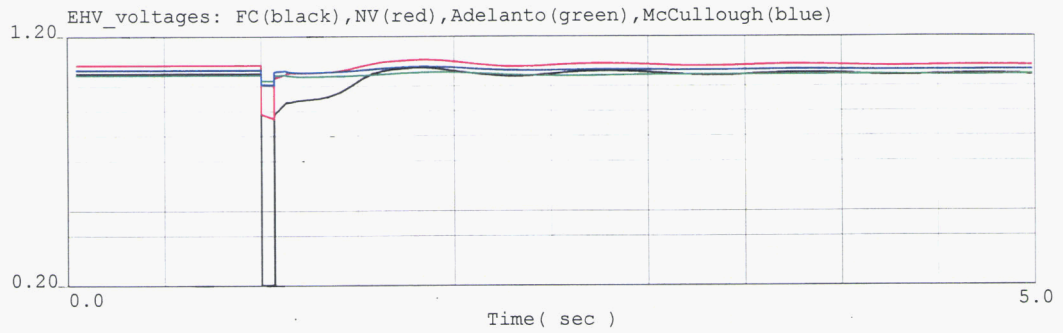


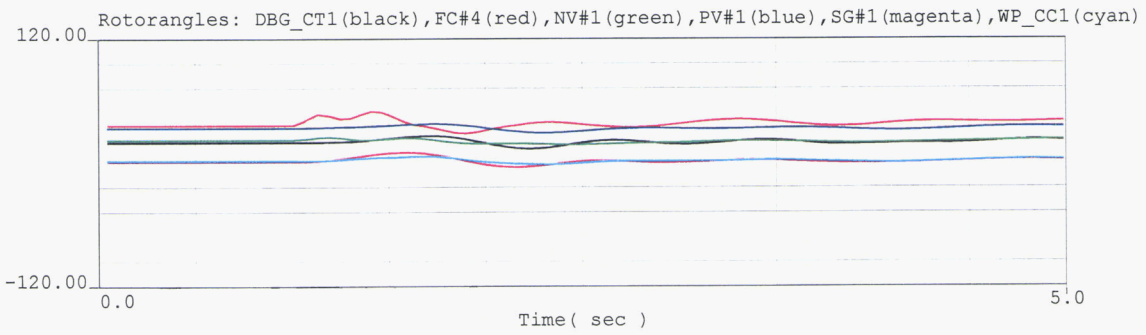


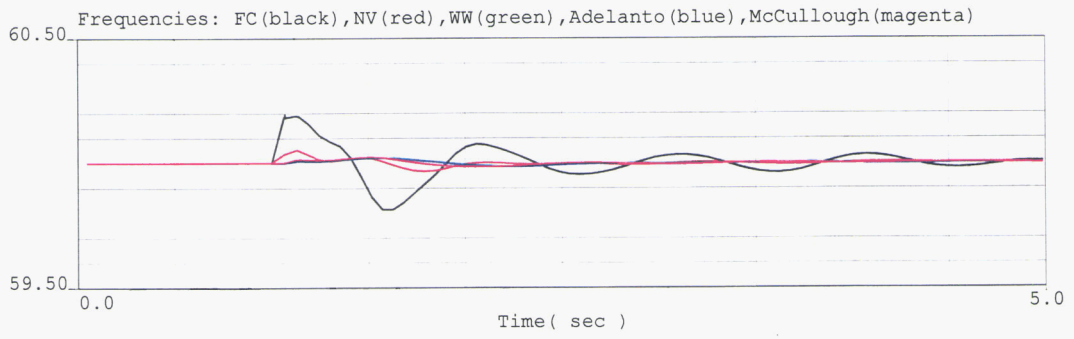


FOUR CORNERS fault w/FC-CH line out
FC-CH STAB; 1/07; T=0 3P FLT FC345;10% FLT DMPING;FLSH
CAPS;4C CLR FLT W/FC-CH #1; 8C REIN CAPS;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

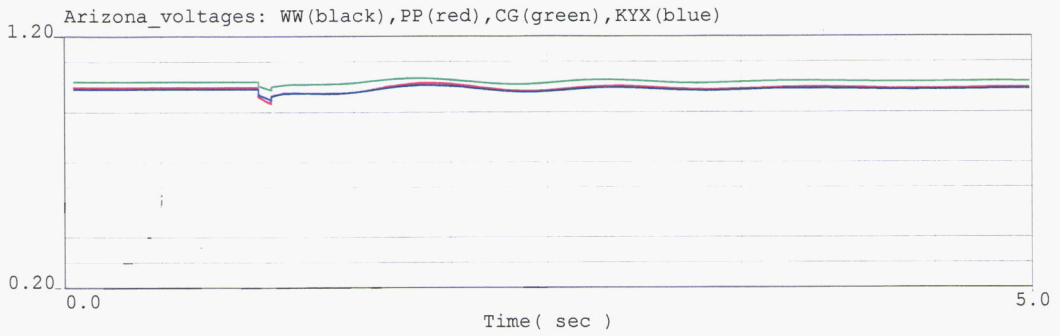


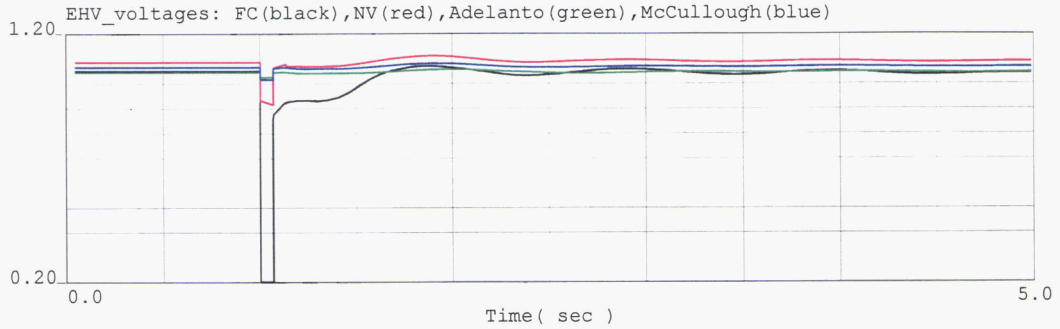


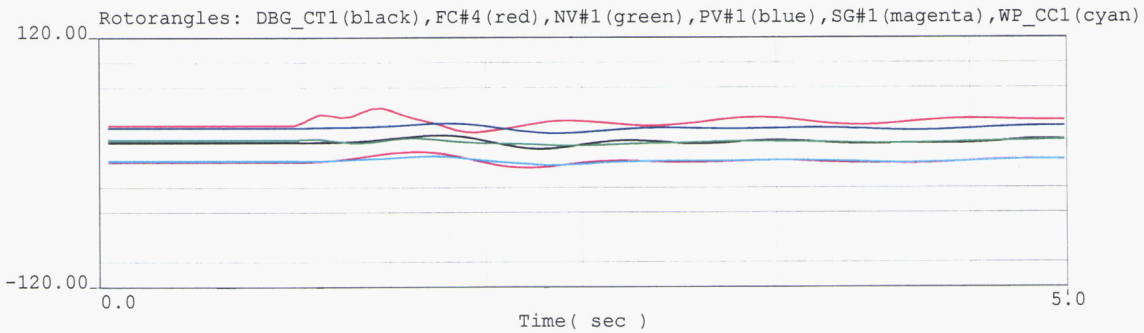


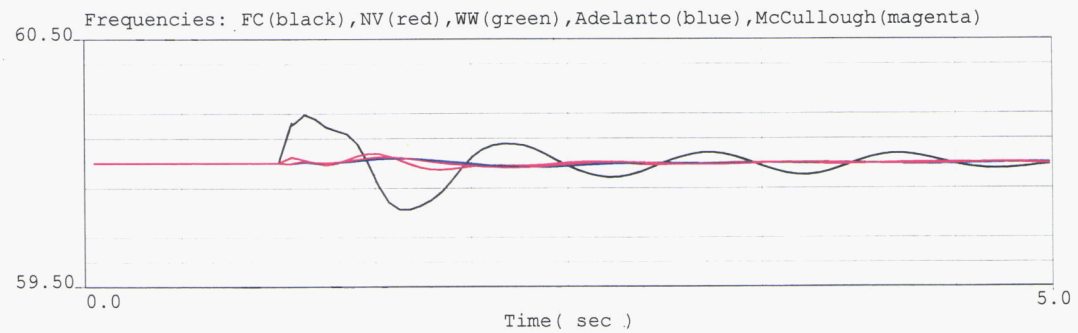


FOUR CORNERS FLT500 FC-MK out
FC-MK STAB; 1/07; T=0 3P FLT FC500;10% FLT DMPING;FLSH
CAPS; 4C CLR FLT W/FC-MK;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

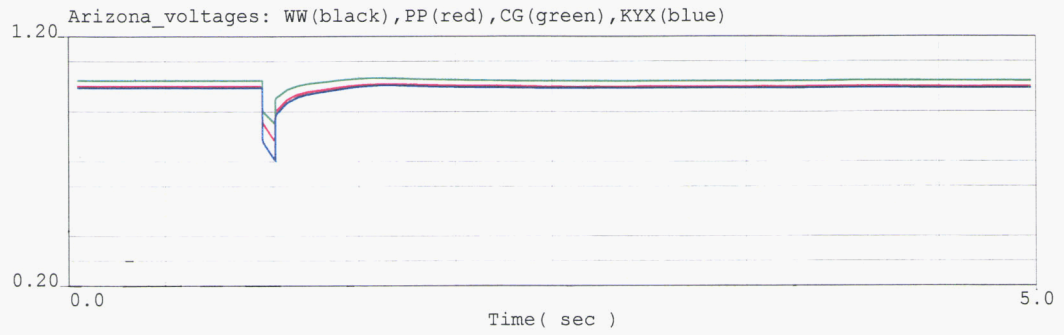


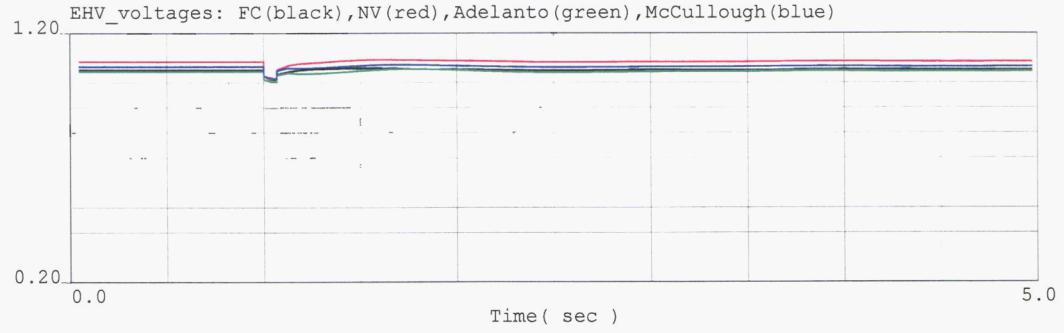


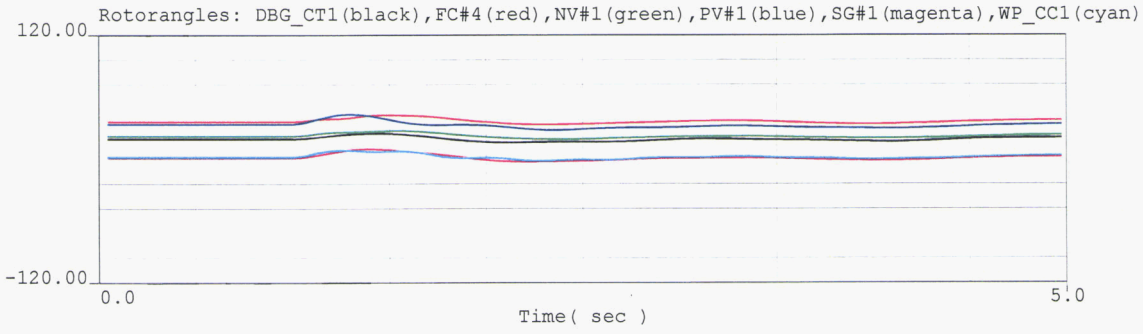


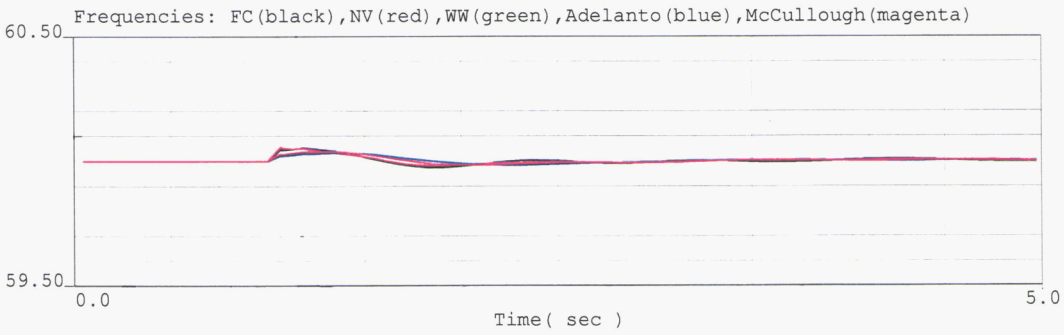


FCW FLT500 FCW-RME out
FCW-RME STAB; 1/07; T=0 3P FLT FCW500;10% FLT DMPING;FLSH
CAPS;4C CLR FLT W/FCW-RME;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

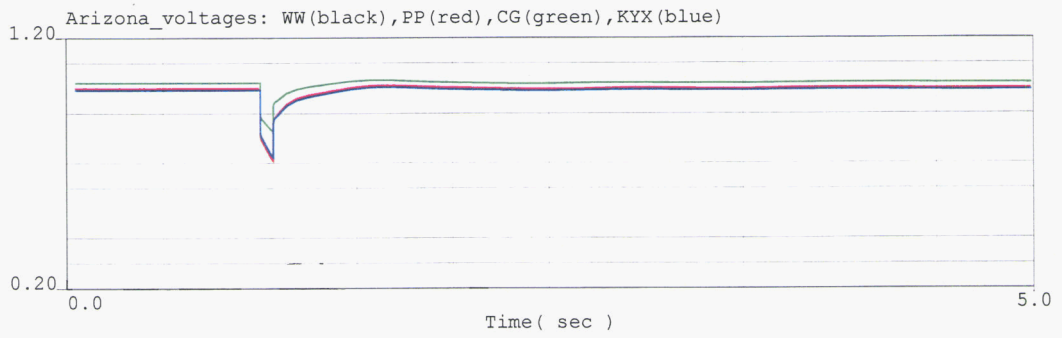


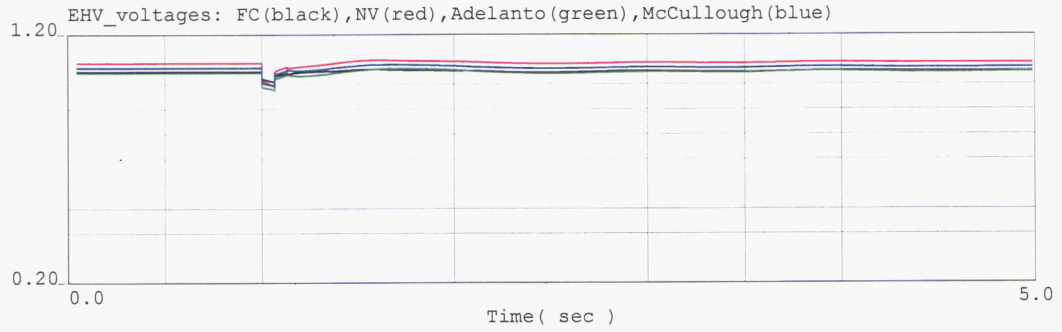


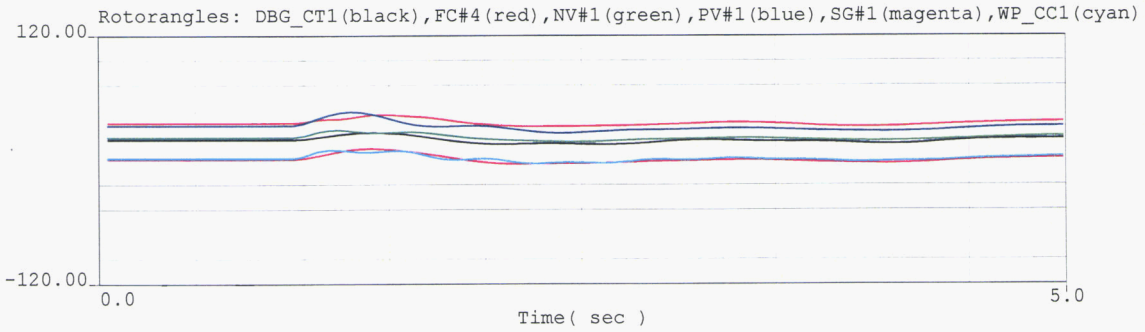


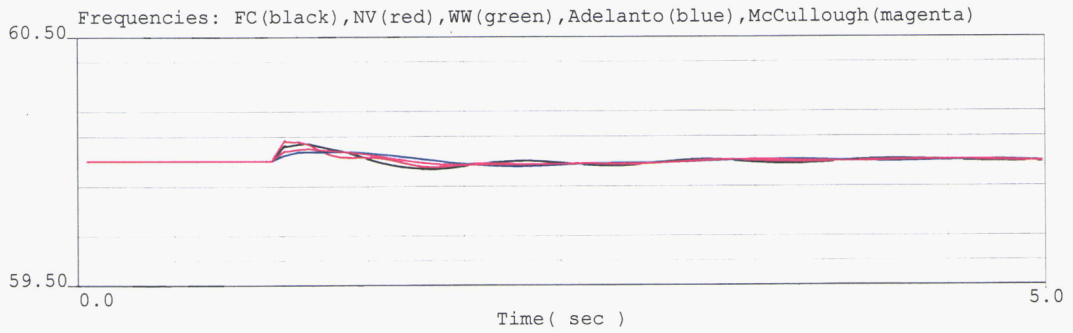


GILA RIVER FLT GR-JJX LINE OUT
GR-JJX STAB; 01/07; T=0 3P FLT GR500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/GR-JJX;8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

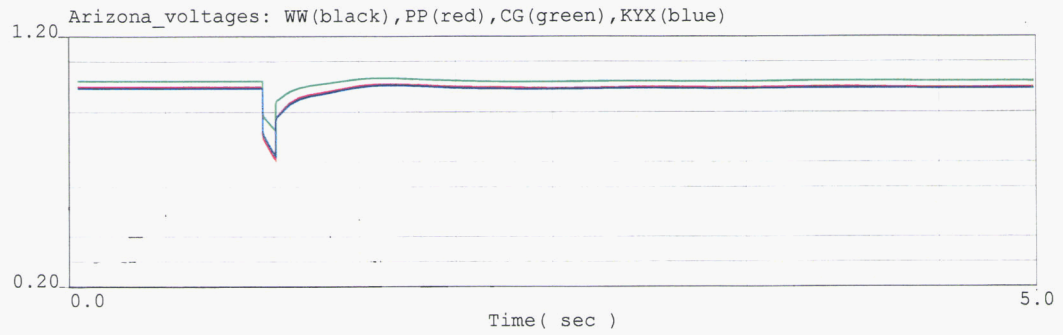


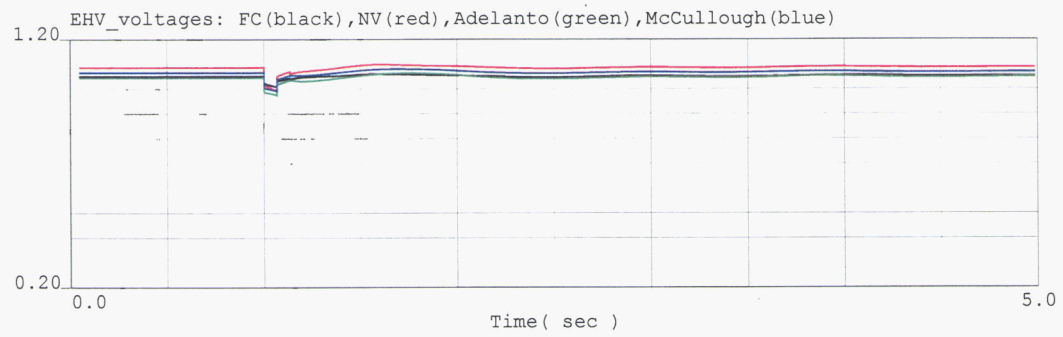


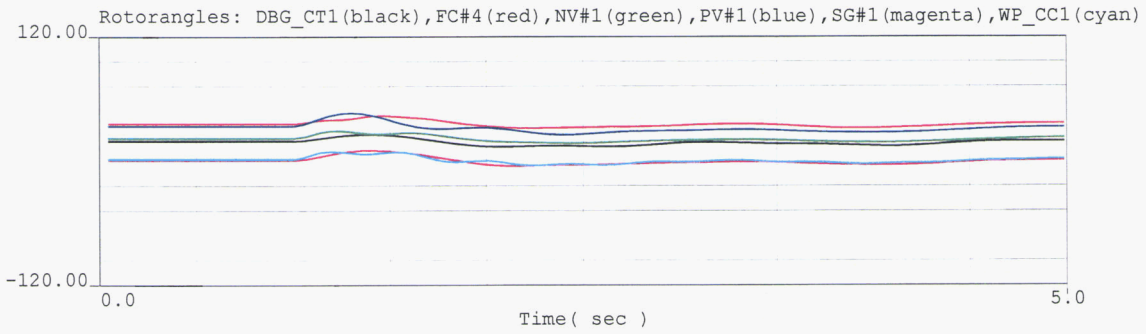


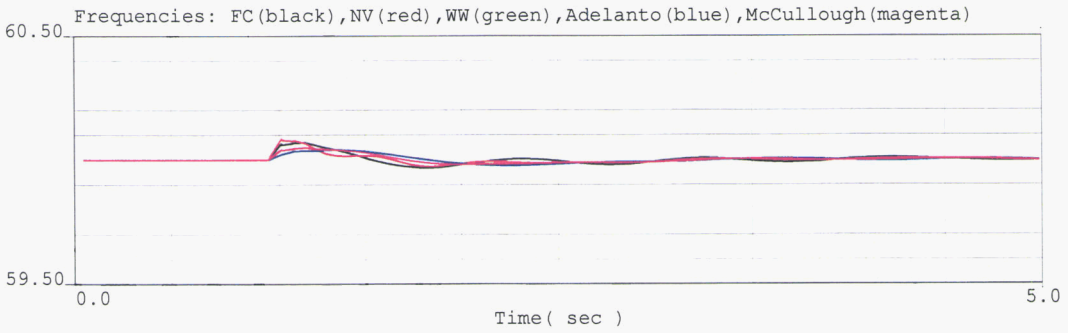


HARQUAHALA JUNCTION FLT HQJ-HAAX LINE OUT
HQJ-HAAX STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-HAAX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

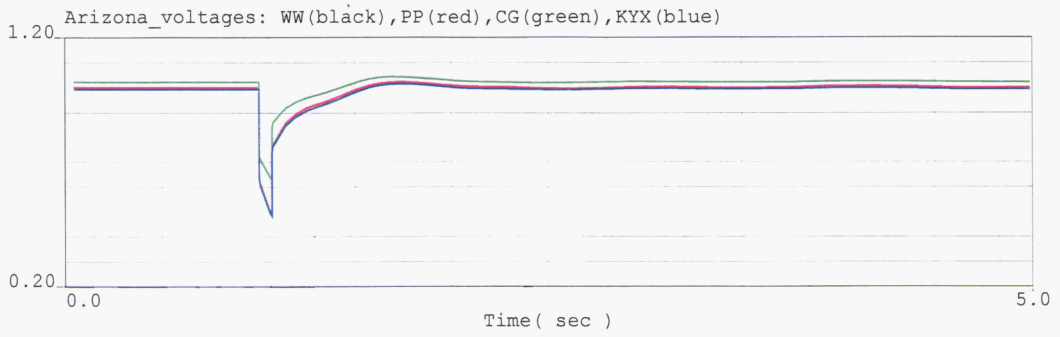


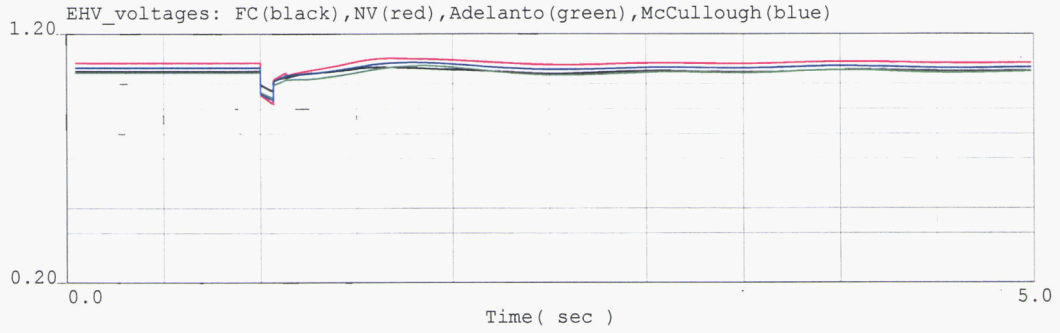


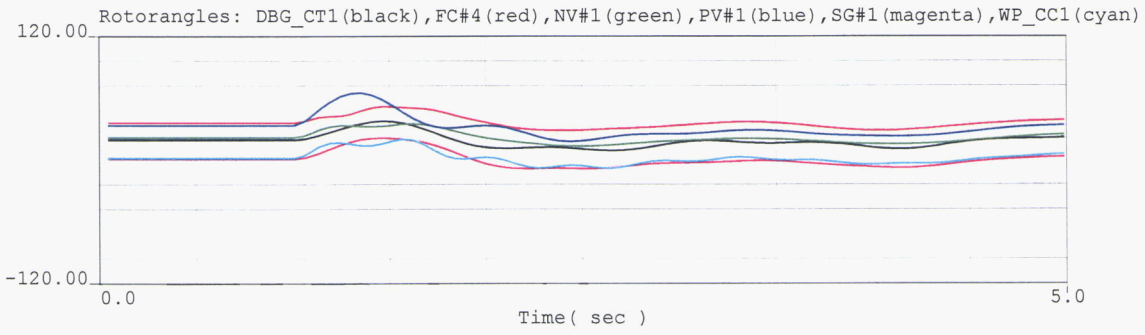


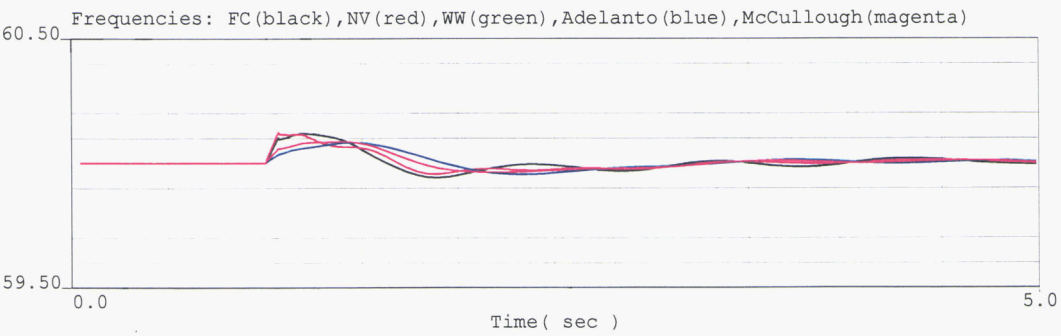


HARQUAHALA JUNCTION FLT HQJ-TS5 LINE OUT
HQJ-TS5 STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-TS5;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

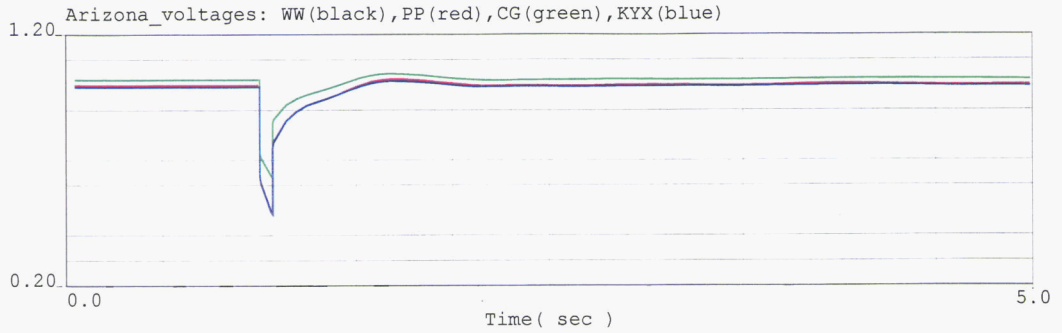


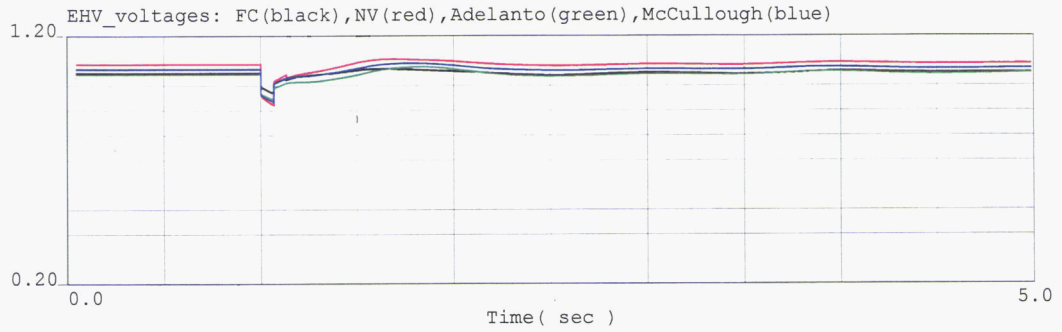


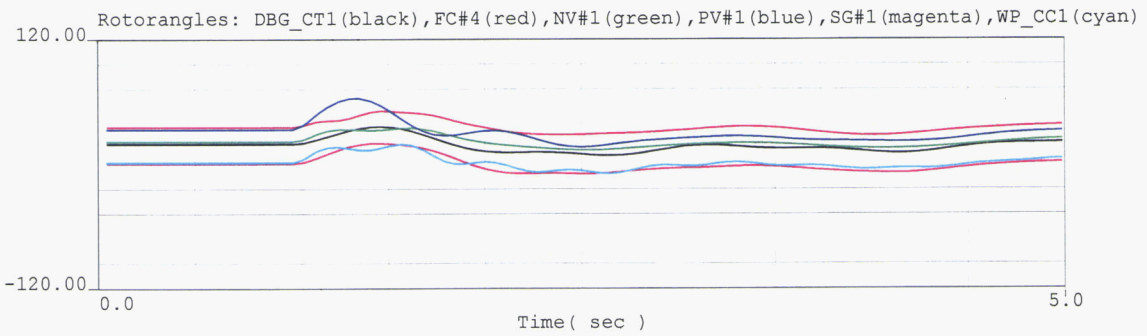


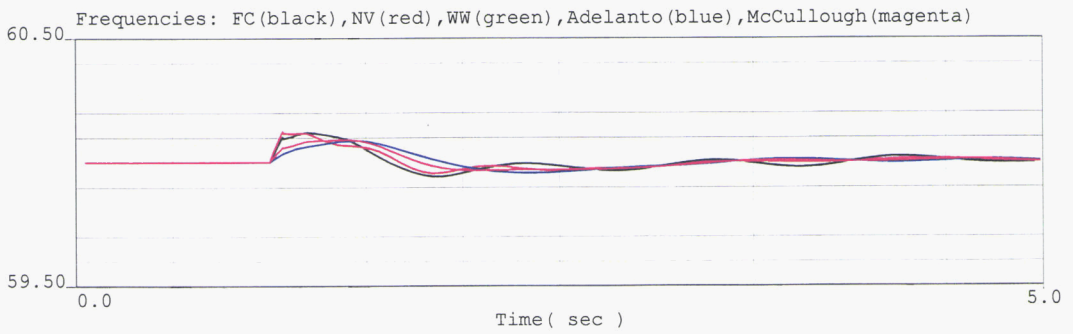


HASSAYAMPA FLT HAAX-HQJ LINE OUT
HQJ-HAAX STAB; 01/07; T=0 3P FLT HQJ500;10% FLT DMPING;FLSH CAPS
4C CLR FLT W/HQJ-HAAX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

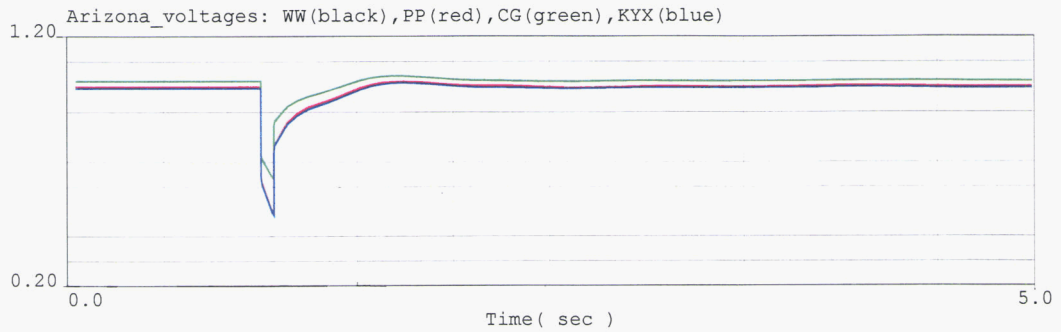


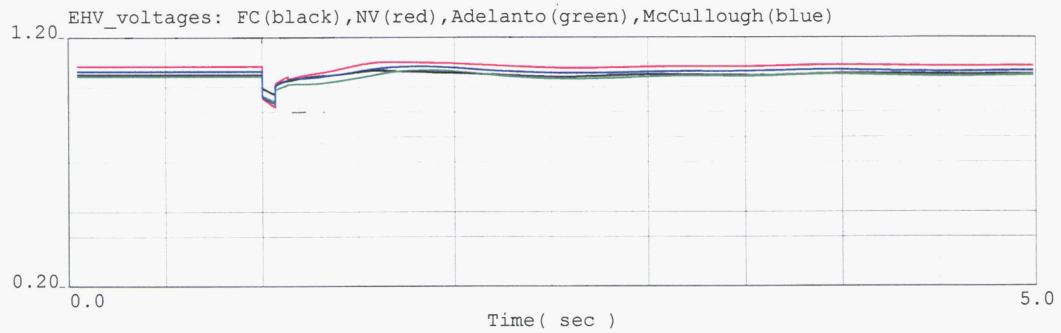


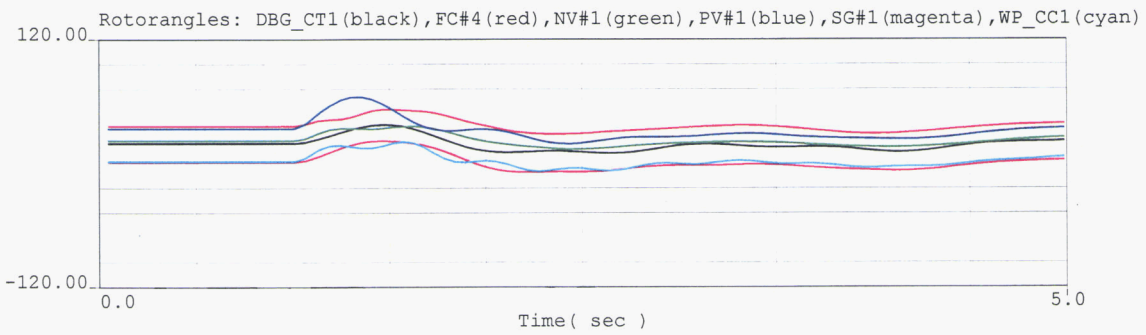


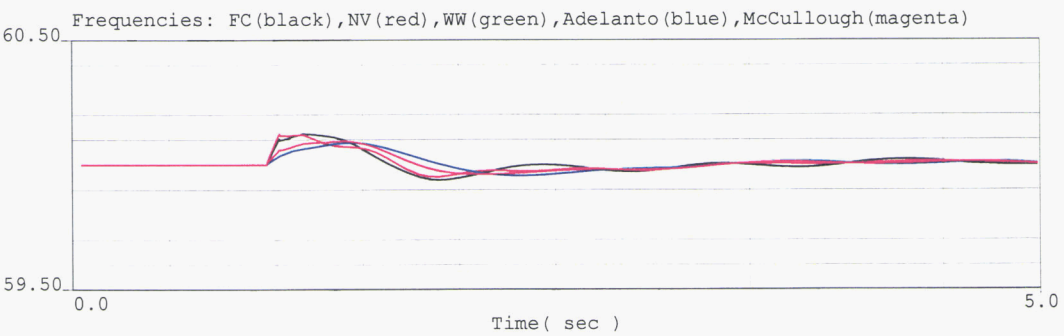


HASSAYAMPA FLT HAAX-JJX LINE OUT
HAAX-JJX STAB; 01/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-JJX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

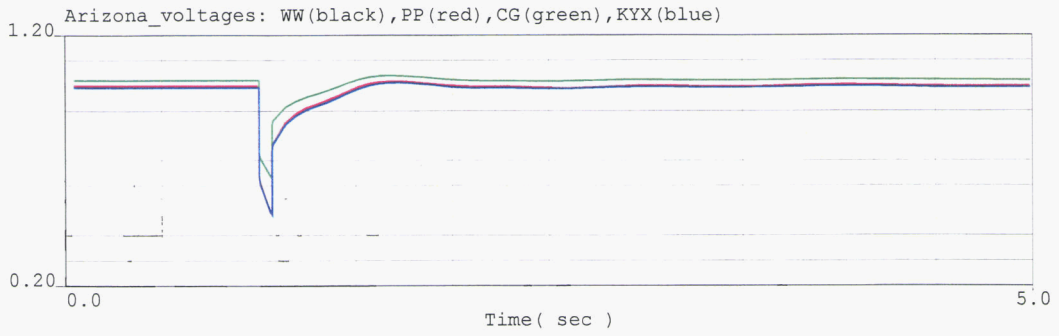


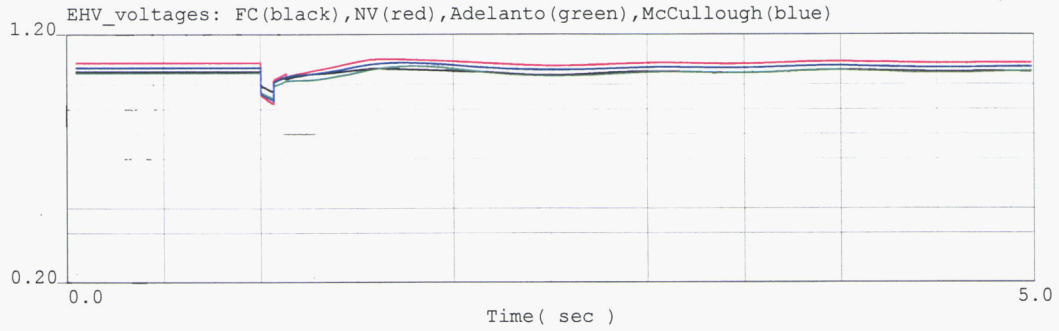


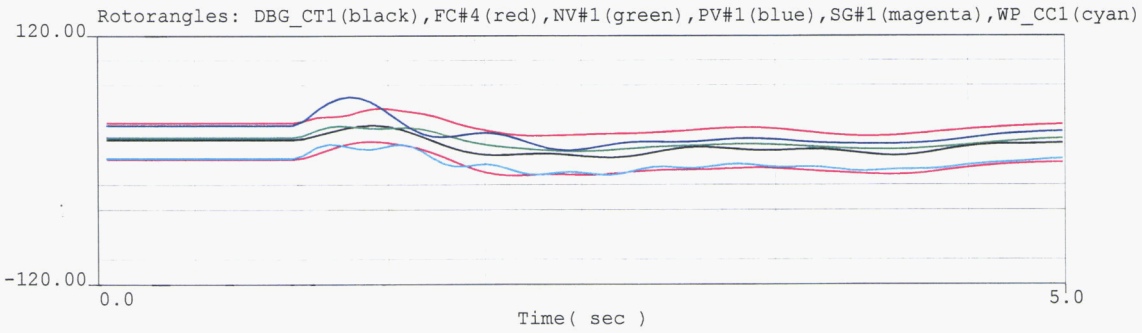


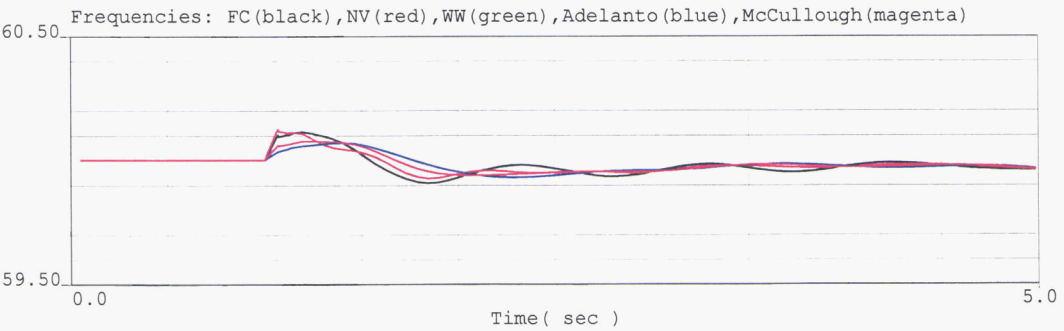


HASSAYAMPA FLT. w/HAAX-NG line out
HAAX-NG STAB; 1/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-NG;4/8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

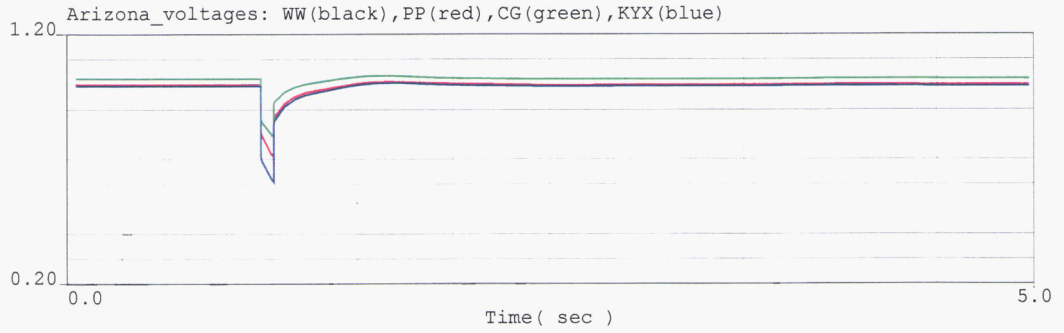


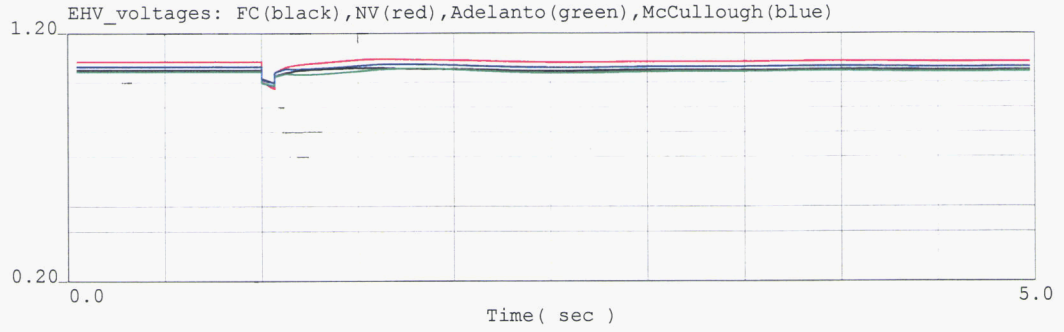


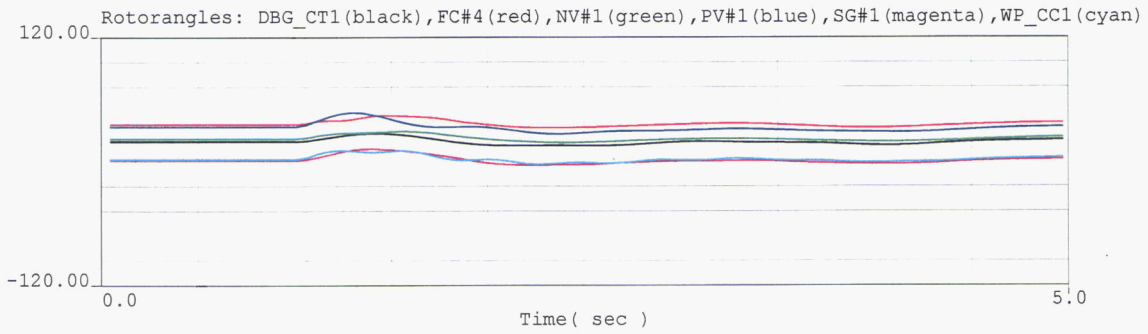


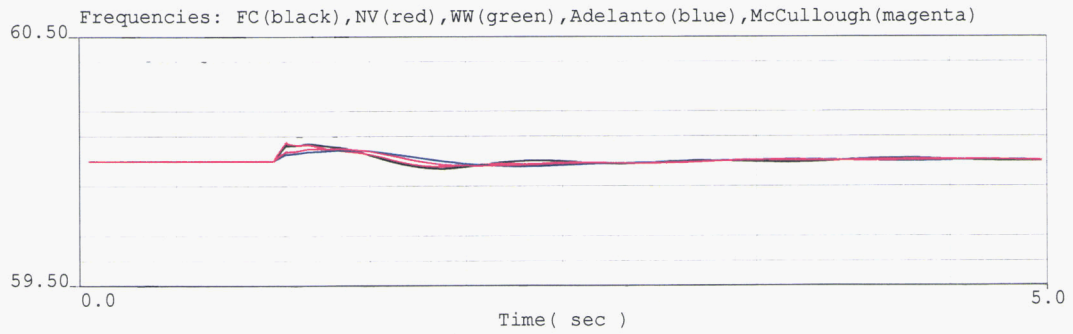


HASSAYAMPA FLT HAAX-RDHK LINE OUT
HAAX-RHK STAB; 01/07; T=0 3P FLT HAAX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-RHK #1;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

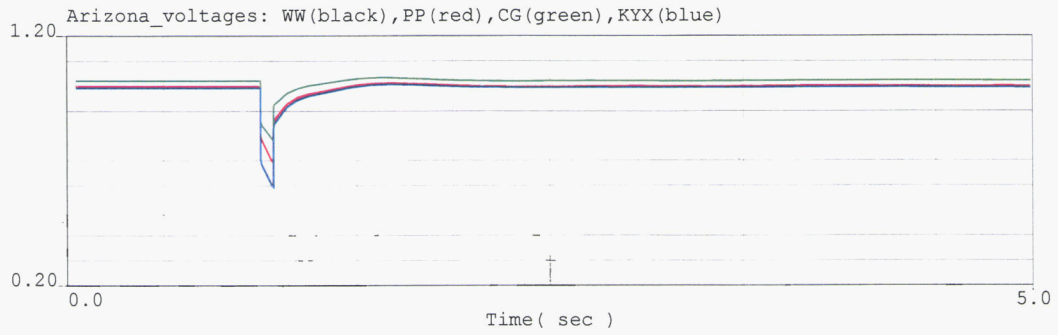


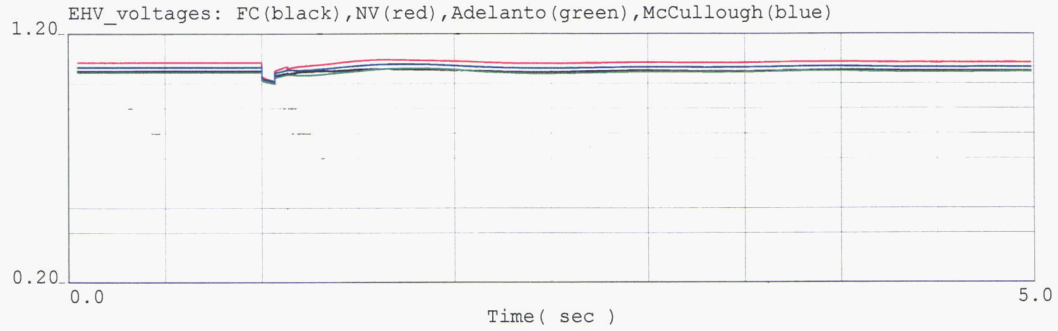


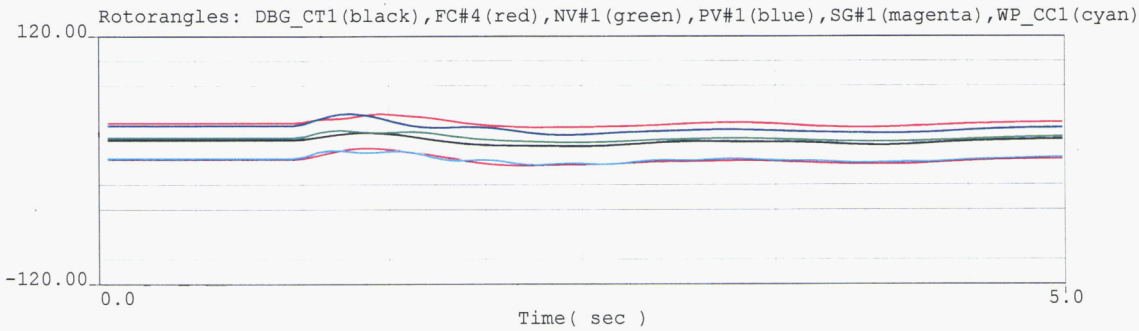


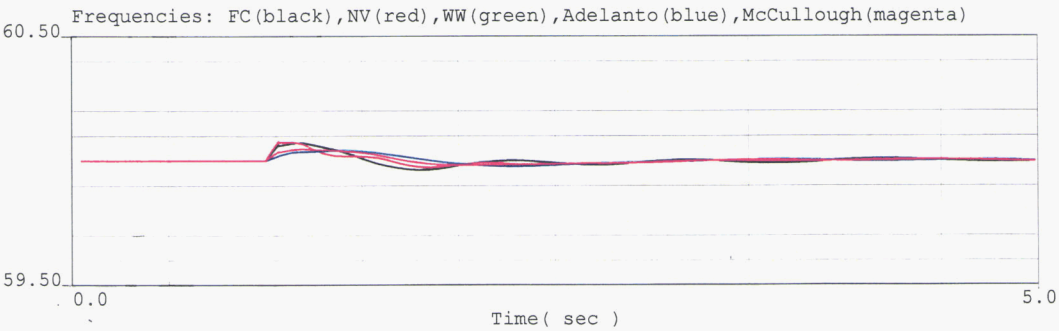


JOJOBA FLT JJX-GR LINE OUT
JJX-GR STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/JJX-GR;8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

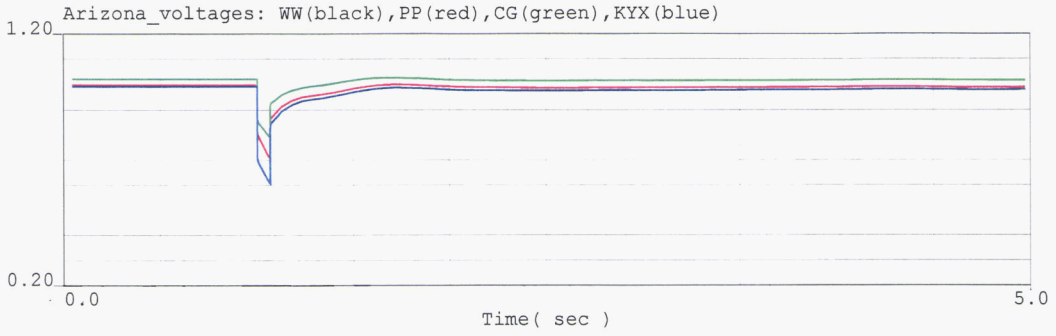


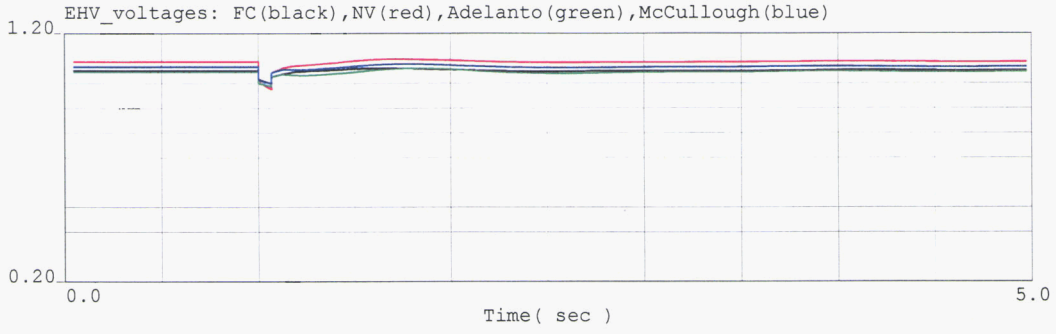


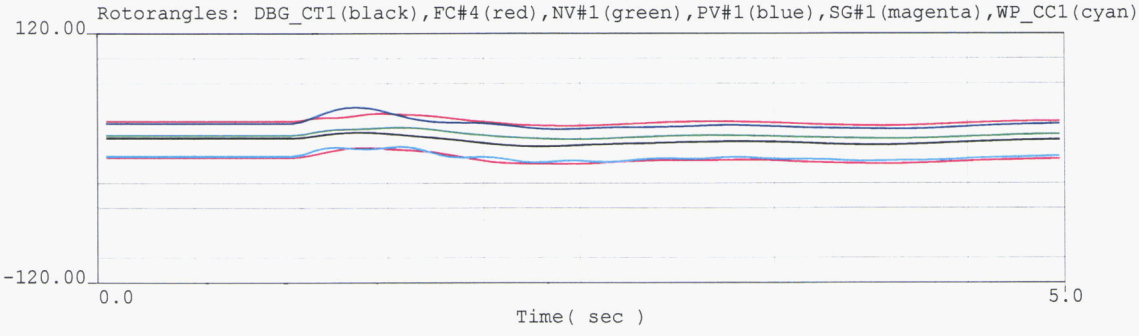


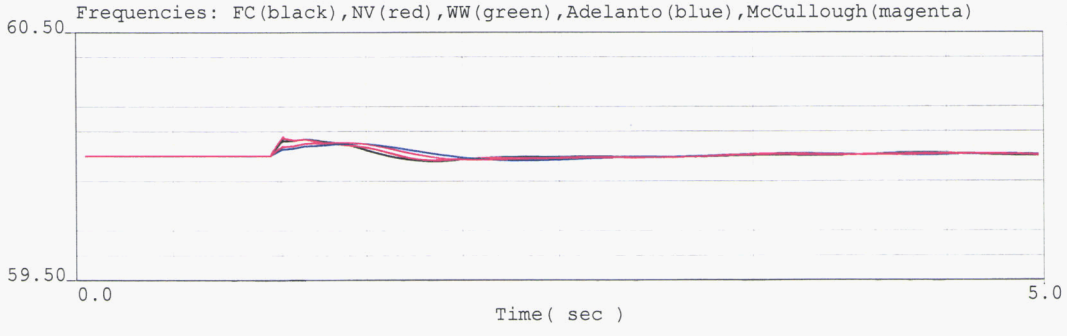


JOJOBA FLT JJX-HAAX LINE OUT
JJX-HAAX STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/HAAX-JJX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

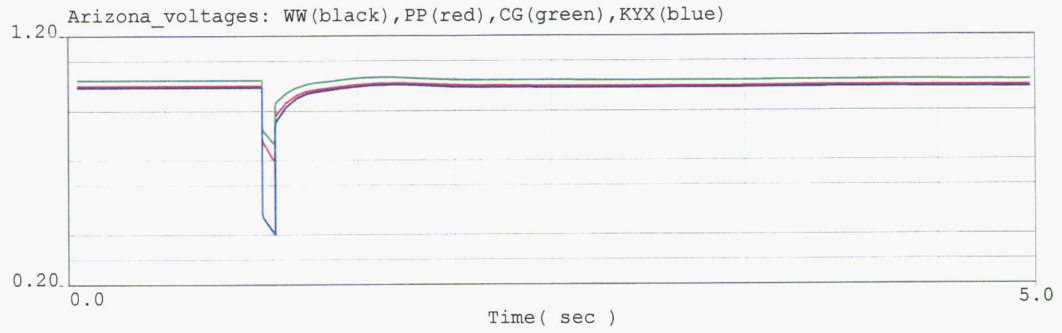


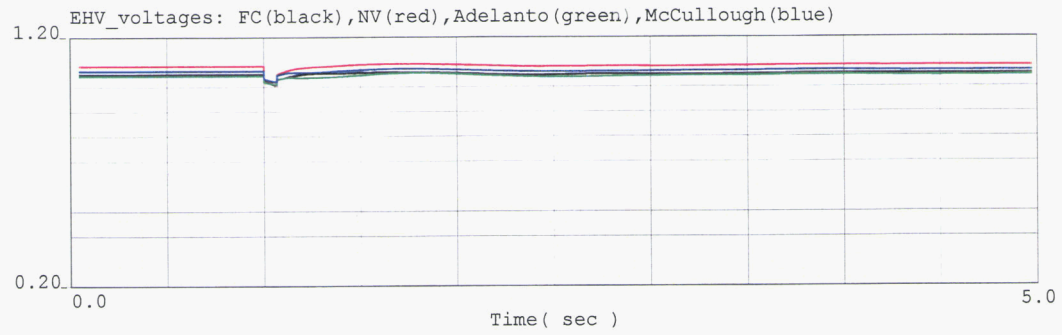


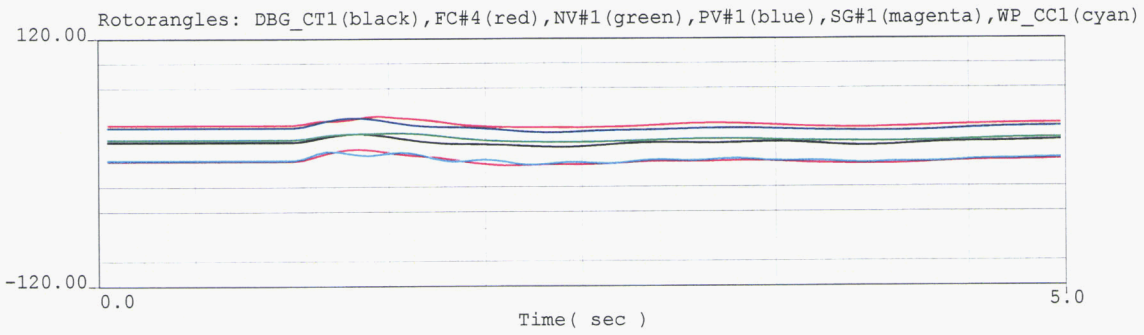


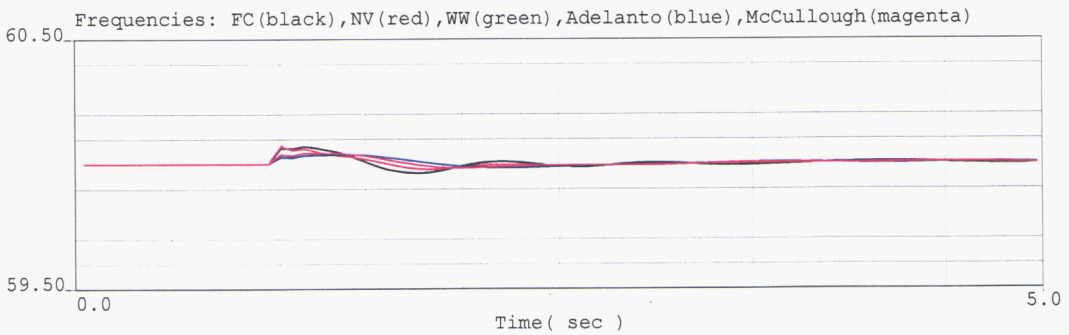


JOJOBA FLT JJX-KYX LINE OUT
JJX-KYX STAB; 01/07; T=0 3P FLT JJX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/JJX-KYX;8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

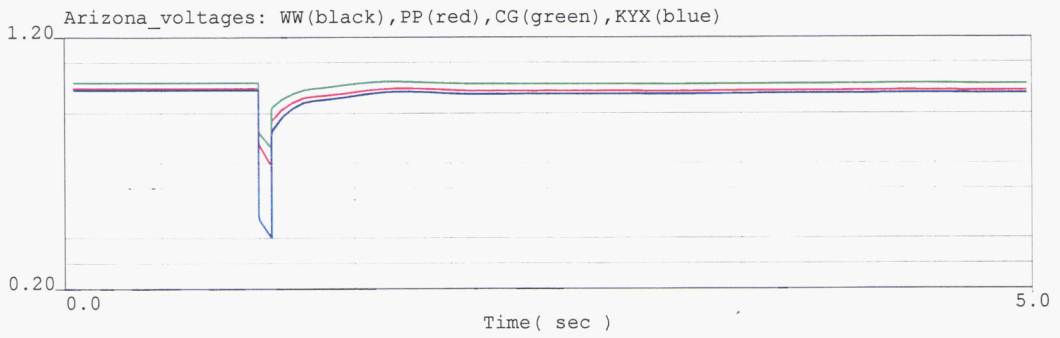


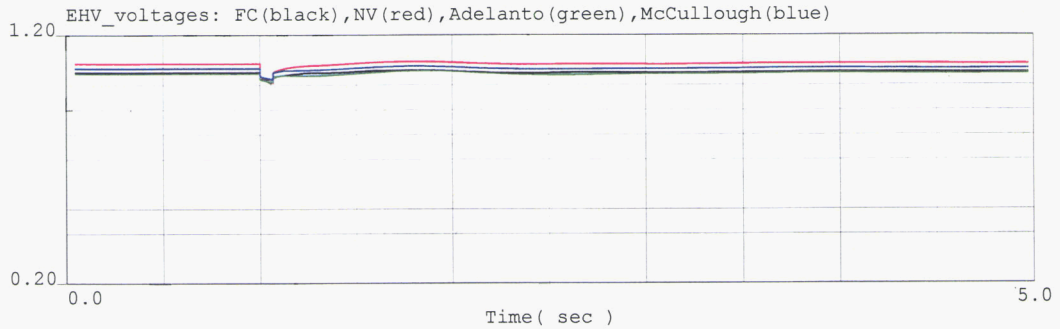


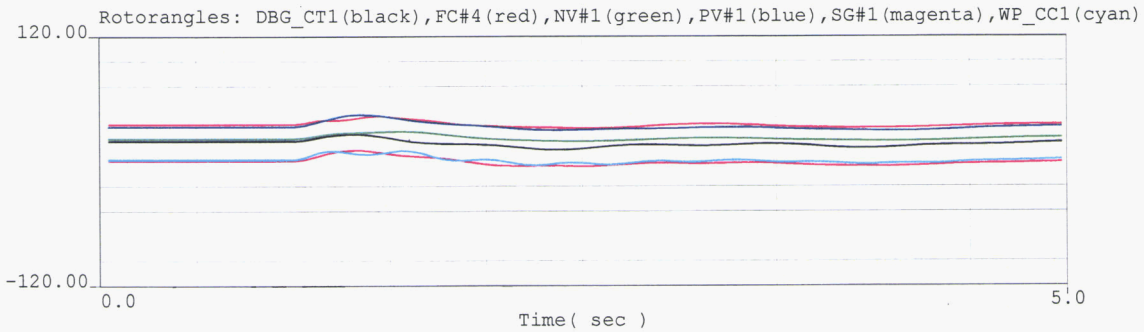


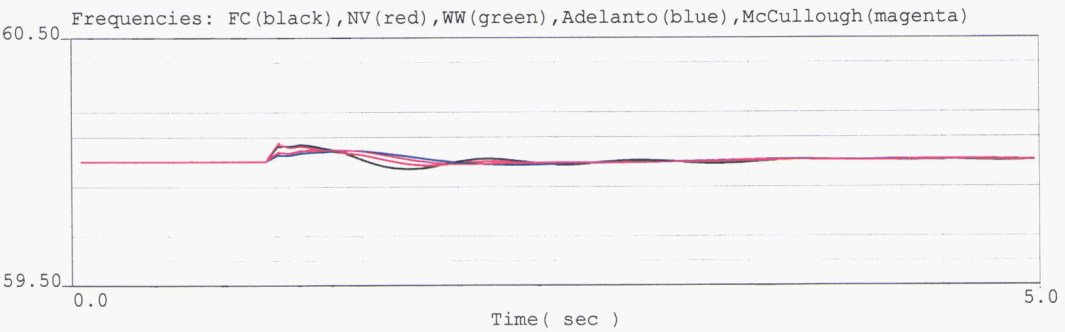


KYRENE FLT KYX-BNX LINE OUT
KYX-BNX STAB #1; 01/07; T=0 3P FLT KYX500;
4C CLR FLT W/KYX-BNX;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

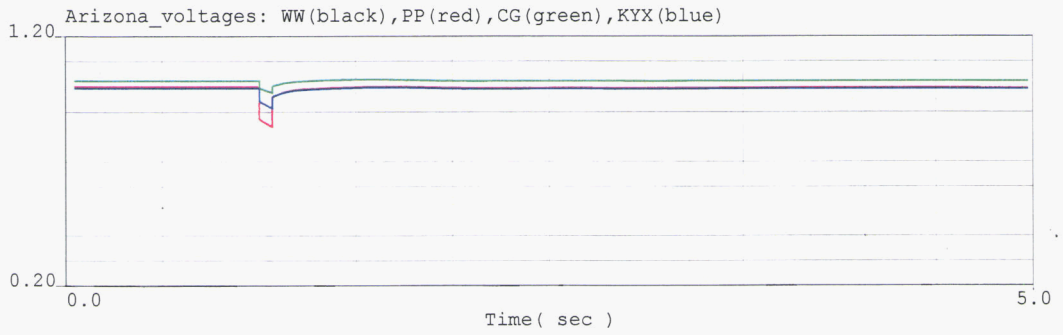


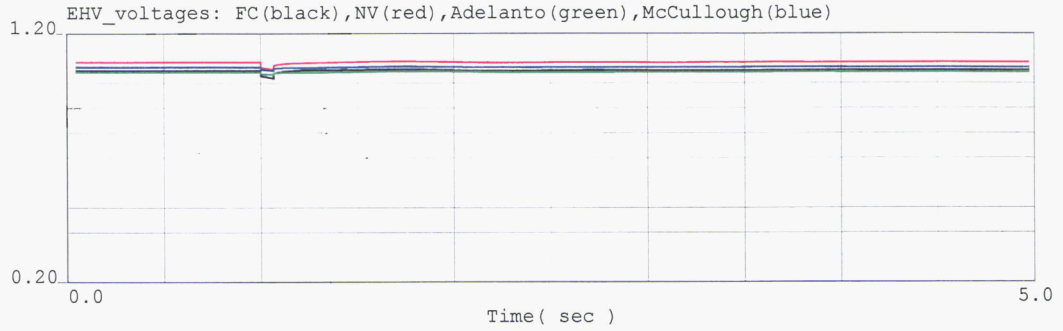


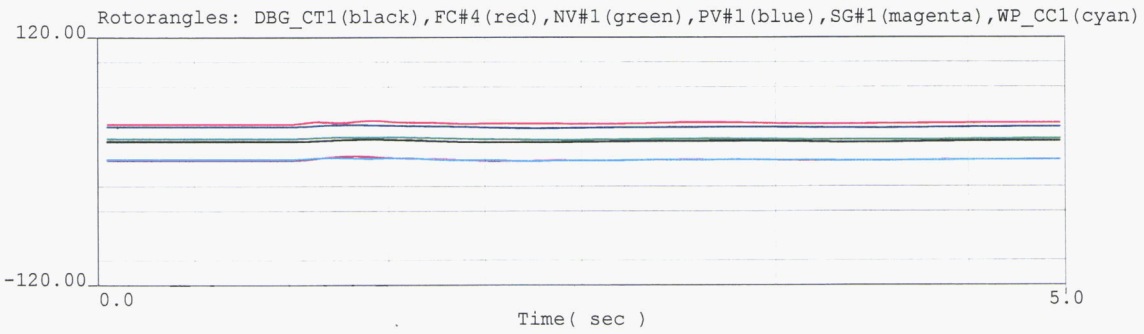


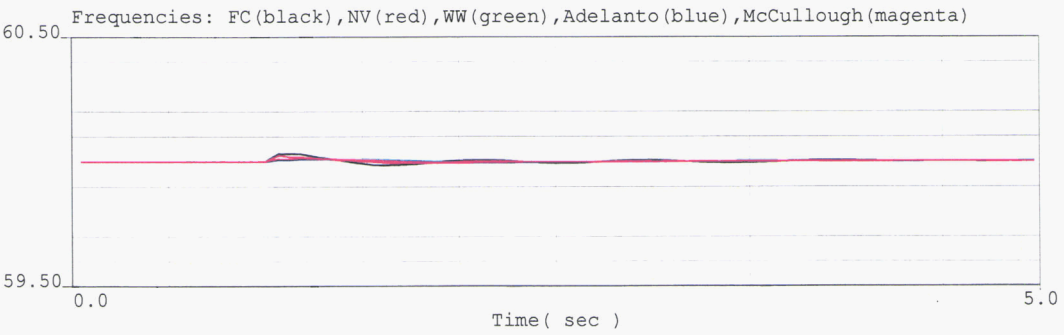


KYRENE FLT KYX-JJX LINE OUT
KYX-JJX STAB #1; 01/07; T=0 3P FLT KYX500;
4C CLR FLT W/KYX-JJX;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

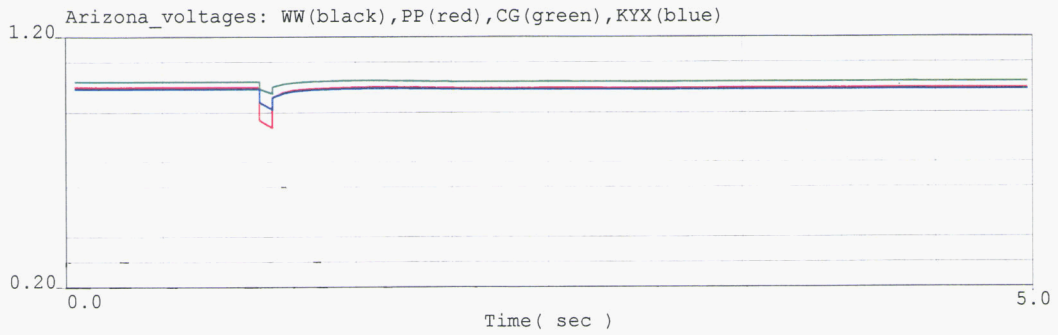


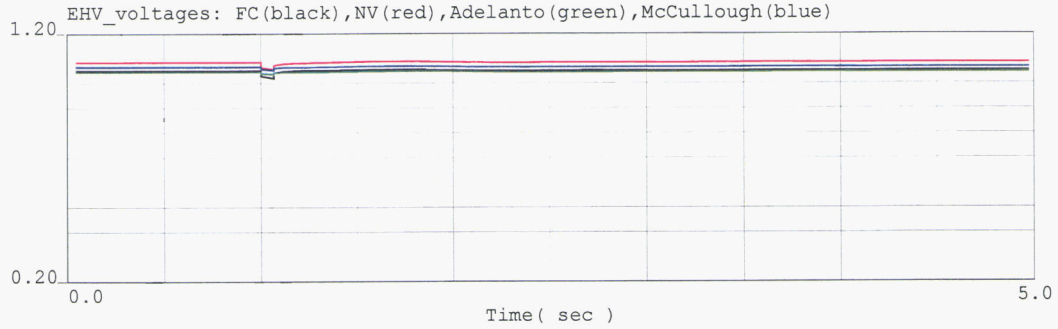


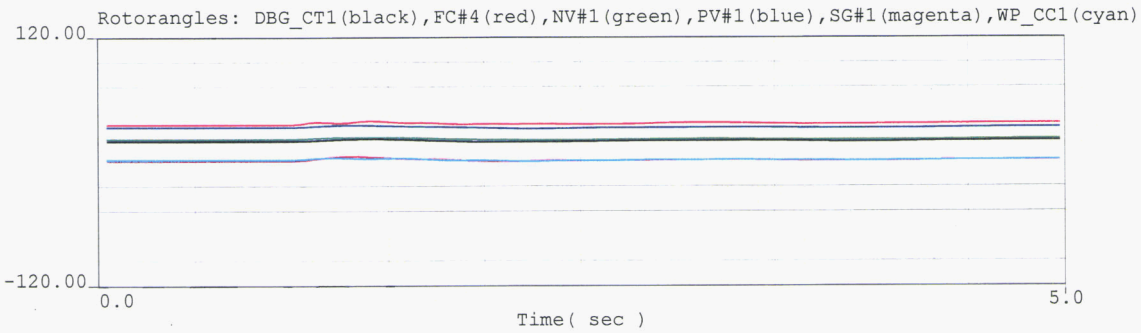


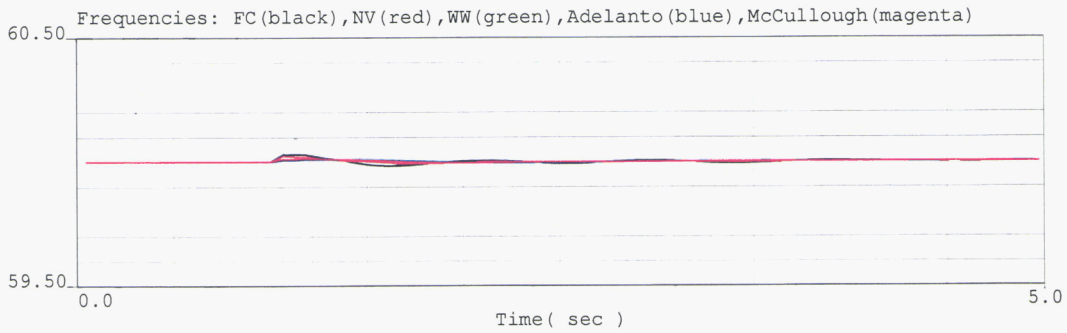


MAZATZAL 345KV FLT MZ-PP LINE OUT
MZ-PP STAB; 01/07; T=0 3P FLT MZ345;
4C CLR FLT W/MZ-PP;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

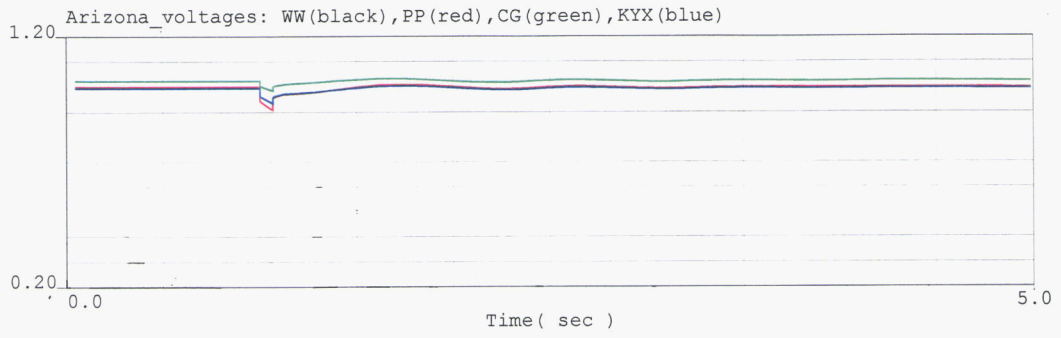


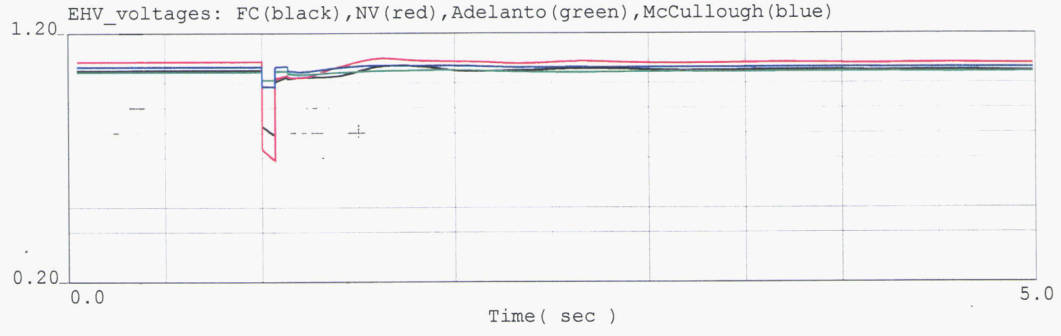


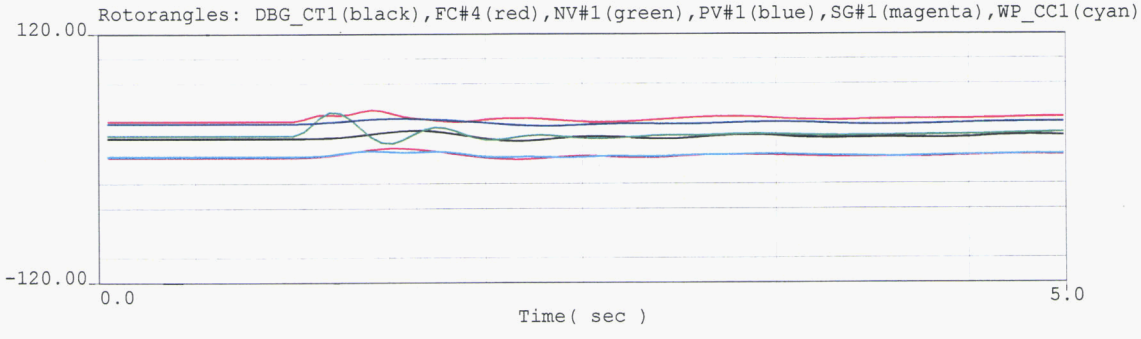


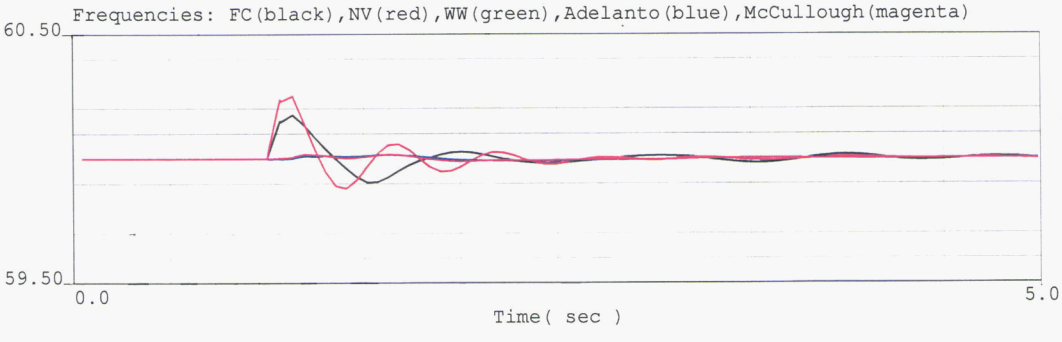


MAZATZAL 345KV FLT MZ-PC LINE OUT
MZ-PC STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/MZ-PC;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

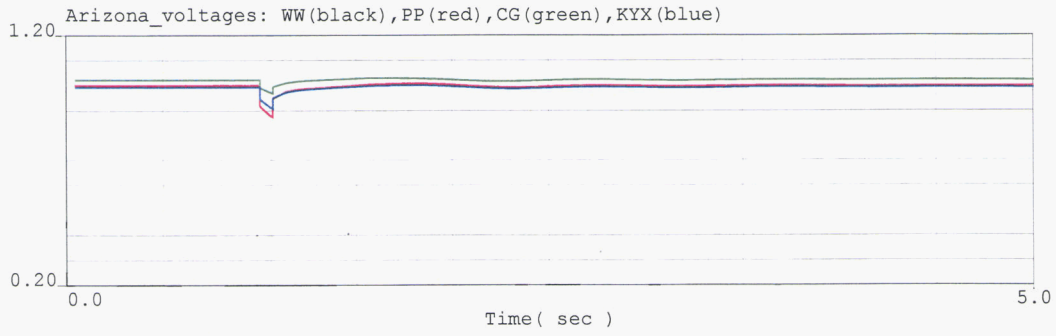


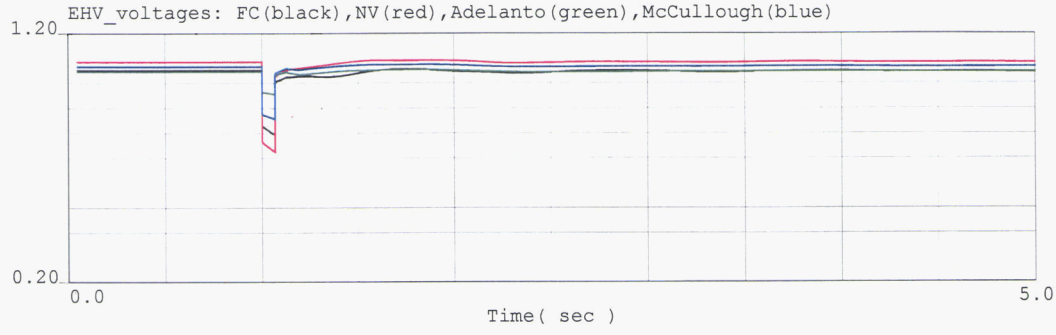


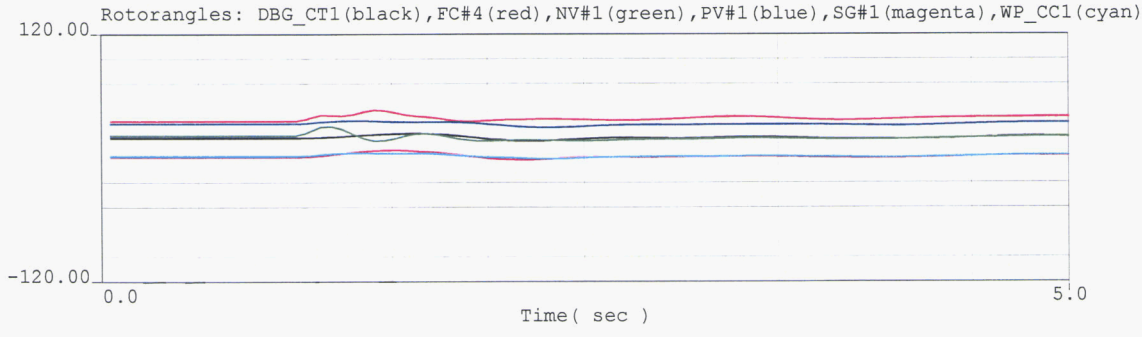


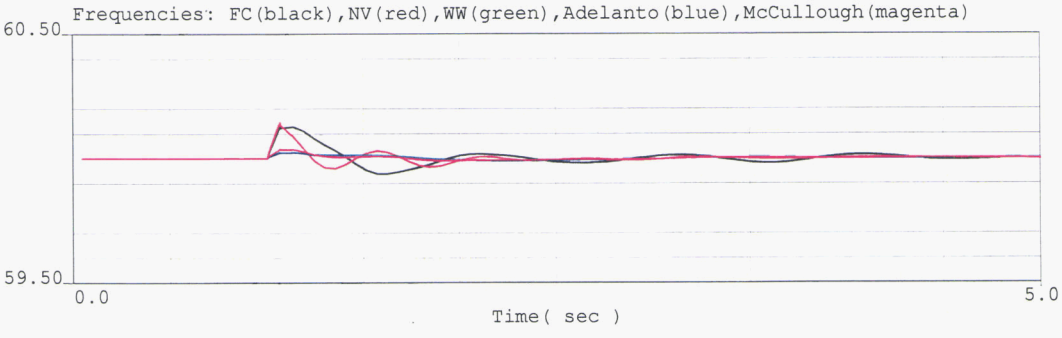


MOENKOPI FLT. MK-EOX line out
MK-EOX STAB; 1/07; T=0 3P FLT MK500;FLSH CAPS;
4C CLR FLT W/MK-EOX;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

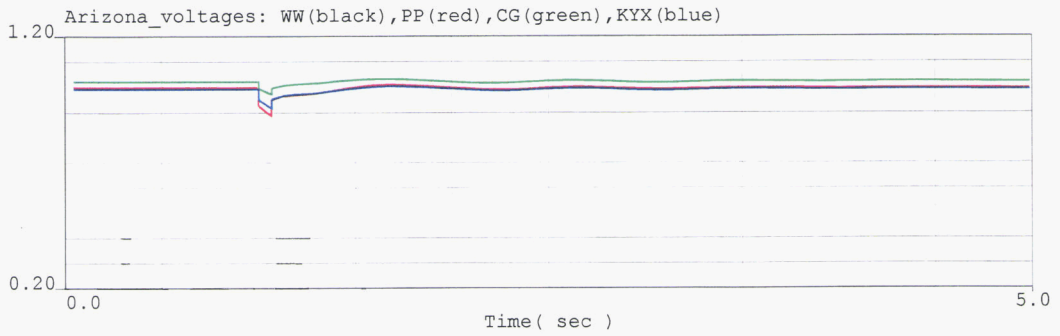


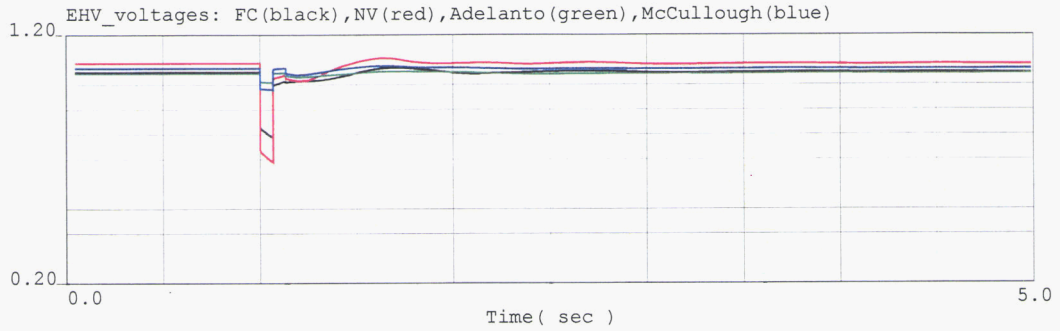


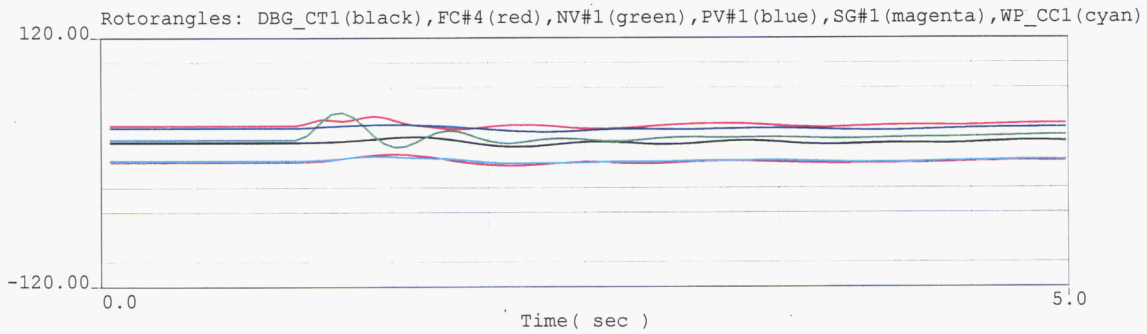


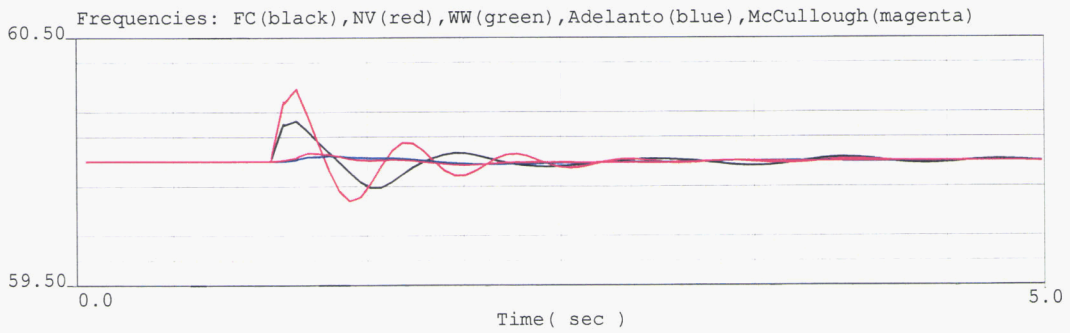


MOENKOPI FLT500 MK-FC out
MK-FC STAB; 1/07; T=0 3P FLT MK500;10% FLT DMPING;FLSH
CAPS; 4C CLR FLT W/MK-FC;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

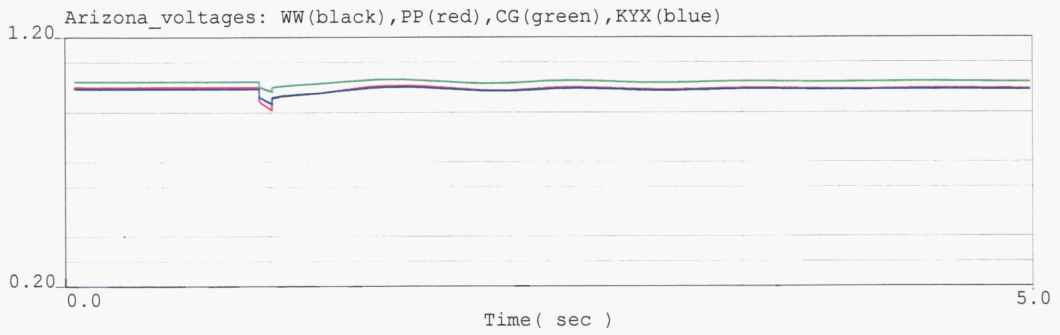


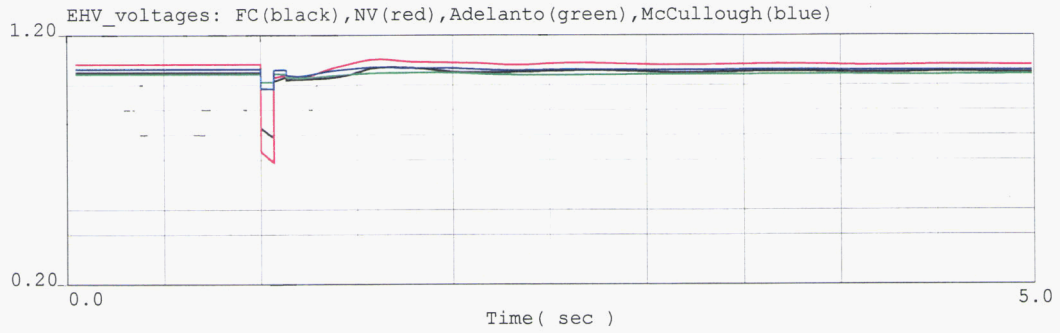


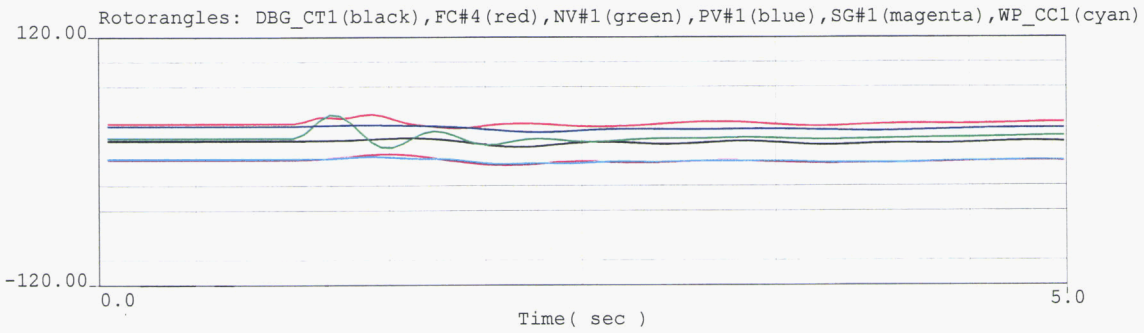


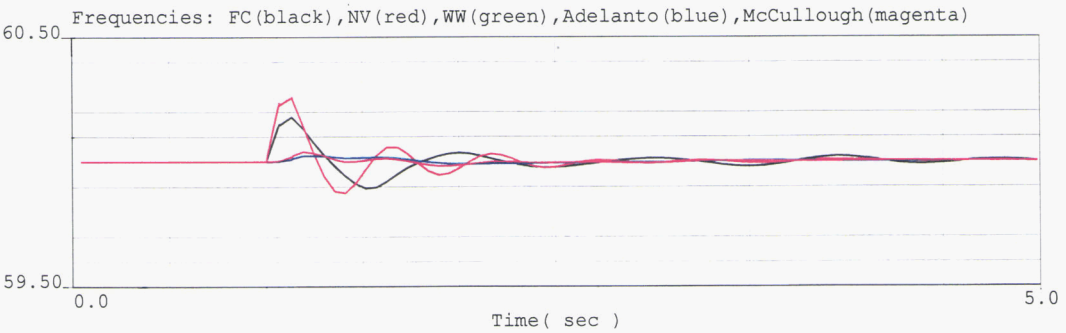


MOENKOPI FLT. MK-RME. line out
MK-RME STAB; 1/07; T=0 3P FLT MK500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/MK-RME;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

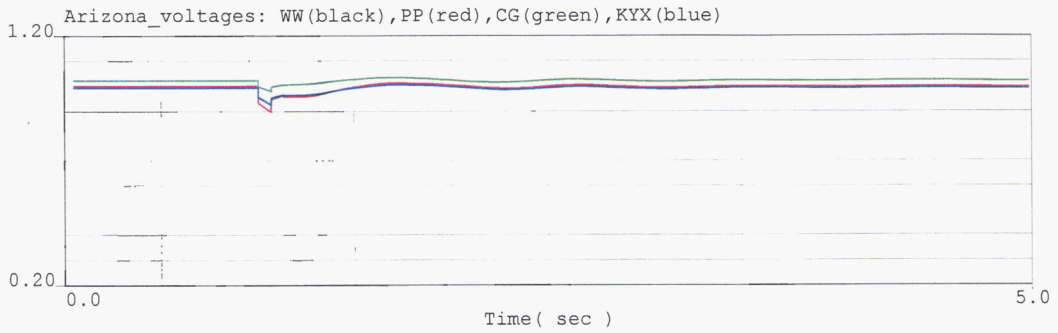


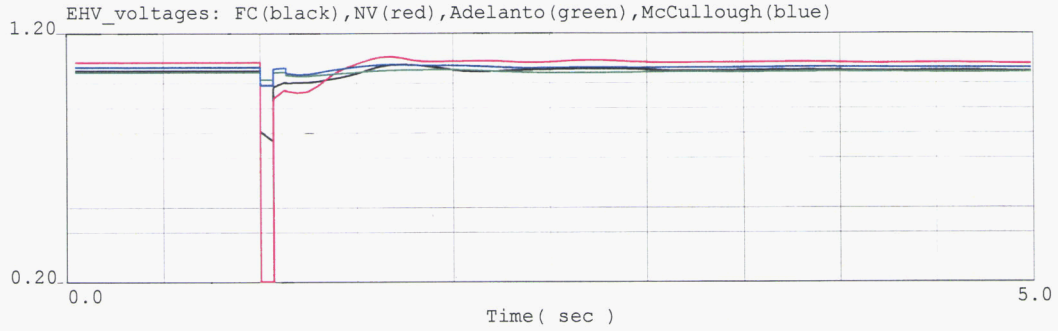


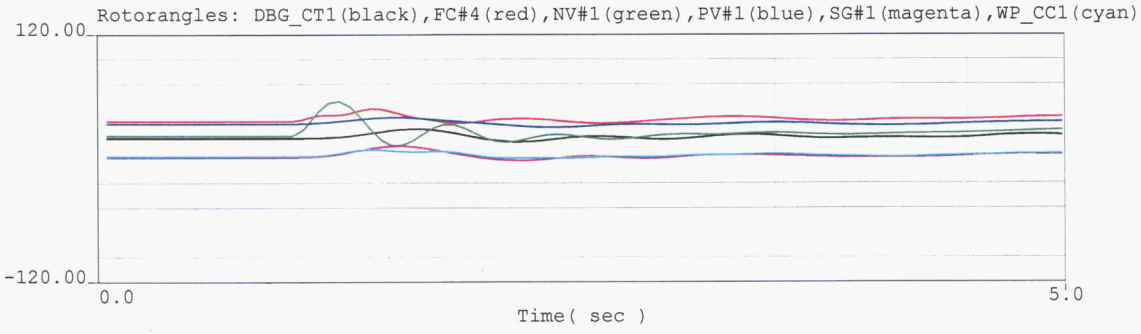


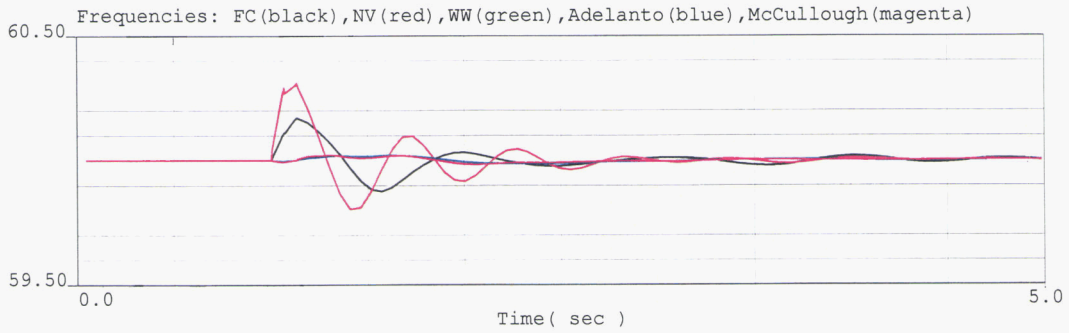


MOENKOPI FLT MK-YV line out
MK-YV STAB; 1/07; T=0 3P FLT MK500;FLSH CAPS;
4C CLR FLT W/MK-YV;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

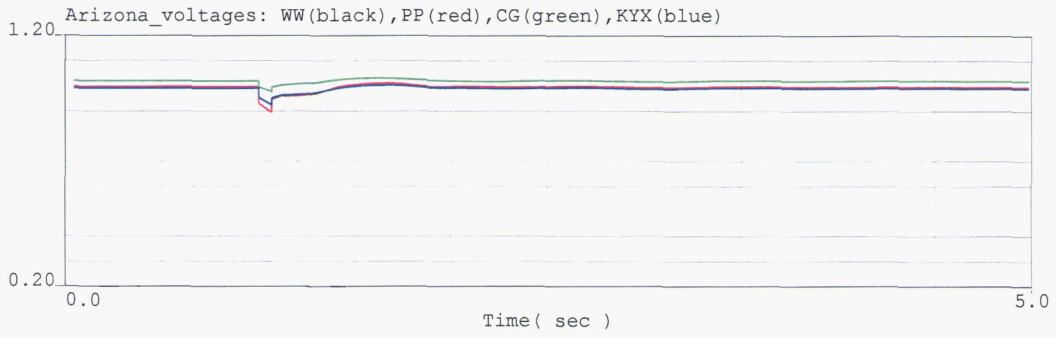


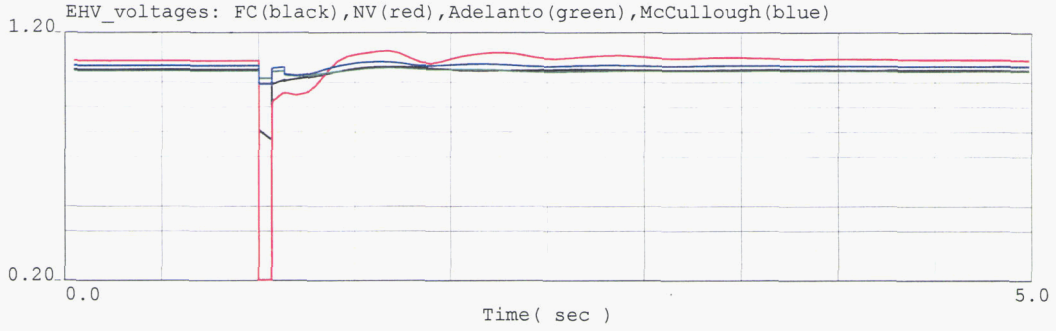


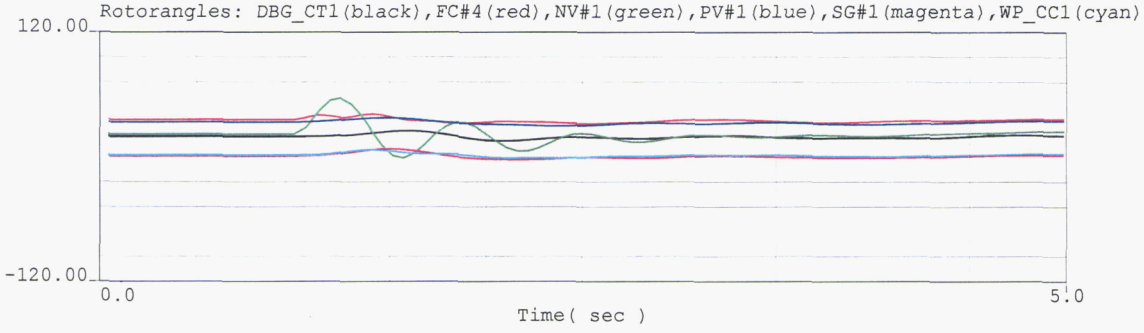


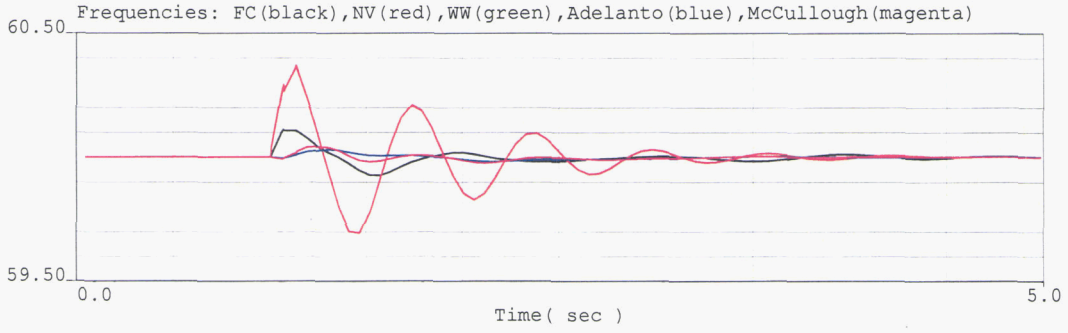


NAVAJO FLT. NV-CYX line out
NV-CYX STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-CYX;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

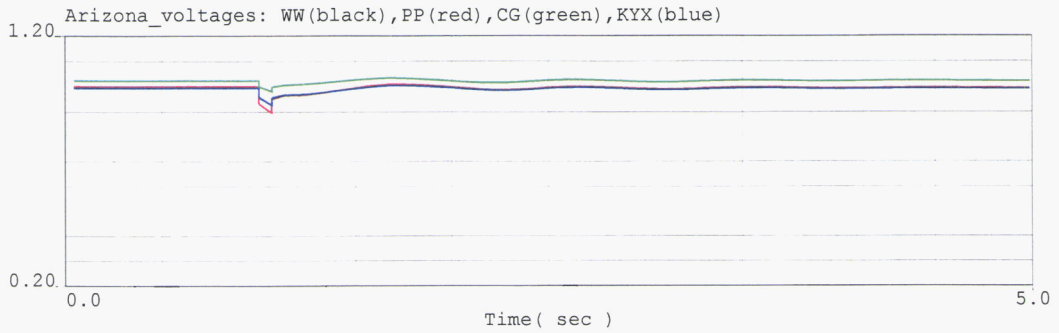


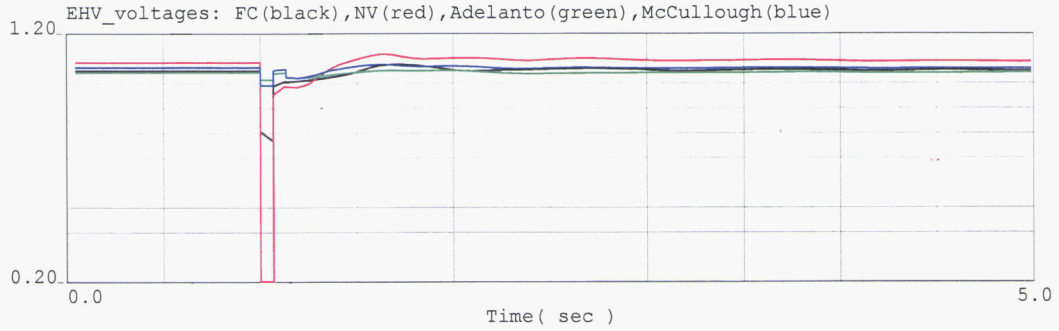


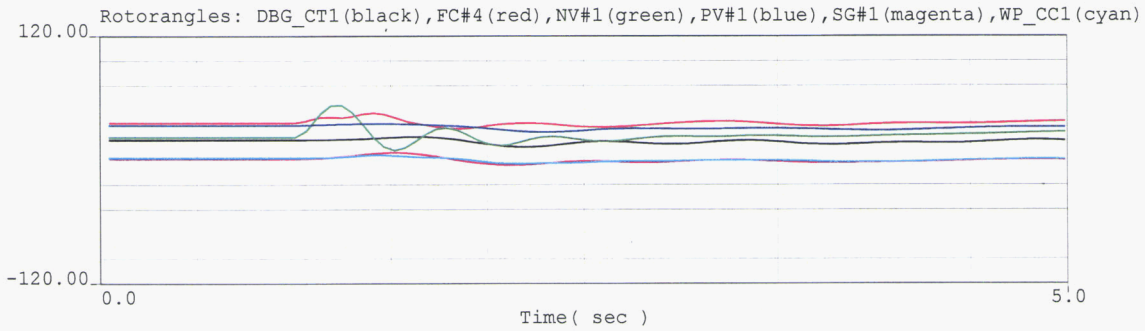


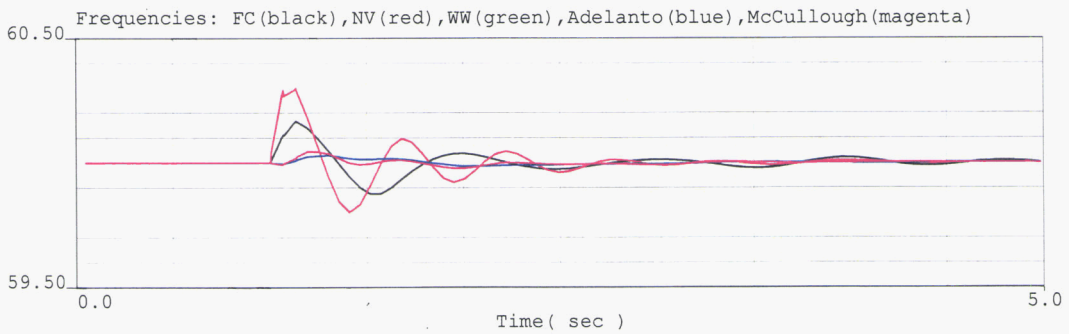


NAVAJO FLT. NV-RME. line out
NV-RME STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-RME;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

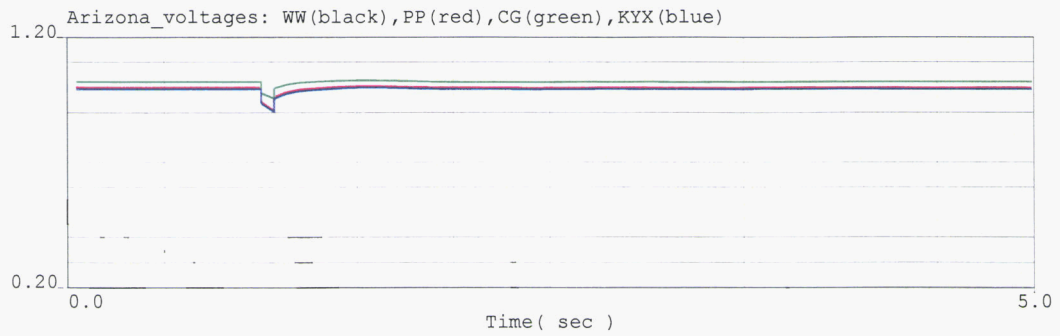


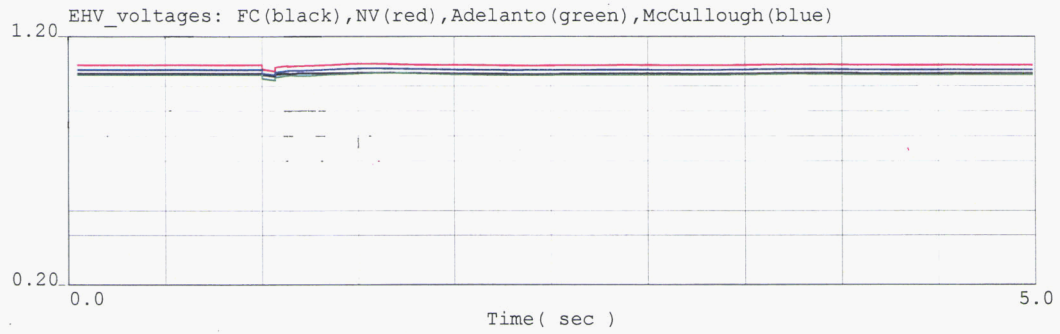


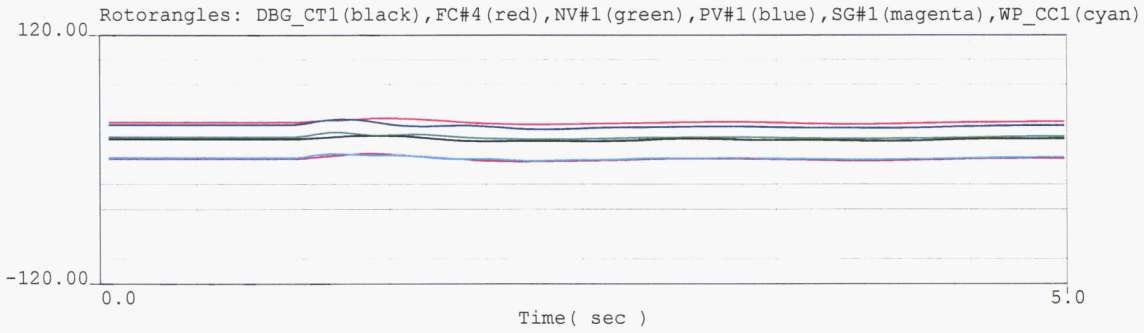


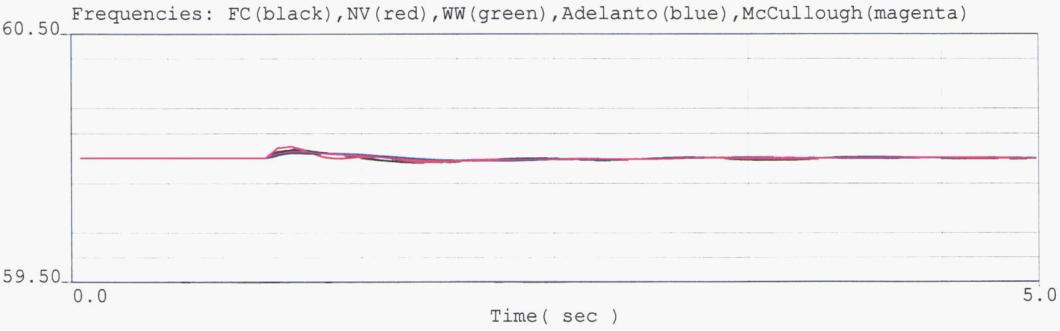


NAVAJO FLT NV-VV1 LINE OUT
NV-VV1 STAB; 1/07; T=0 3P FLT NV500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/NV-VV1;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

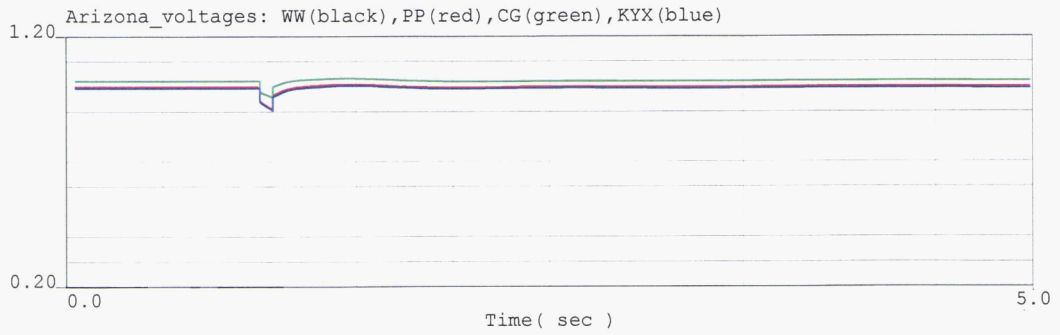


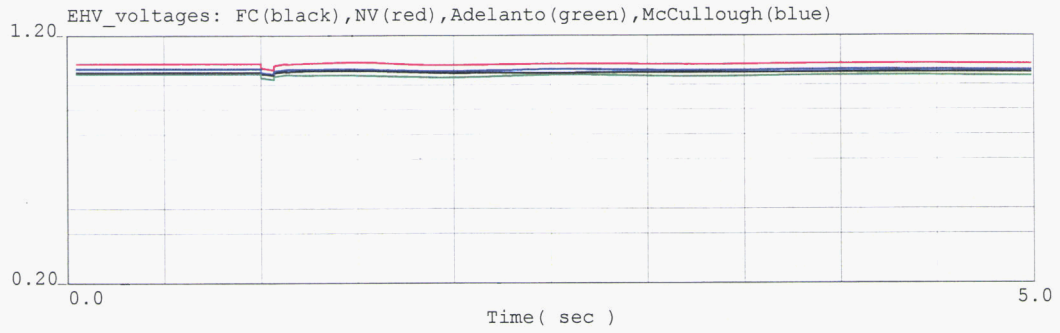


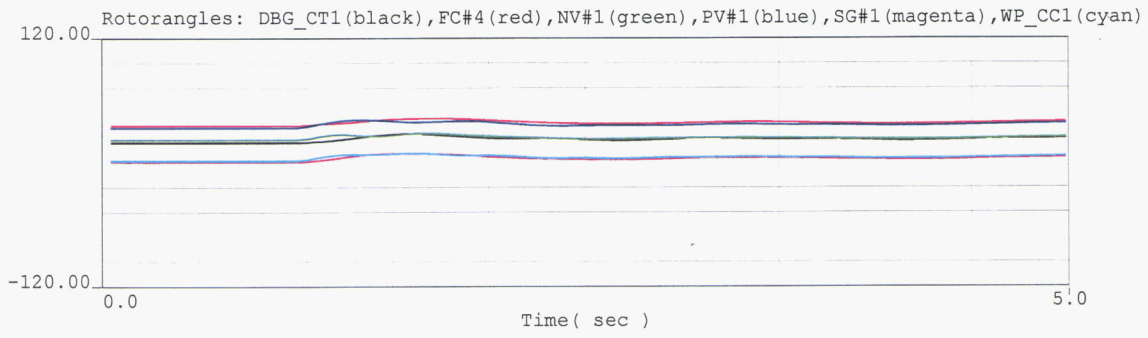


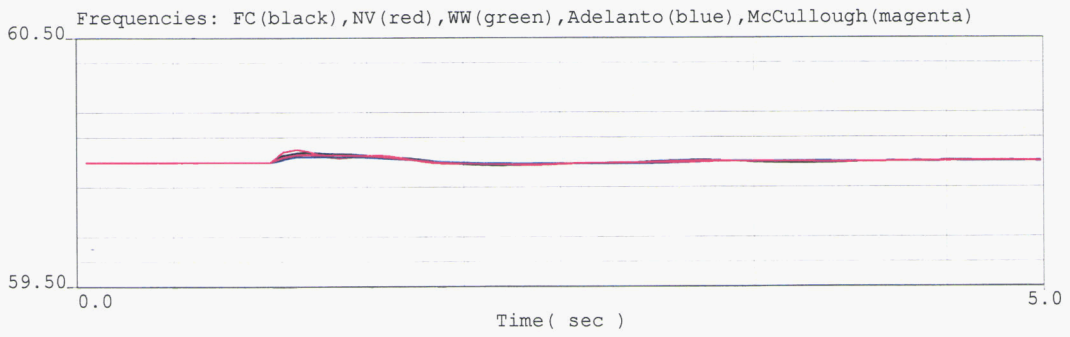


N.GILA FLT NG-HAAX LINE OUT
NG STAB;3 PH FLT NG500KV; FLASH CAPS; 4 CYC CLR FLT;
NG-HAAX OUT;4/8 CYC REIN CAPS;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

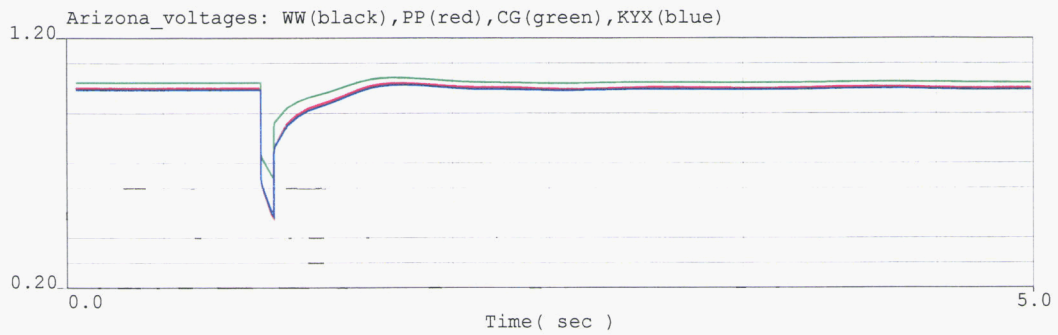


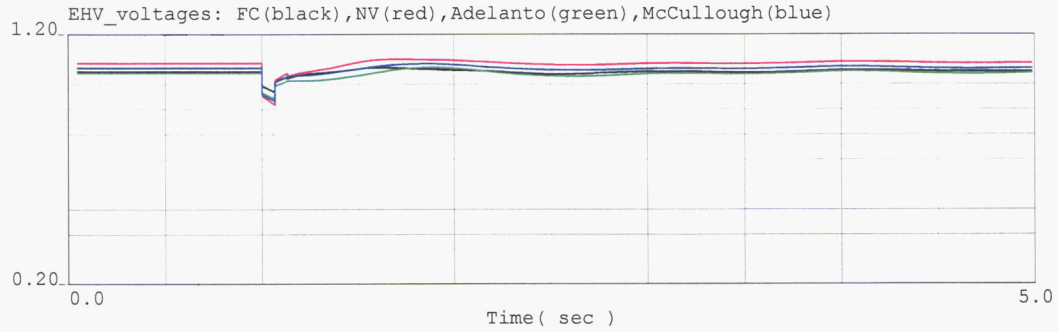


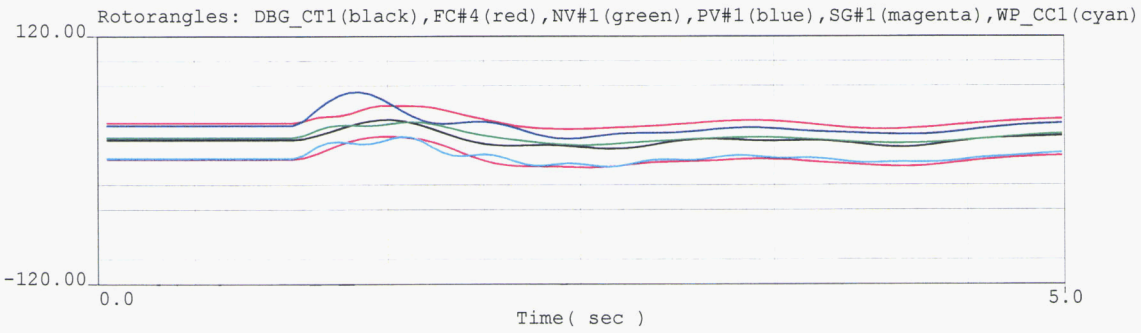


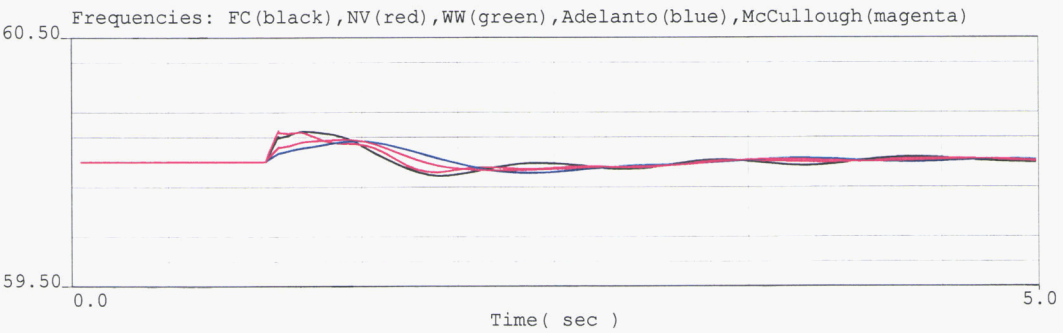


N.GILA FLT NG-IVX. V LINE OUT
NG STAB,3 PH FLT NG500KV;FLASH CAPS;W/4 CYC CLR FLT;
NG-IVX OUT;4/8 CYC REIN CAPS;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

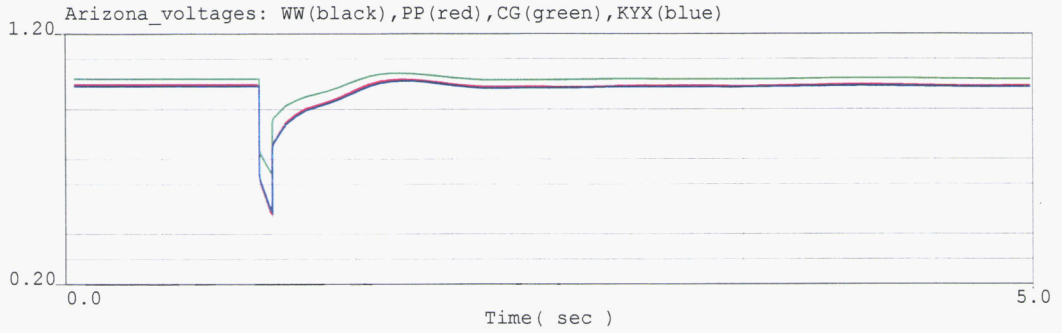


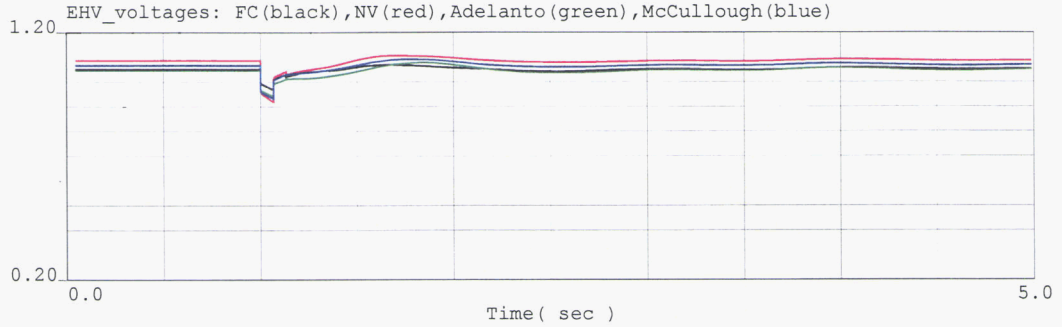


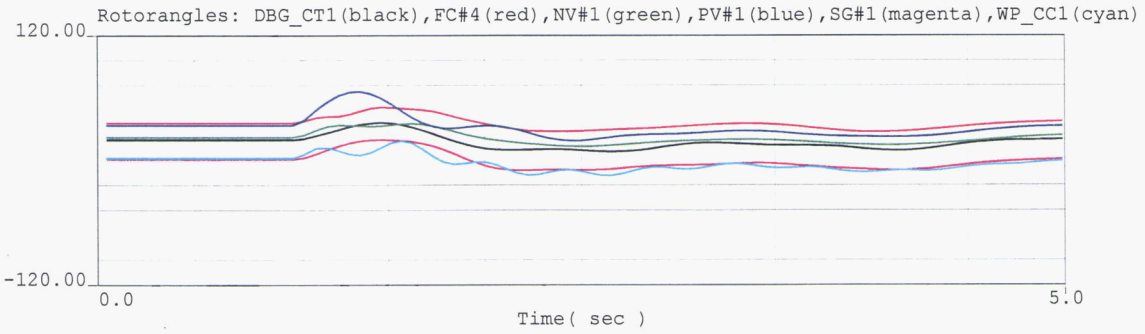


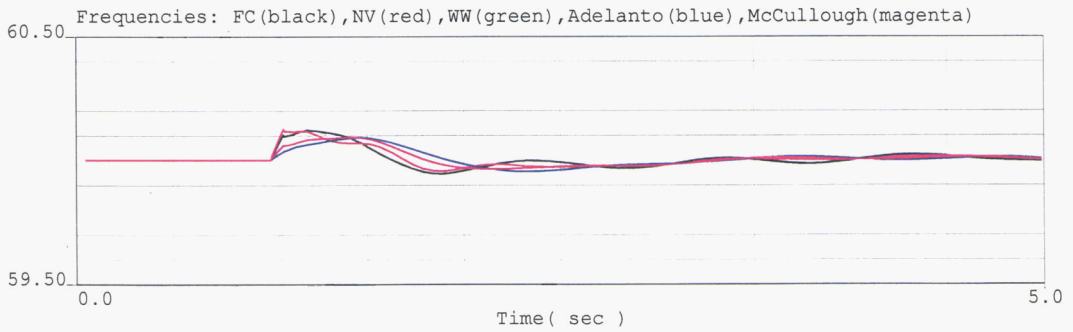


PALO VERDE FLT. w/PLX-DEX line out
PLX-DVX STAB; 1/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-DVX;4/8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

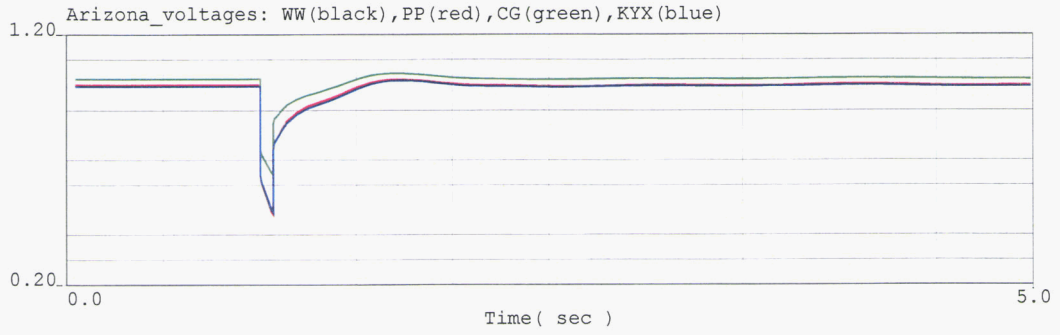


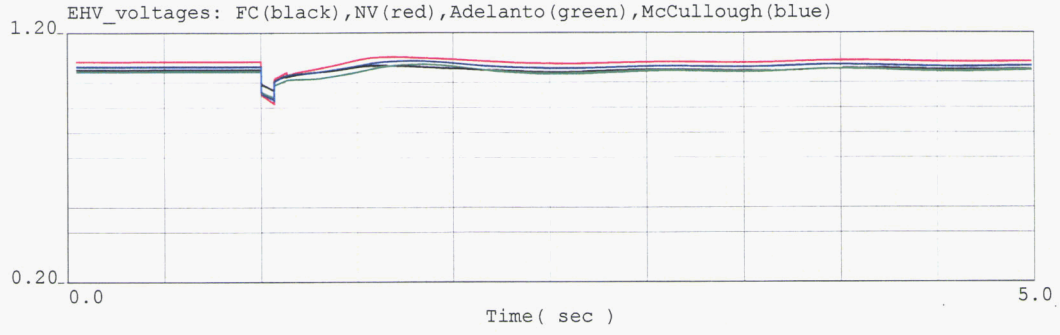


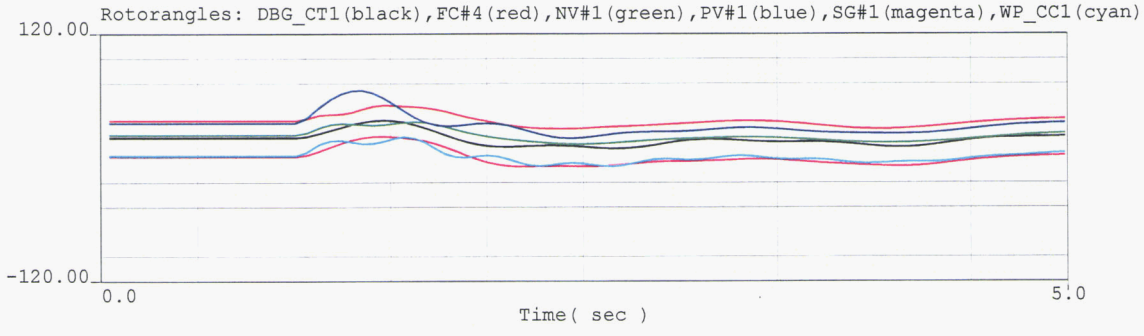


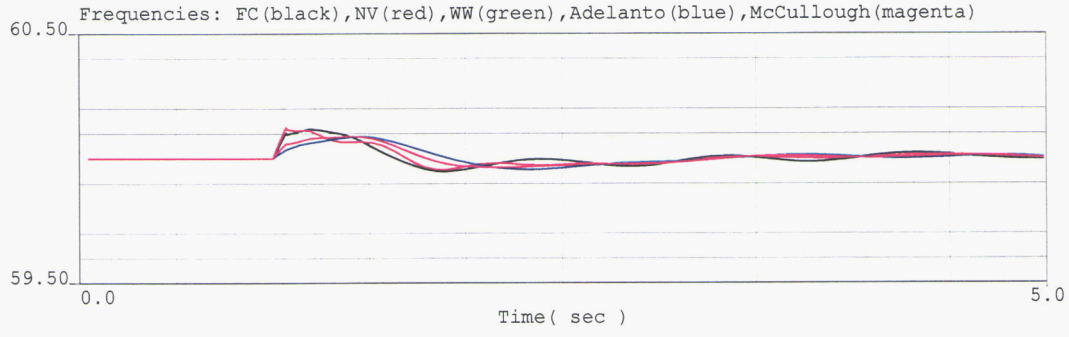


PALO VERDE FLT PLX-RUX LINE OUT
PLX-RUX STAB; 01/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-RUX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

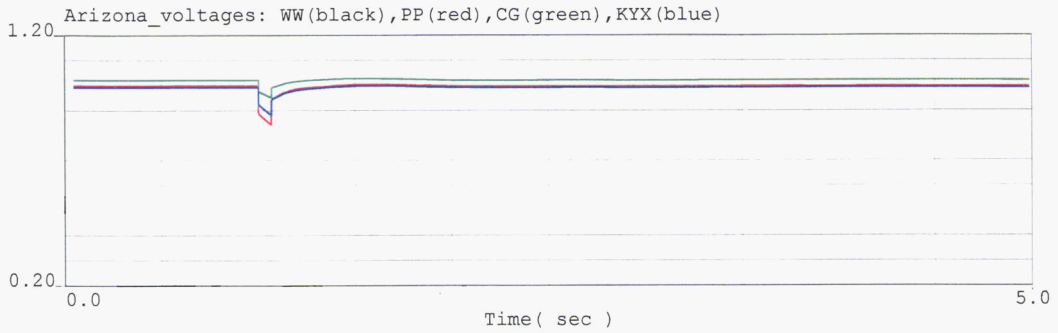


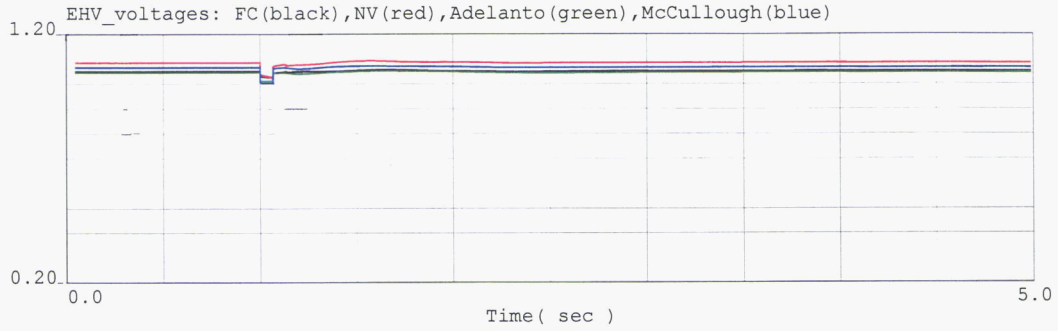


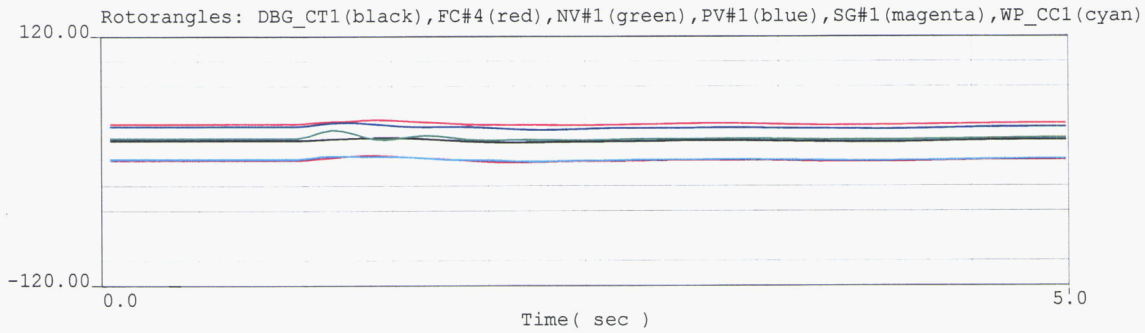


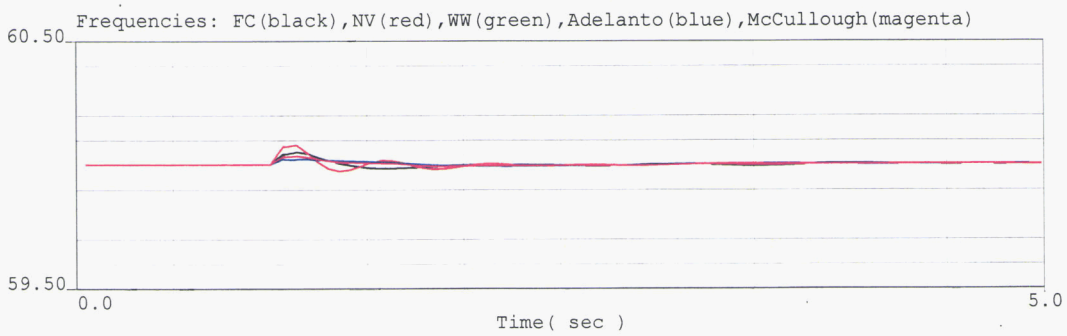


PALO VERDE FLT w/PLX-WW line out
PLX-WW STAB; 1/07; T=0 3P FLT PLX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/PLX-WW;4/8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

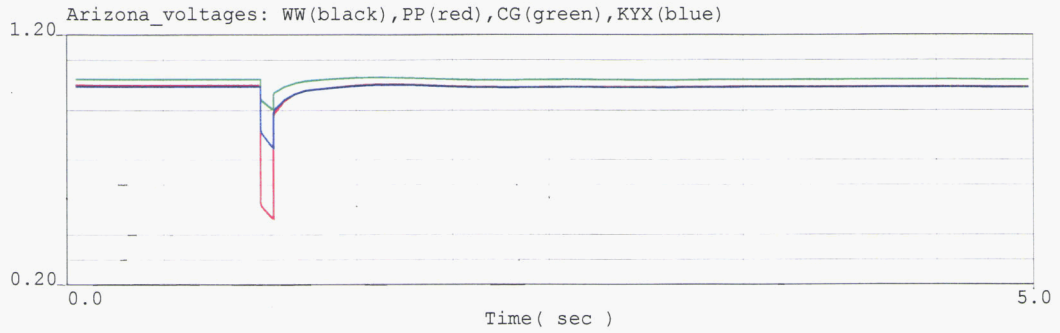


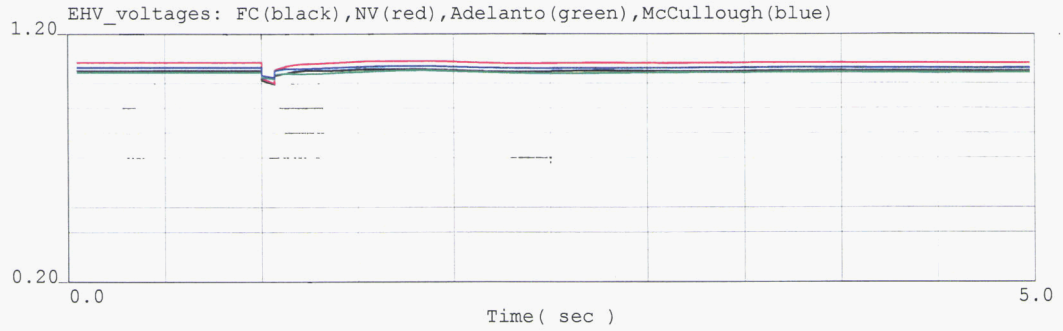


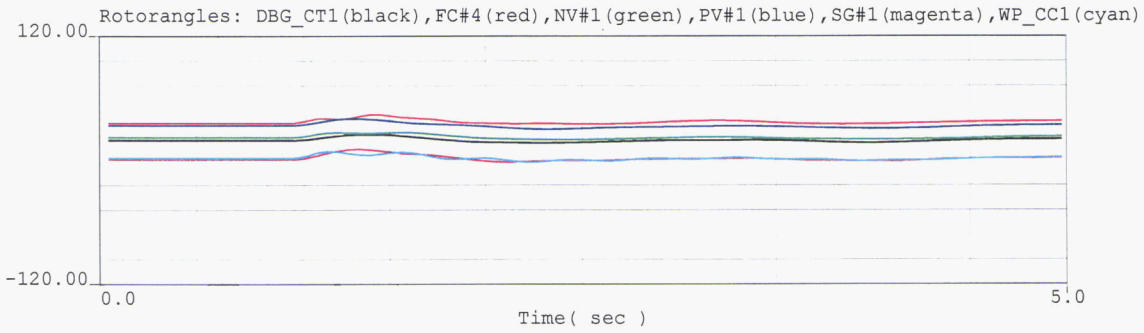


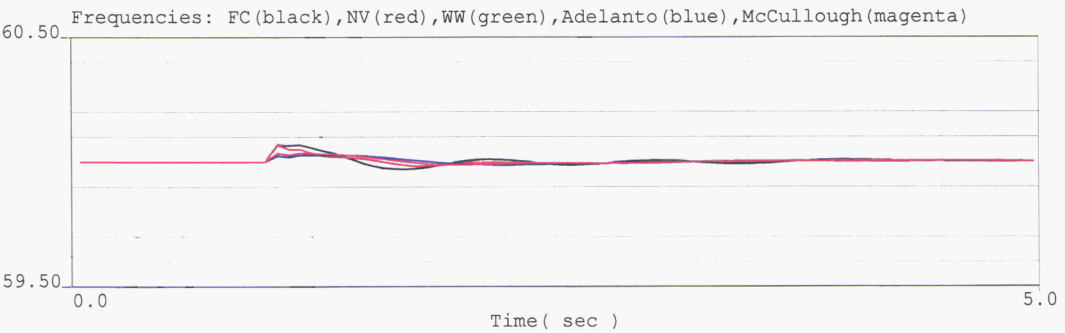


PERKINS FLT PEX-MEX LINE OUT
PEX-MEX STAB; 01/07; T=0 3P FLT PEX500;FLSH CAPS;
4C CLR FLT W/PEX-MEX;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

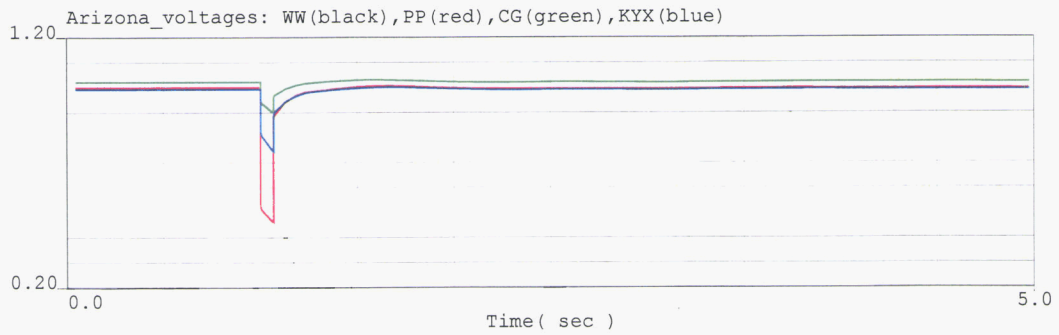


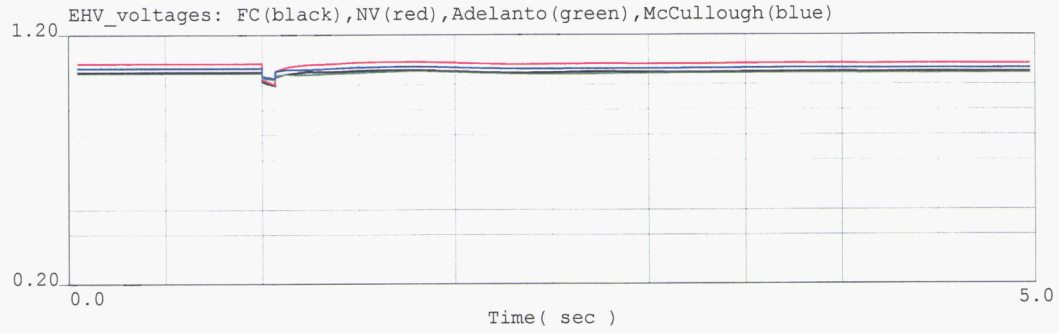


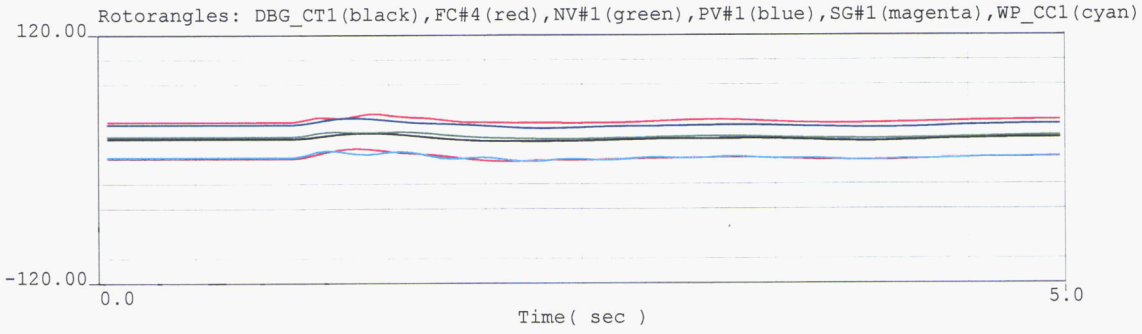


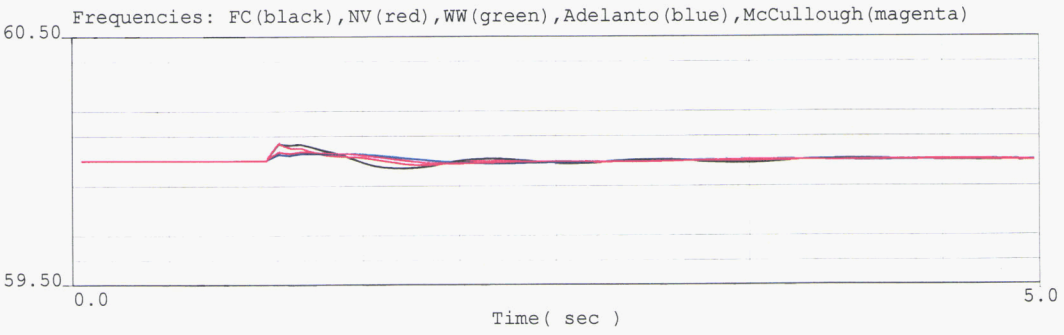


PINNACLE PEAK 345KV FLT PP-CH LINE OUT
PP-CH STAB; 01/07; T=0 3P FLT PP345;
4C CLR FLT W/PP-CH;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

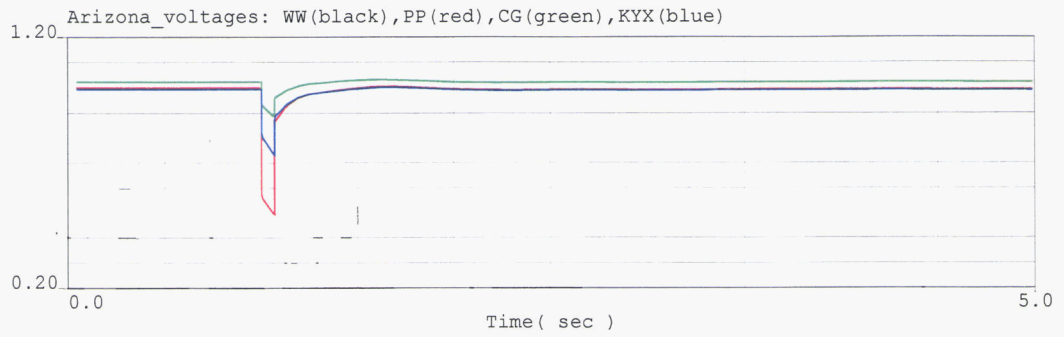


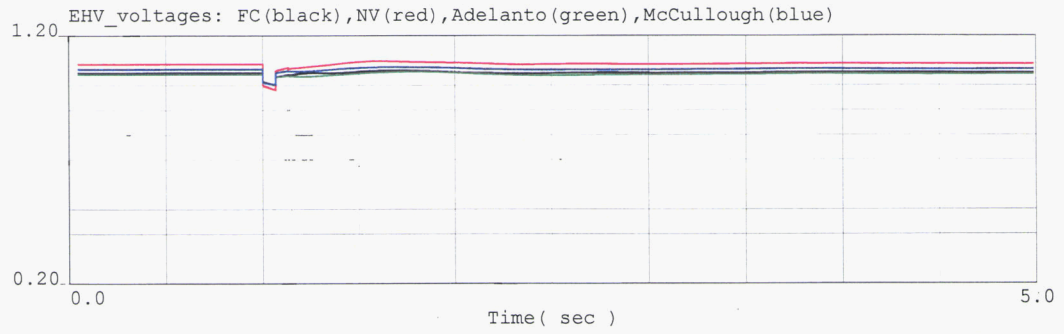


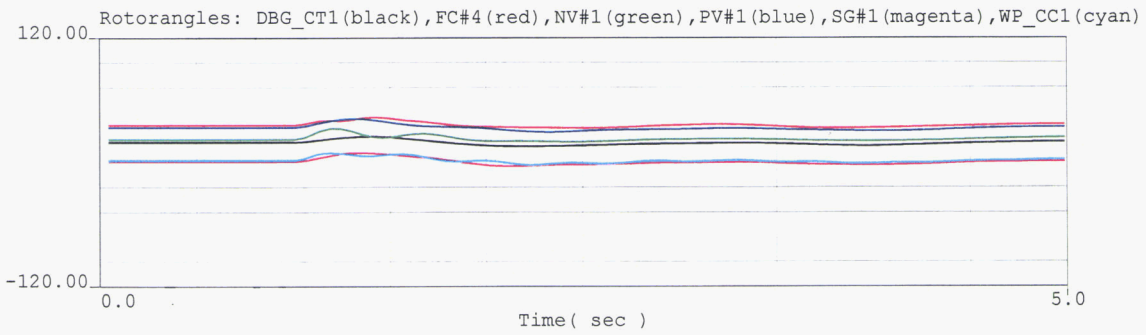


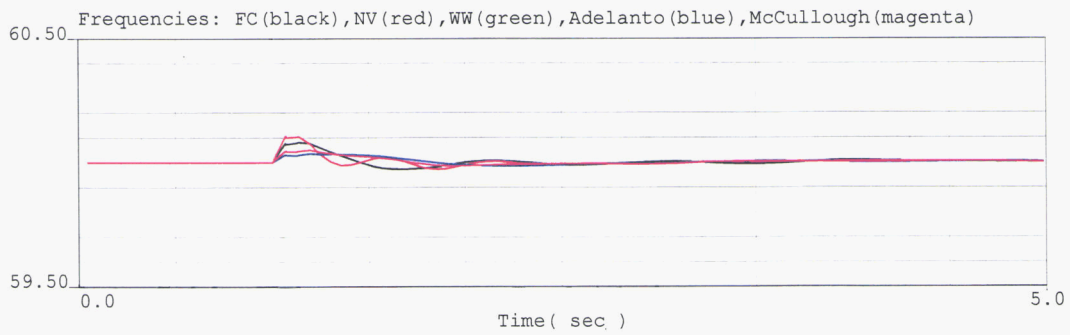


PINNACLE PEAK 345KV FLT PP-MZ LINE OUT
PP-MZ STAB; 01/07; T=0 3P FLT PP345;
4C CLR FLT W/PP-MZ;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

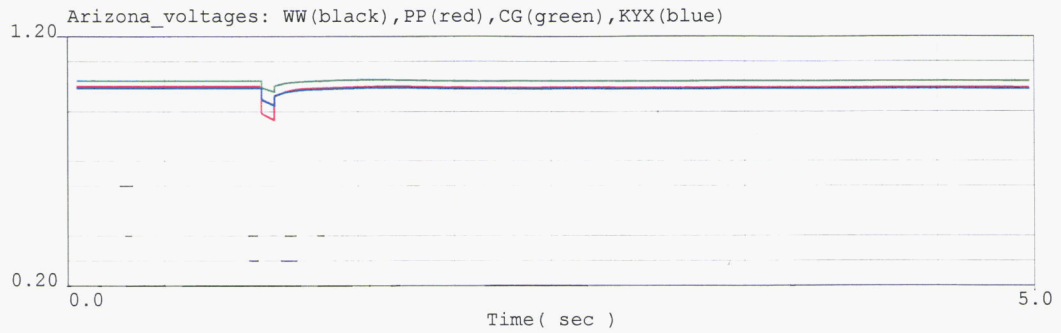


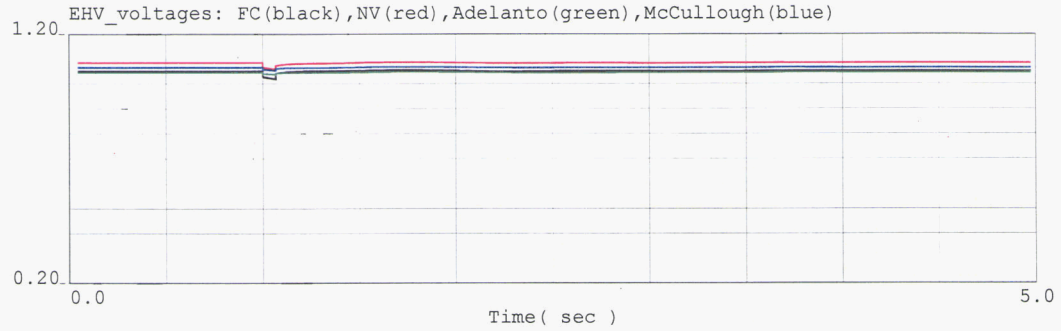


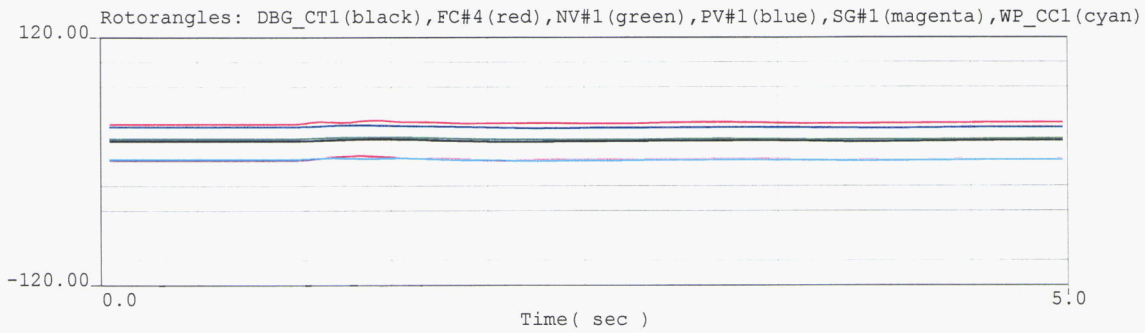


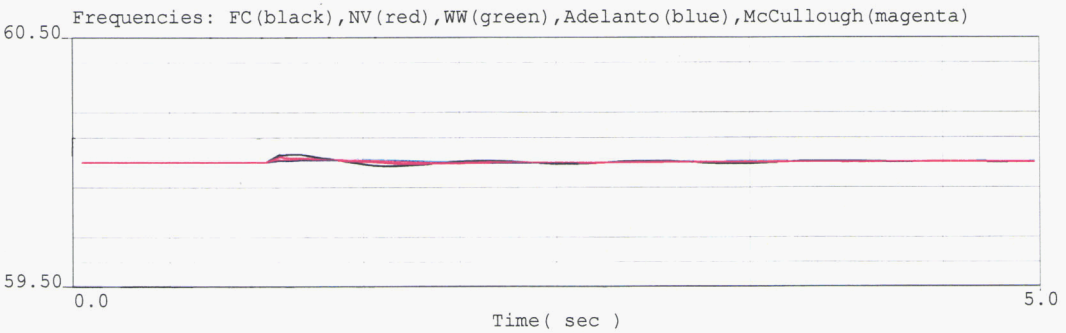


PINNACLE PEAK FLT. PP-TS9 line out
PP-TS9 STAB; 1/07; T=0 3P FLT PP500;FLSH CAPS;
4C CLR FLT W/PP-TS9;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

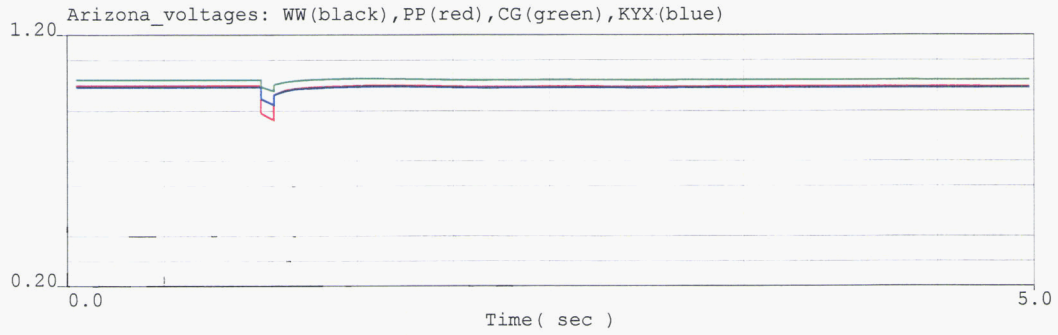


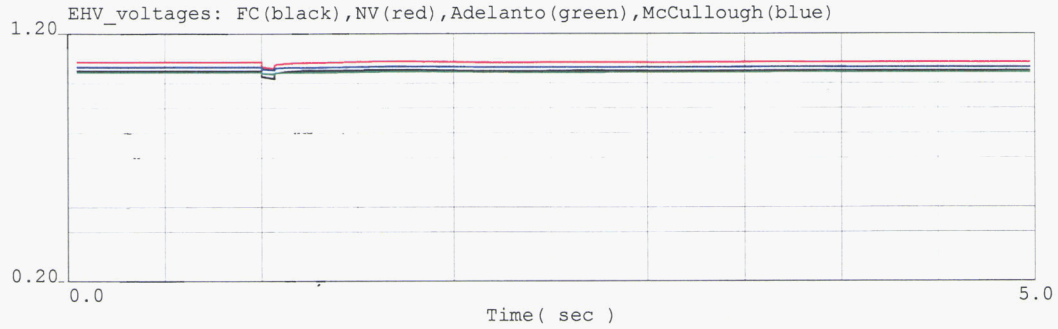


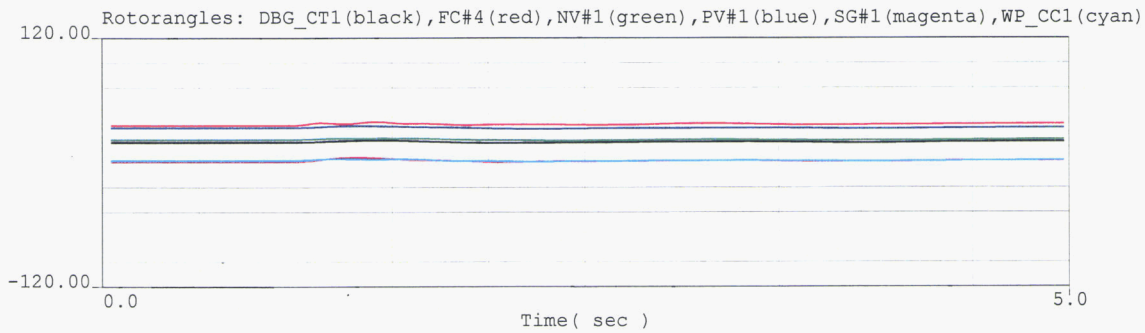


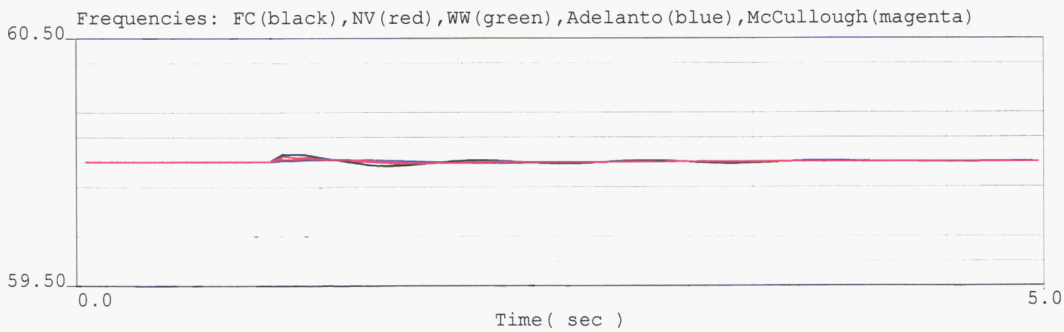


PREACHER CANYON 345KV FLT PC-CH LINE OUT
PC-CH STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/PC-CH;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

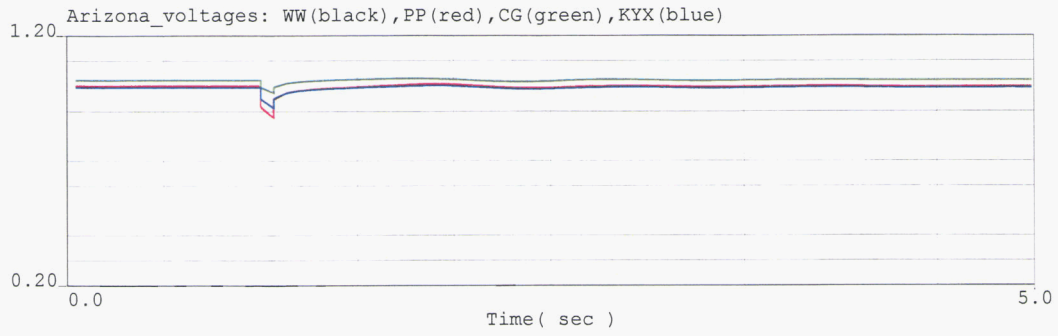


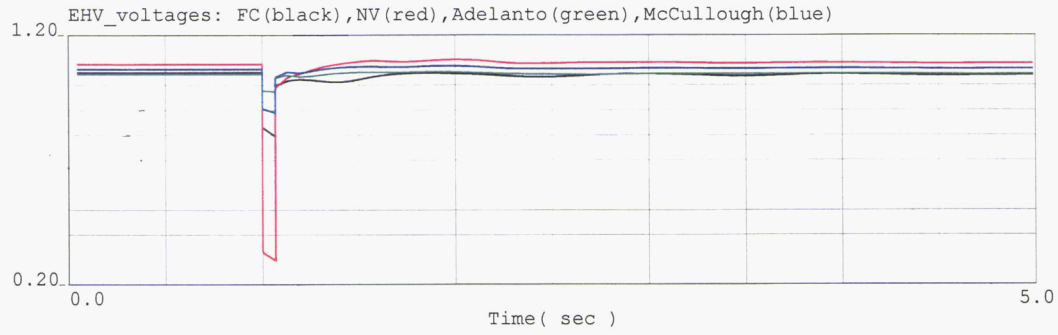


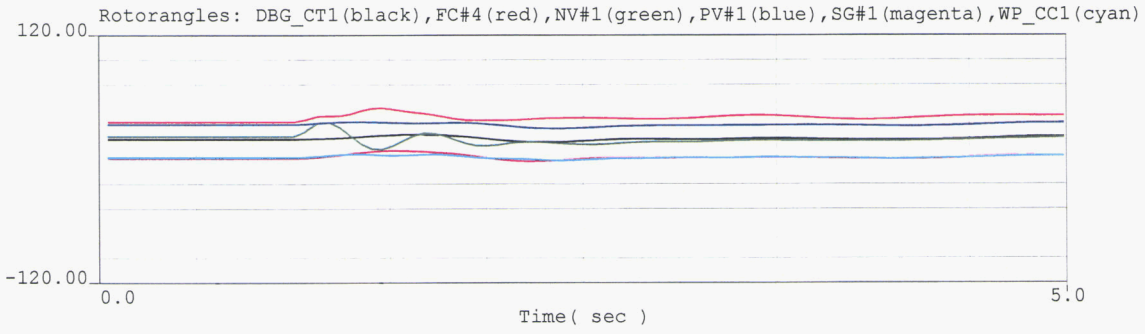


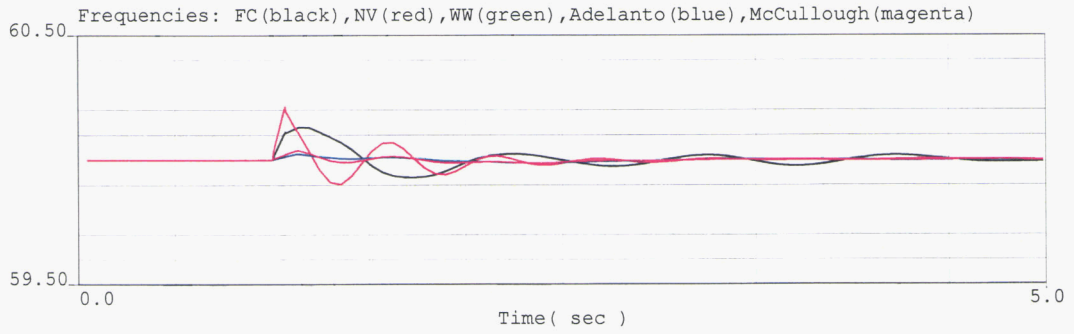


PREACHER CANYON 345KV FLT PC-MZ LINE OUT
PC-MZ STAB; 01/07; T=0 3P FLT PC345;
4C CLR FLT W/PC-MZ;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

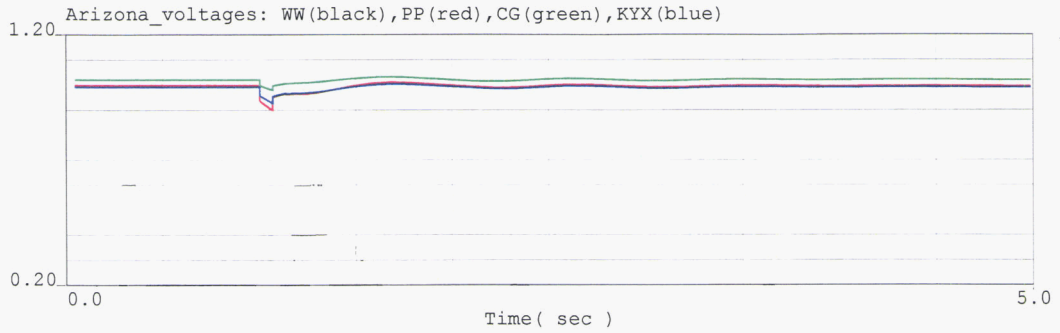


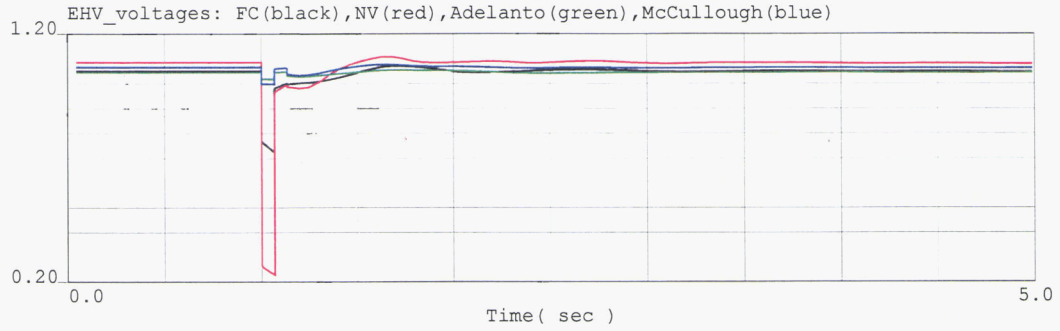


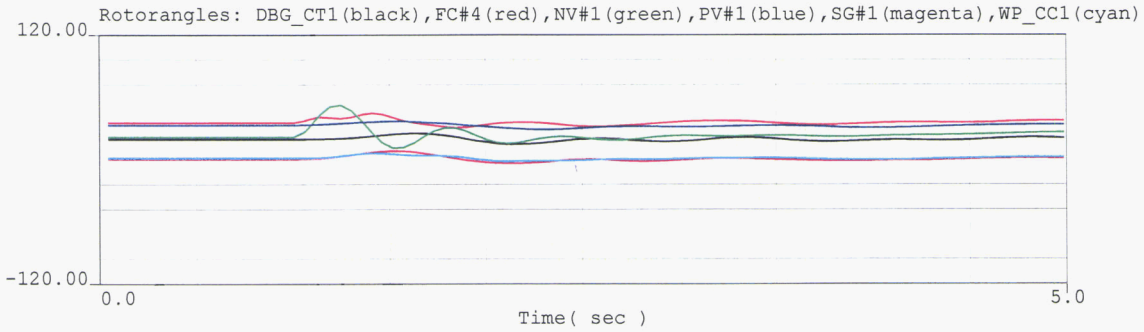


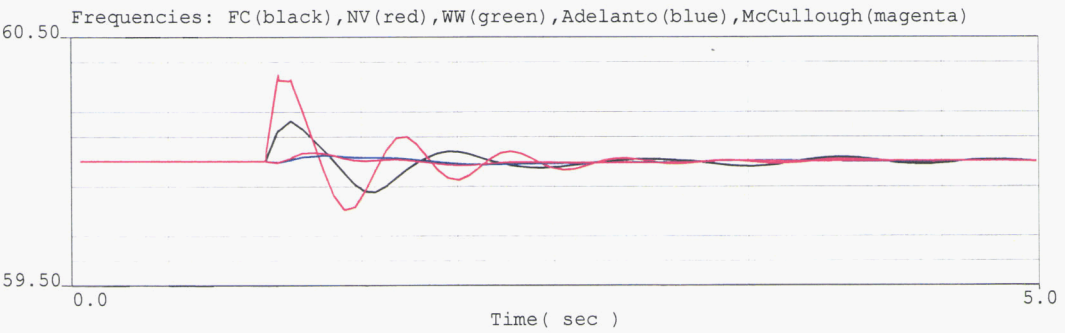


RME FLT500 RME-FCW out
RME-FCW STAB; 1/07; T=0 3P FLT RME500;10% FLT DMPING;FLSH
CAPS;4C CLR FLT W/RME-FCW;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

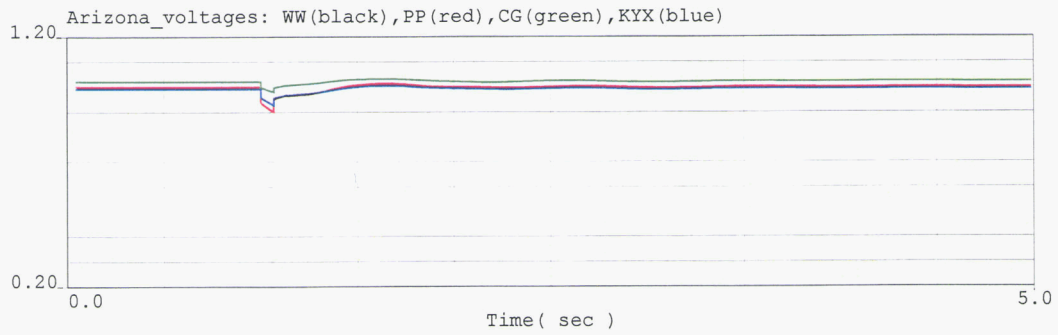


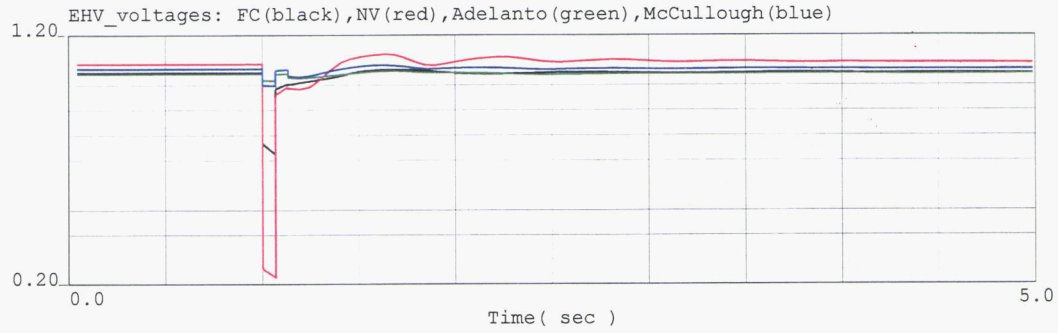


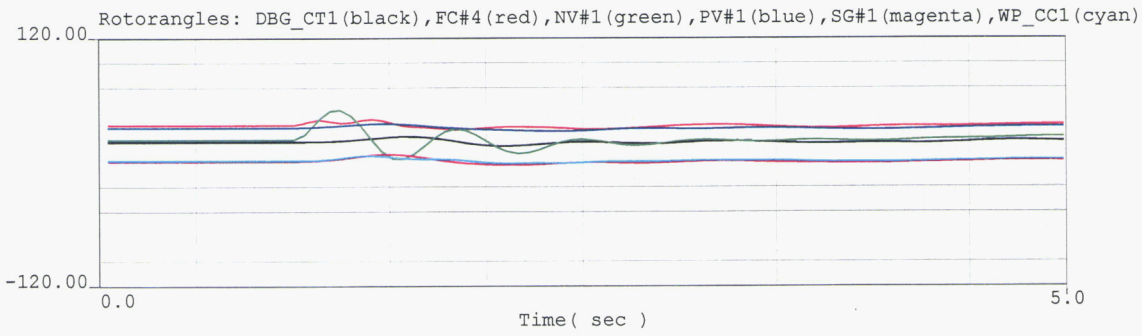


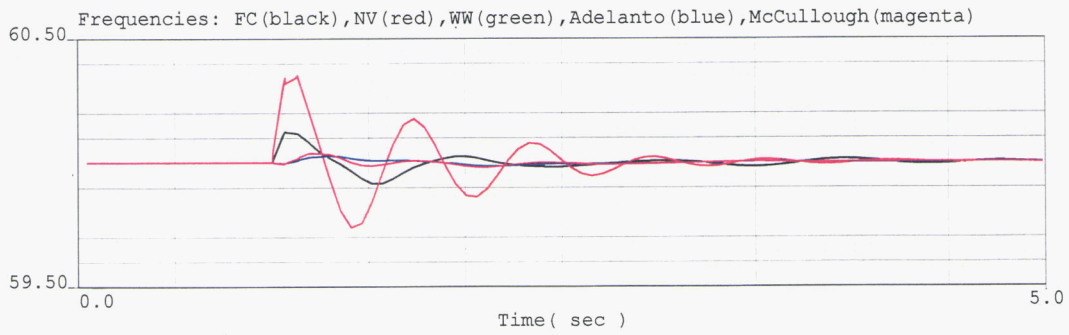


RED MESA EAST FLT. RME-MK. line out
RME-MK STAB; 1/07; T=0 3P FLT RME500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RME-MK;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

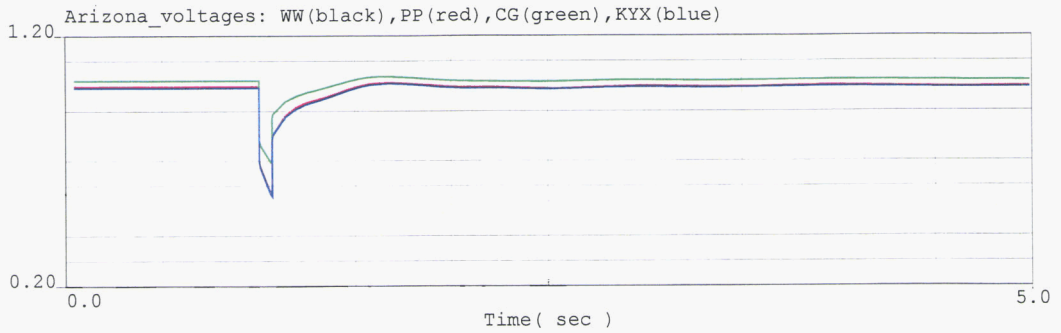


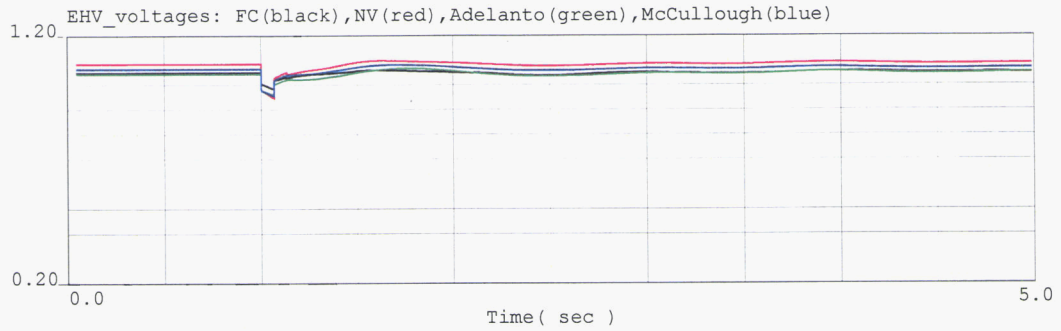


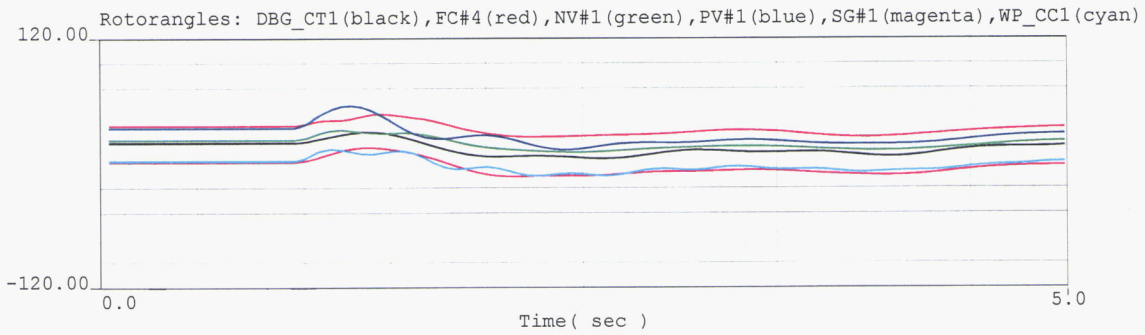


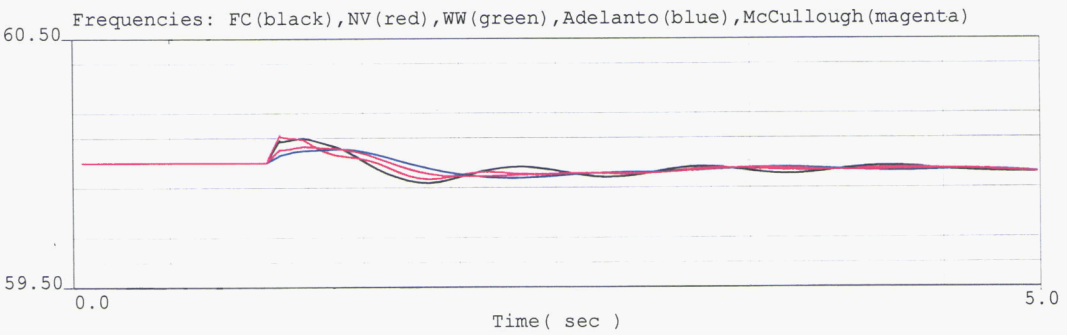


RED MESA EAST FLT. RME-NV. line out
RME-NV STAB; 1/07; T=0 3P FLT RME500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RME-NV;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

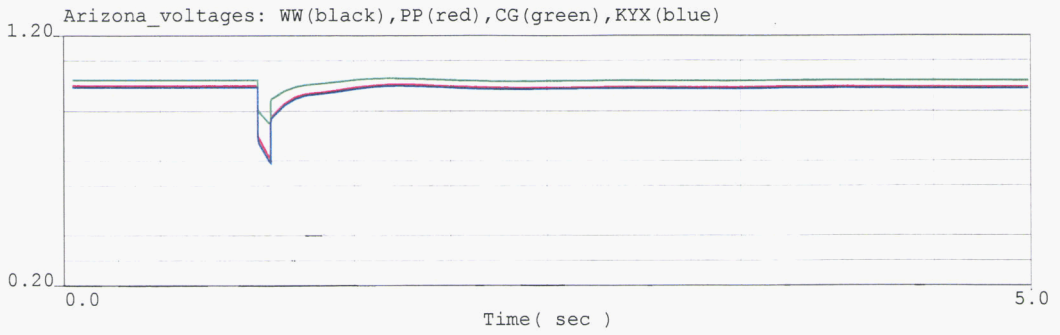


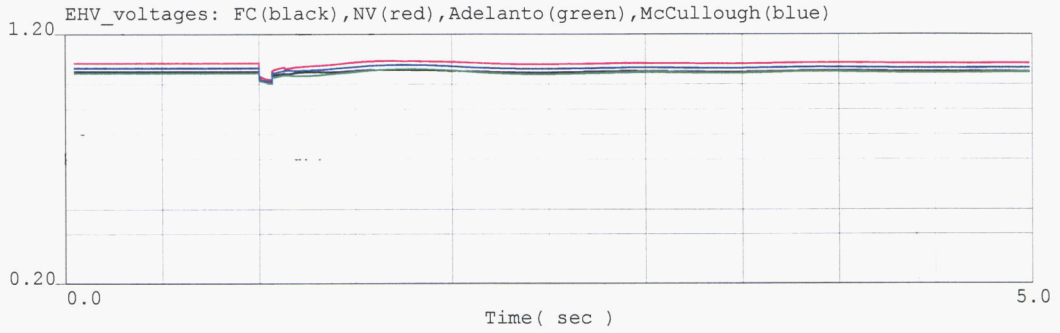


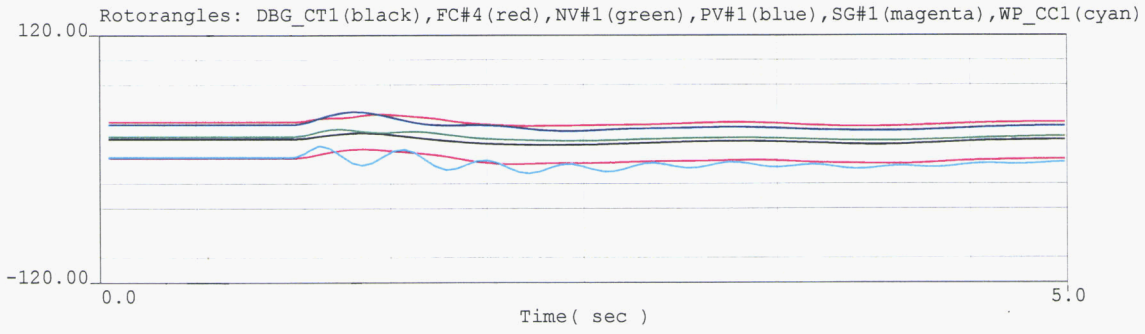


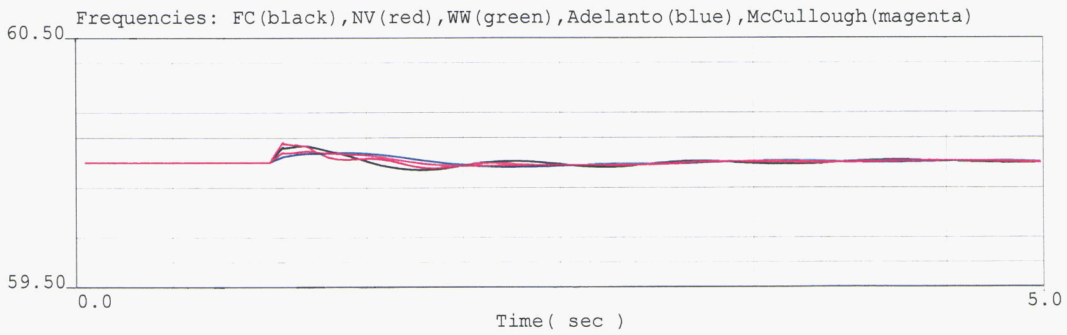


REDHAWK FLT RDHK-HAAX LINE OUT
RHK-HAAX STAB; 01/07; T=0 3P FLT RHK;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RHK-HAAX #1;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

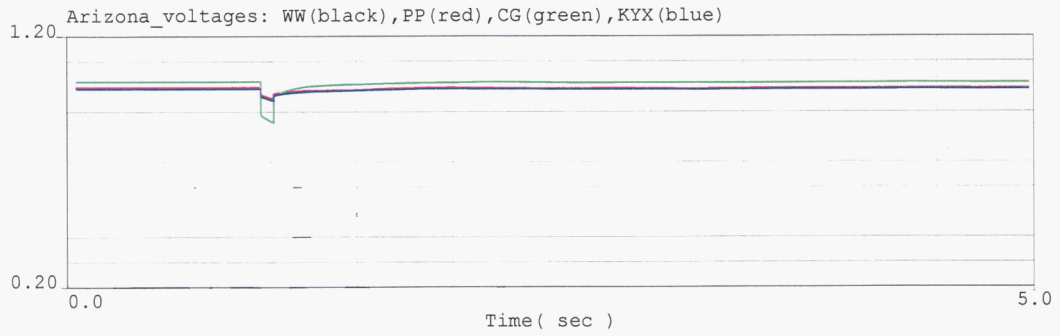


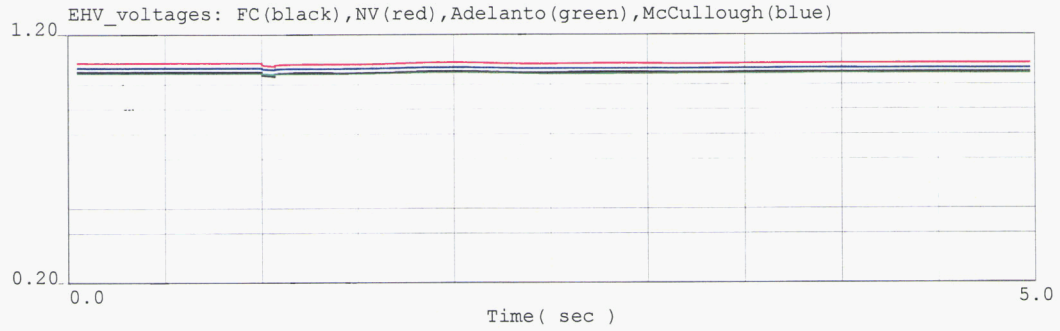


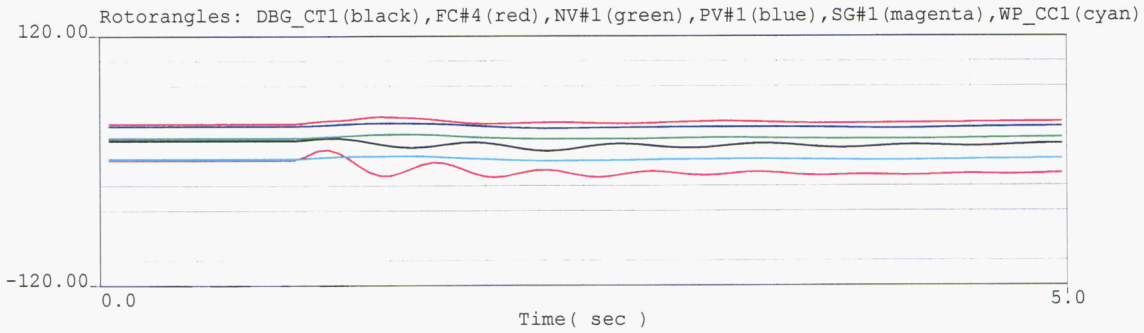


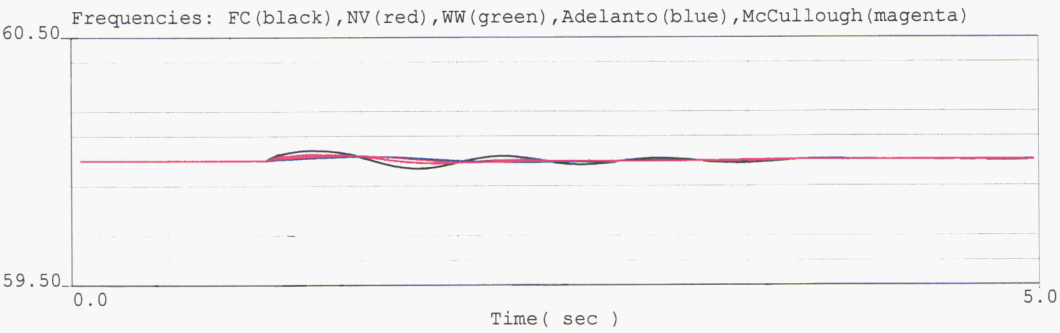


RUDD FLT RUX-PLX LINE OUT
RUX-PLX STAB #1; 01/07; T=0 3P FLT RUX500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/RUX-PLX;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

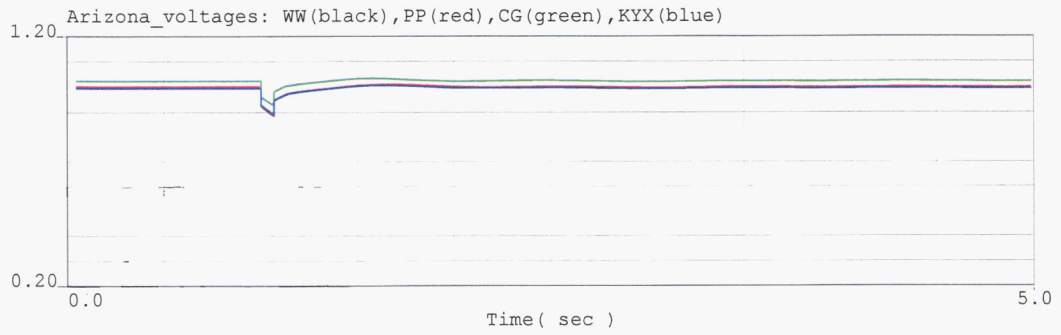


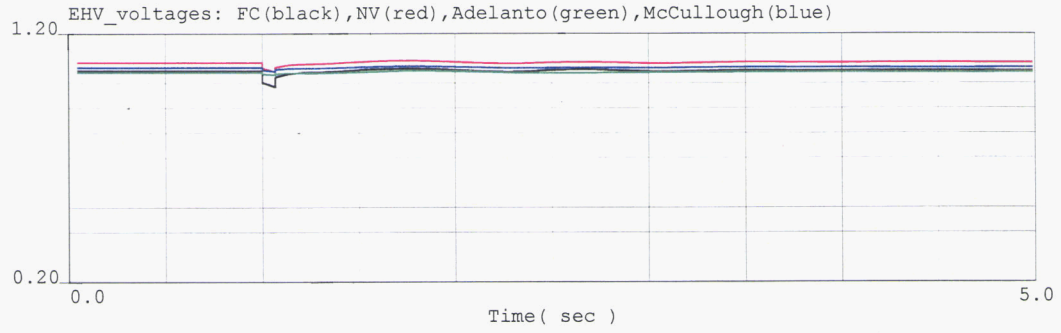


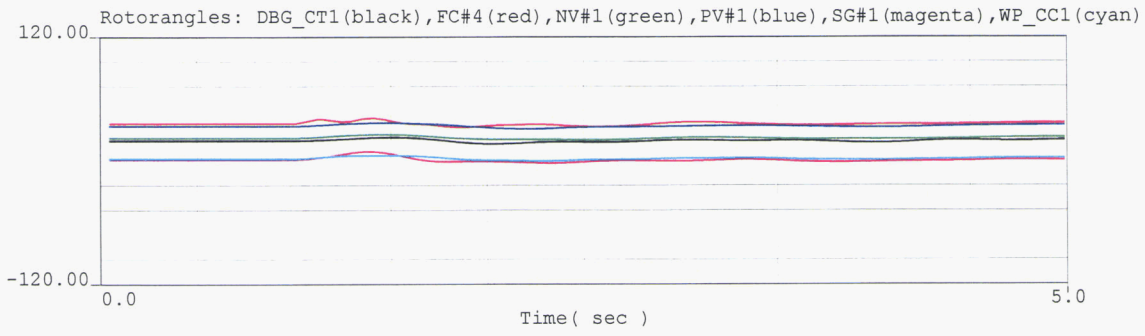


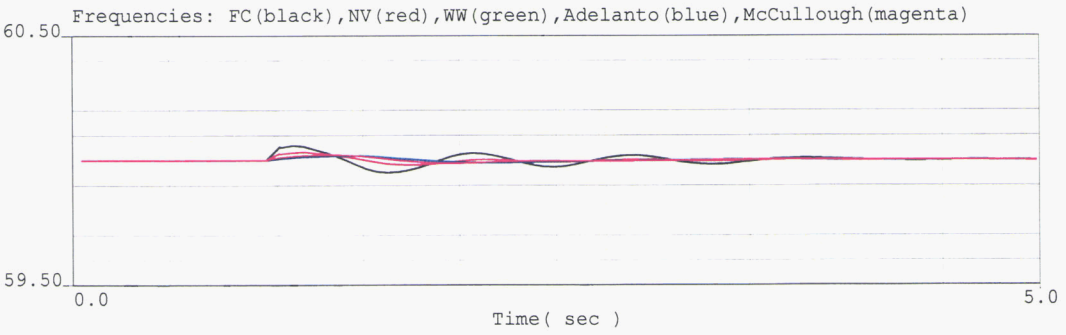


SAGUARO FLT SG-CH LINE OUT
SG-CH STAB; 01/07; T=0 3P FLT SG500;FLSH CAPS;
4C CLR FLT W/SG-CH;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

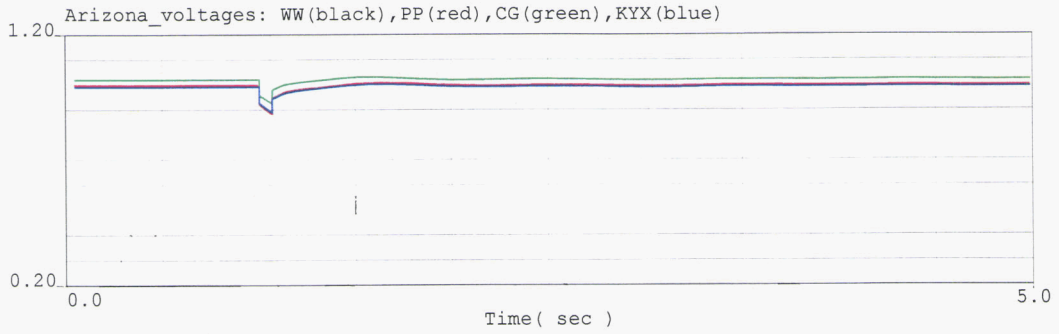


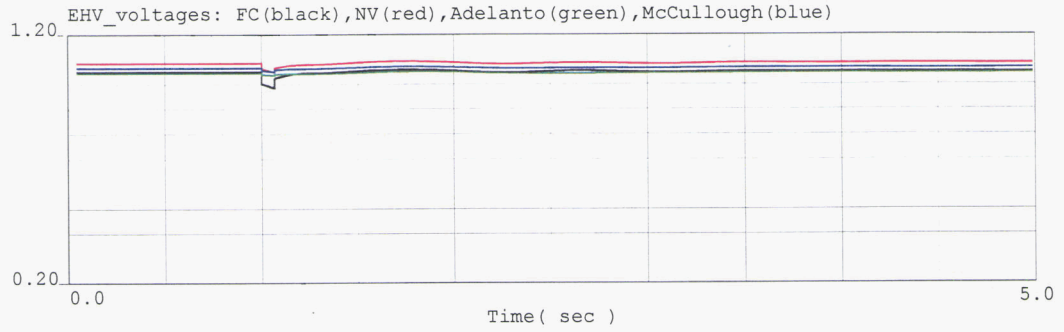


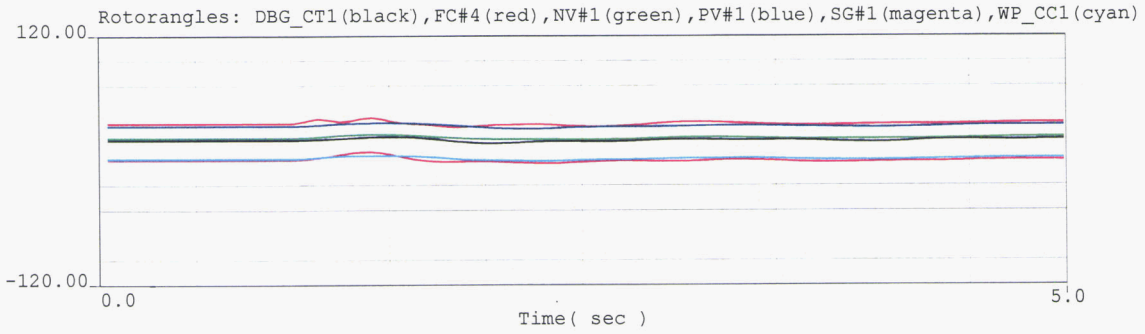


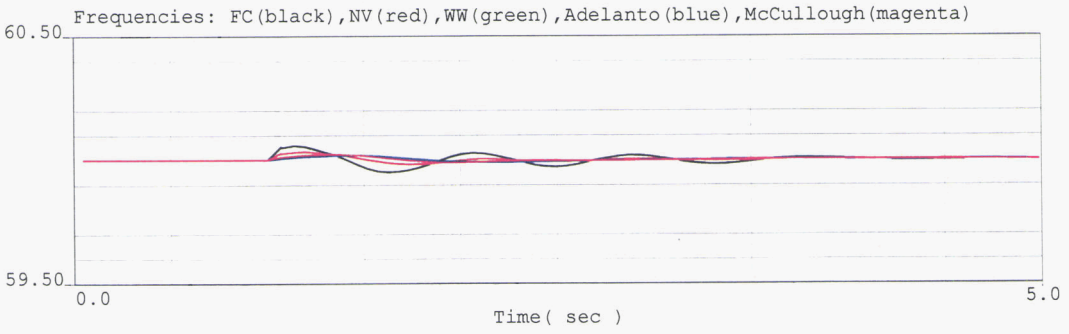


SECOND KNOLL 500KV FLT SN-CH LINE OUT
SN-CH STAB; 1/07; T=0 3P FLT SN500; FLASH CAPS;
4C CLR FLT W/SN-CH;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

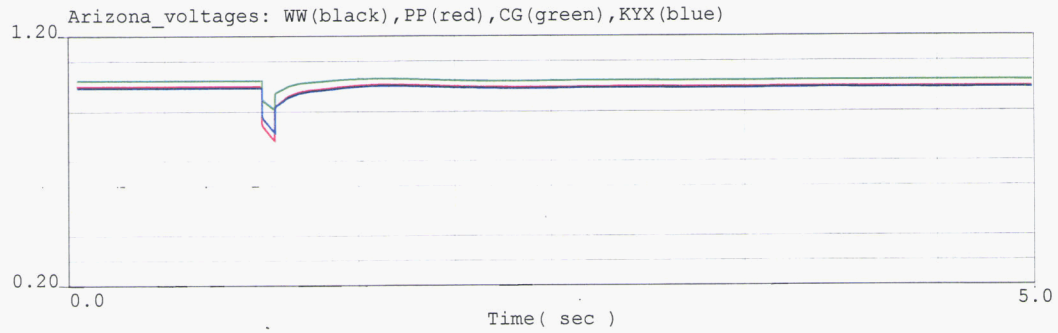


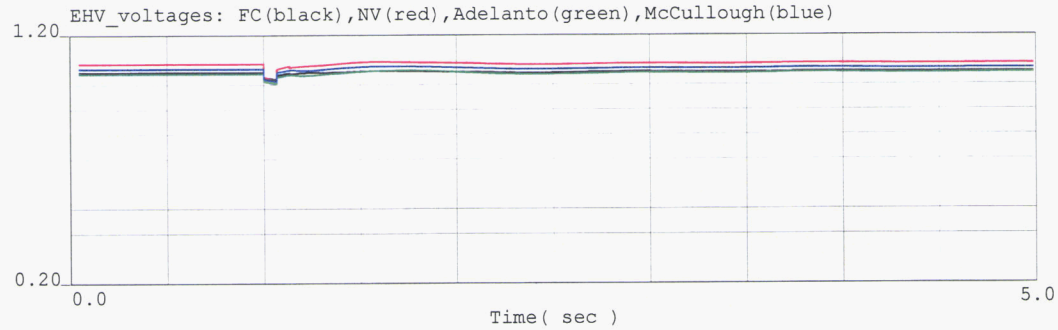


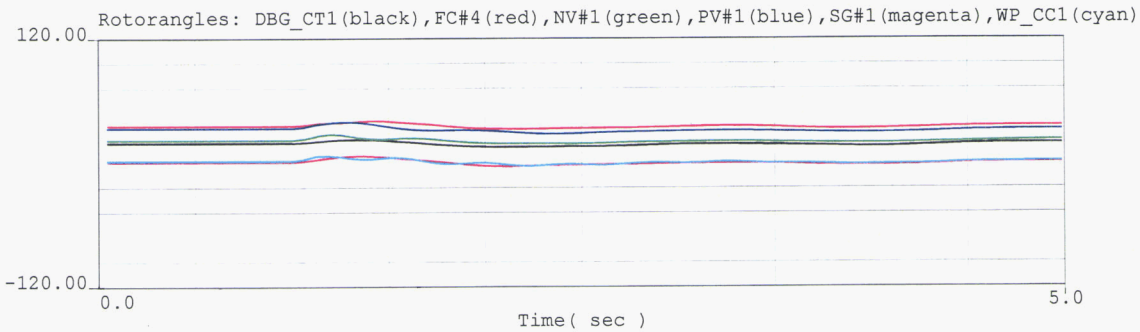


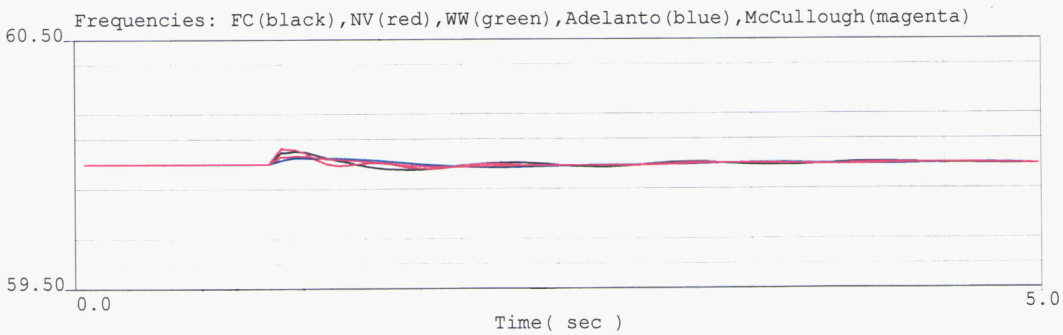


SECOND KNOLL 500KV FLT SN-CNX LINE OUT
SN-CNX STAB; 1/07; T=0 3P FLT SN500; FLASH CAPS;
4C CLR FLT W/SN-CNX;8C REIN CAPS;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

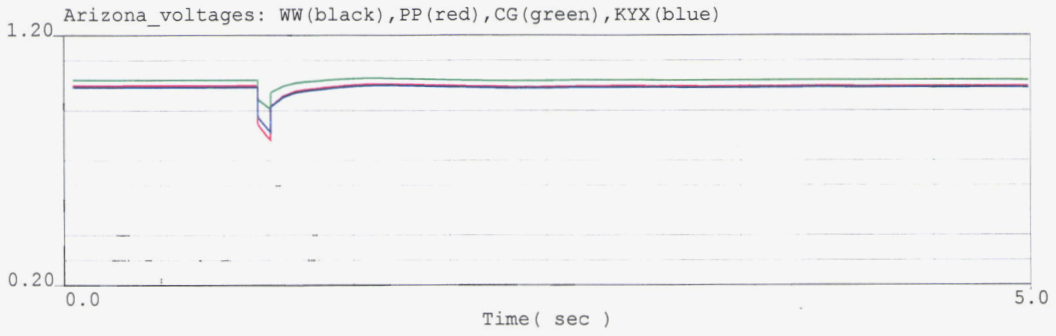


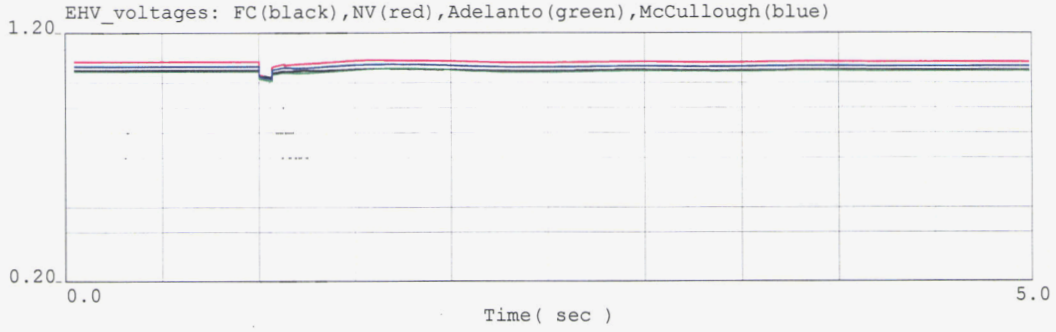


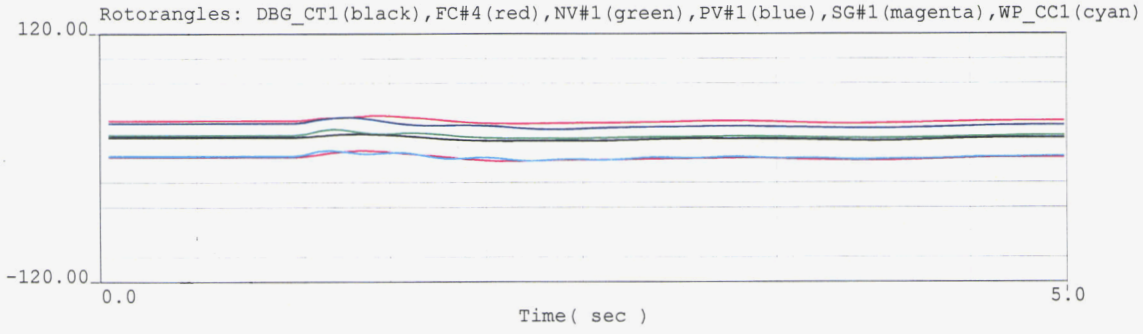


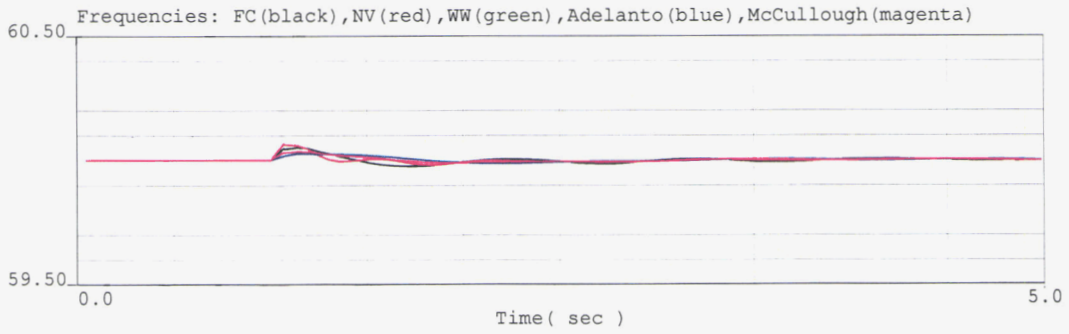


TS5 FLT TS5-HQJ LINE OUT
TS5-HQJ STAB; 01/07; T=0 3P FLT TS5500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/TS5-HQJ;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

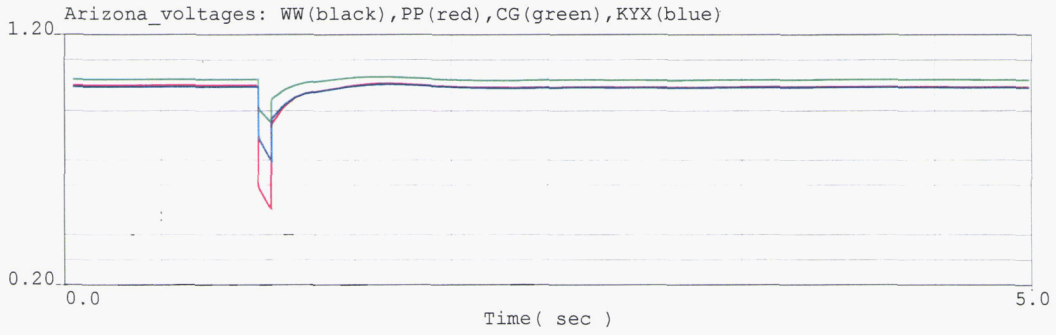


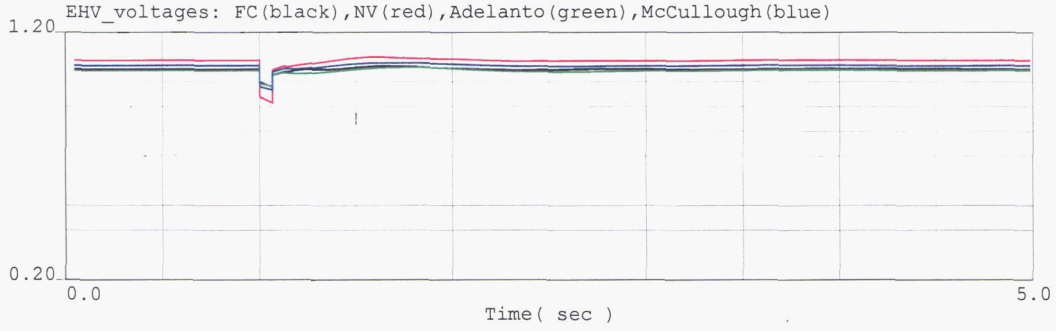


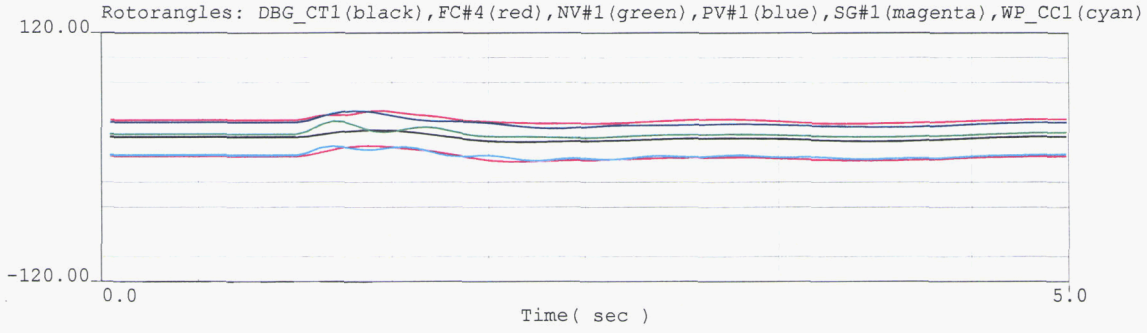


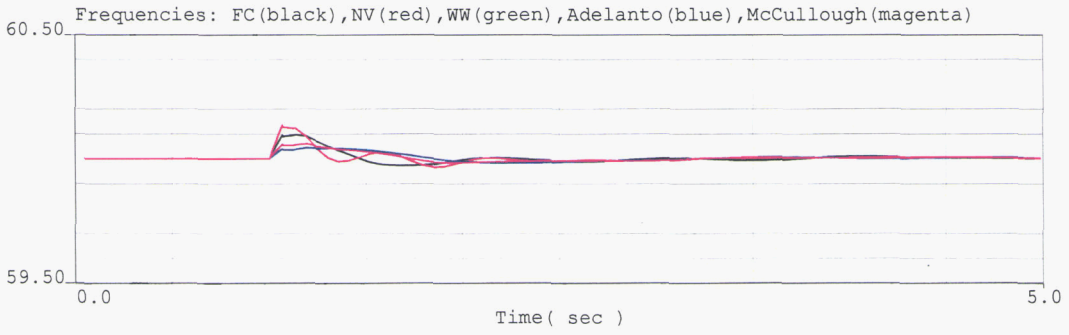


TS5 FLT TS5-TS9 LINE OUT
TS5-TS9 STAB; 01/07; T=0 3P FLT TS5500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/TS5-TS9;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

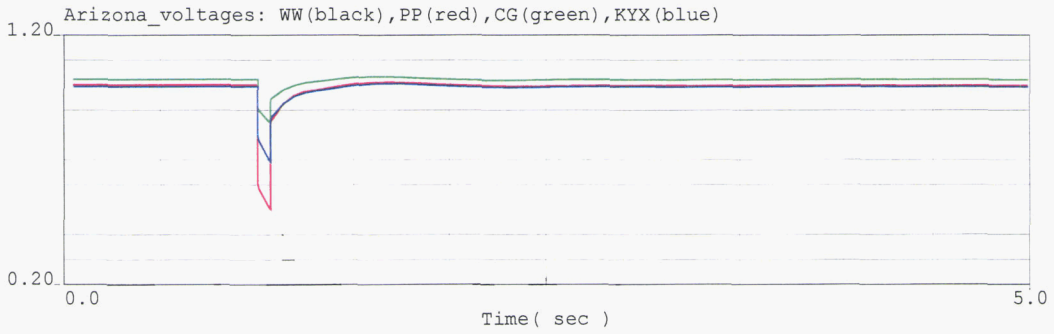


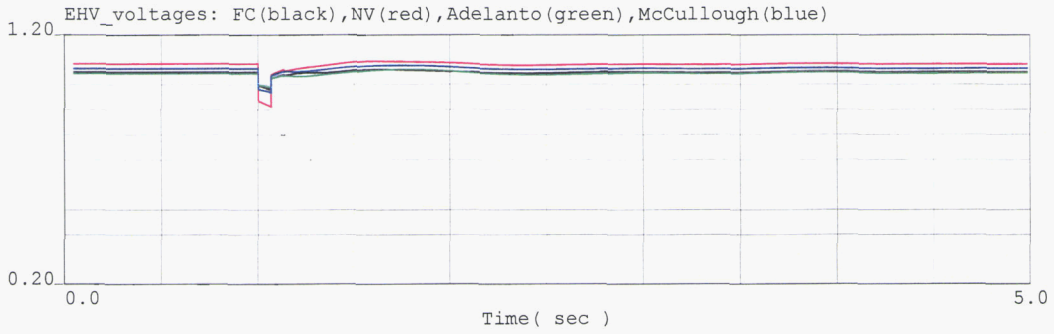


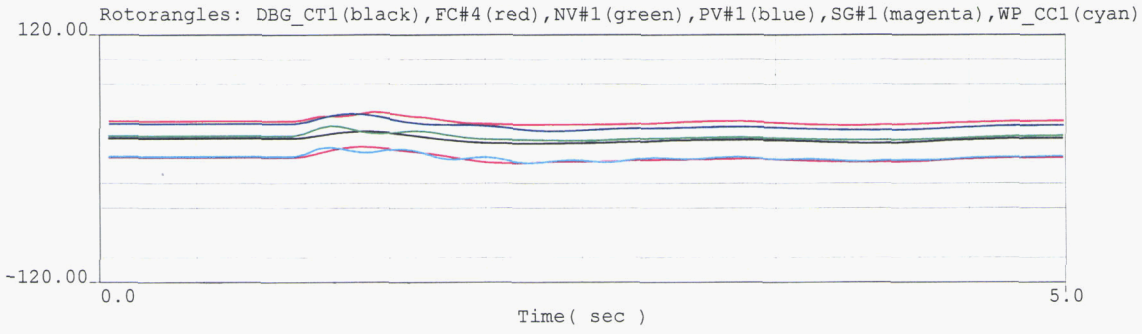


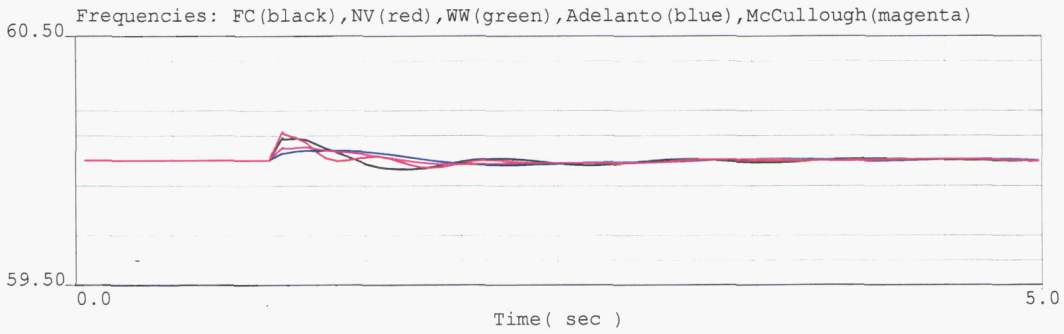


TS9 FLT. TS9-PP line out
TS9-PP STAB; 1/07; T=0 3P FLT TS9500;FLSH CAPS;
4C CLR FLT W/TS9-PP;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

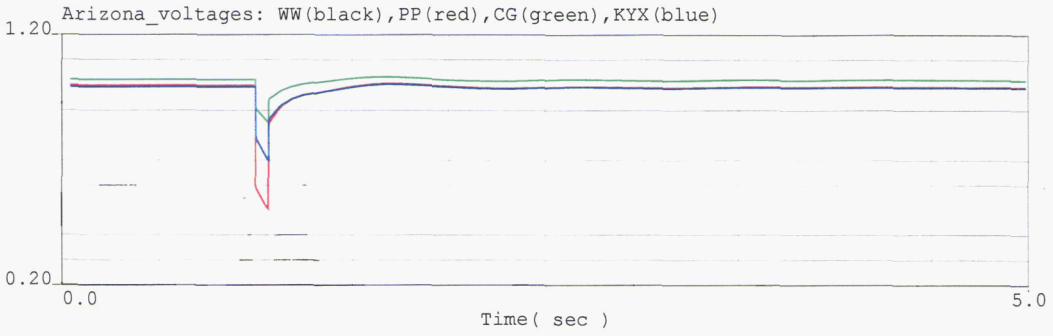


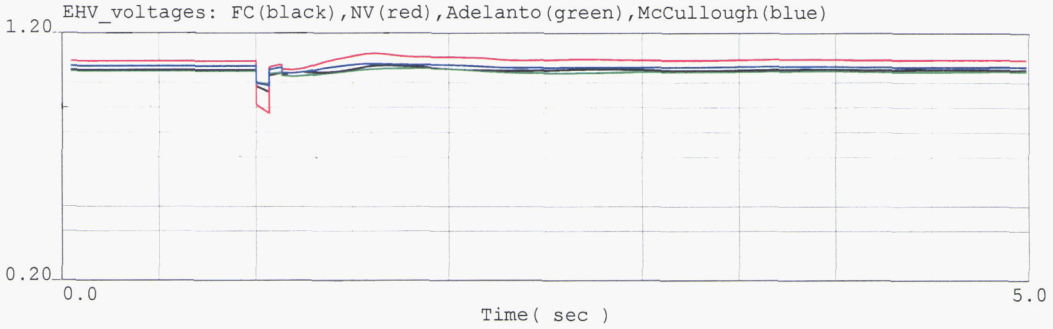


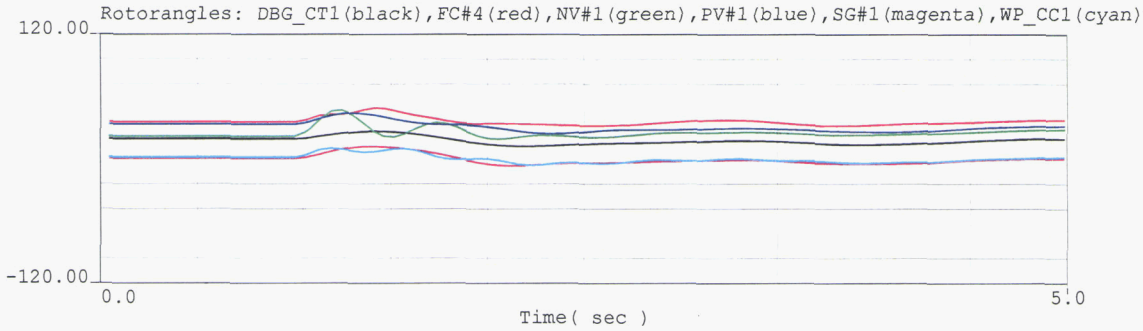


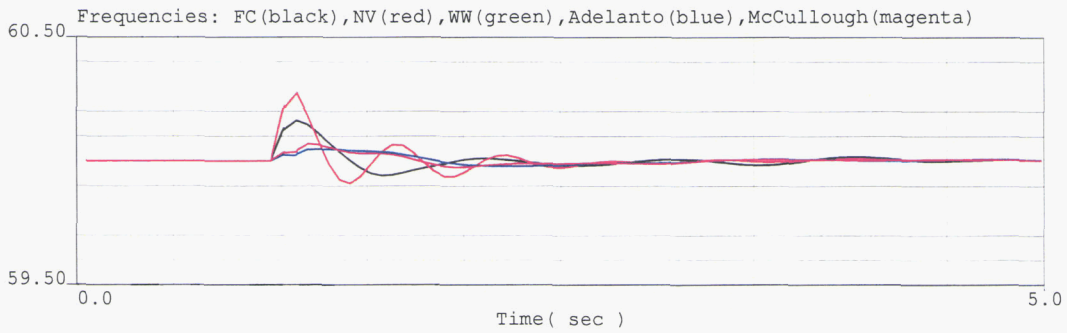


TS9 FLT TS9-TS5 LINE OUT
TS9-TS5 STAB; 01/07; T=0 3P FLT TS9500;10% FLT DMPING;FLSH CAPS;
4C CLR FLT W/TS9-TS5;4/8C REIN;2016.dyd;WSCC.bpt
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

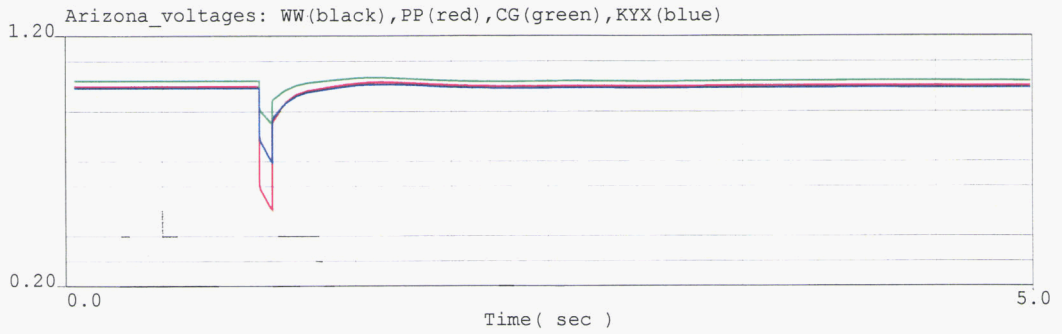


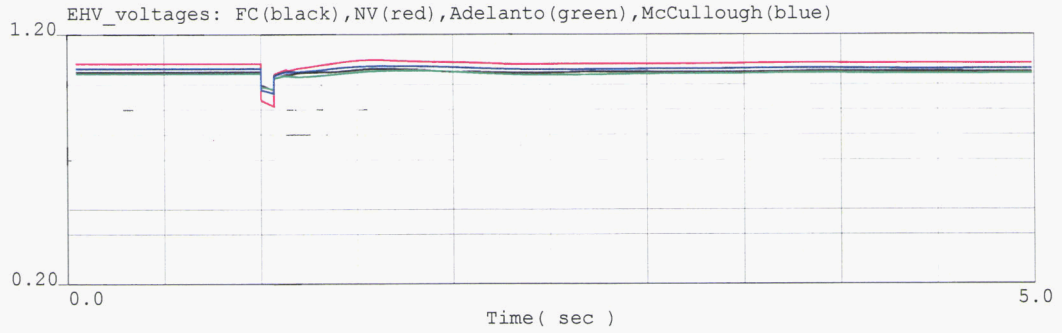


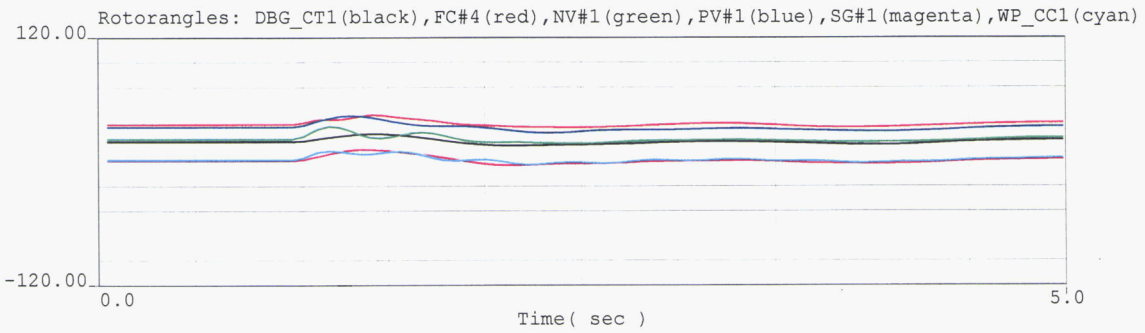


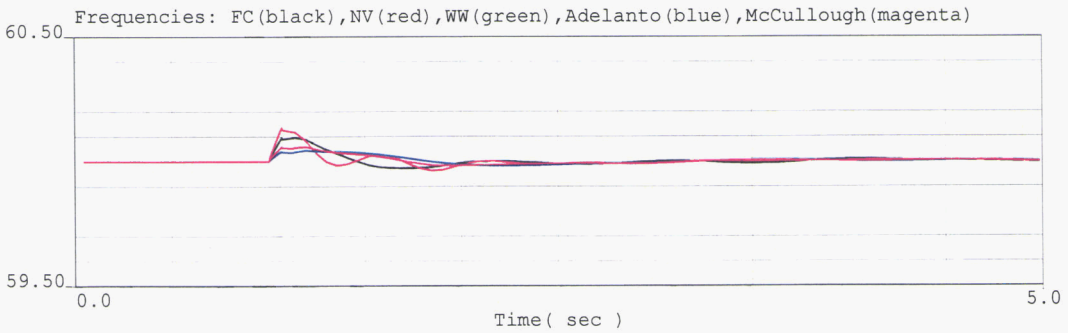


TS9 FLT TS9-VV1 LINE OUT
TS9-VV1 STAB; 1/07; T=0 3P FLT TS9500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/TS9-VV1;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

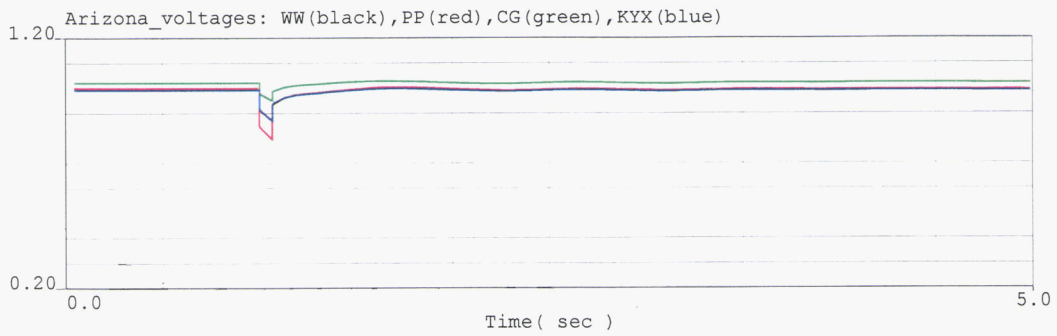


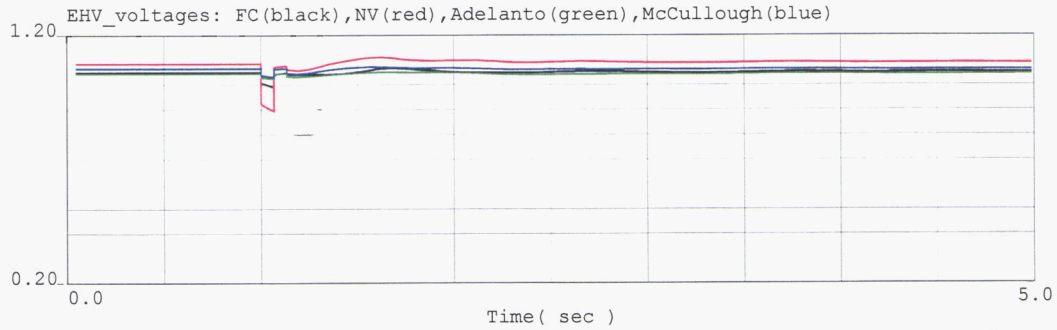


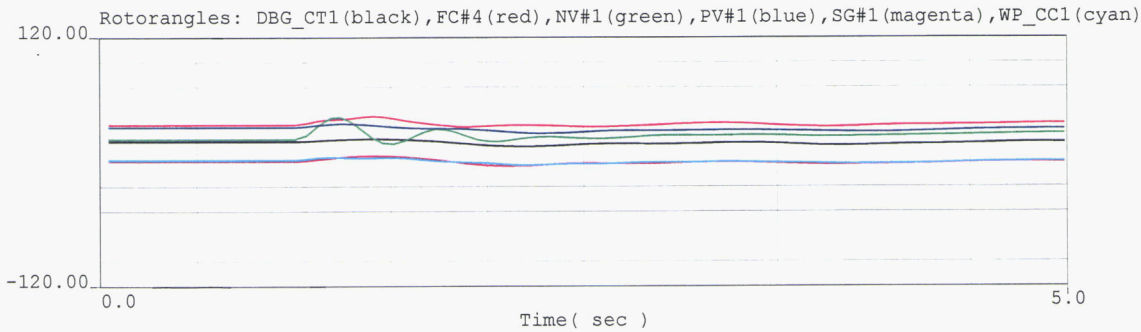


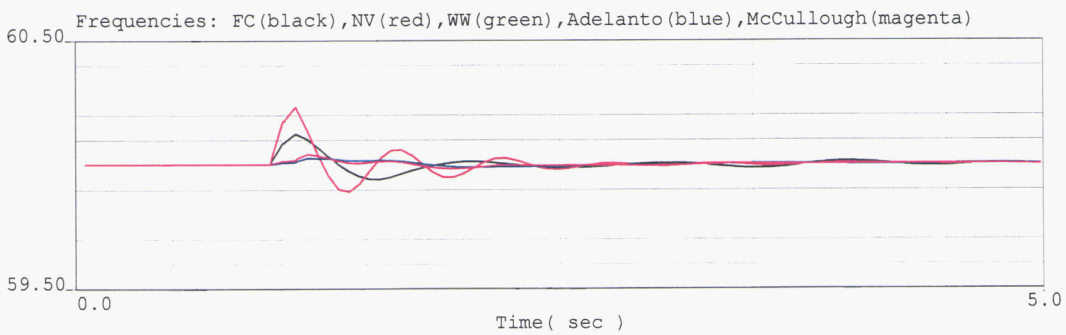


TS9 FLT. TS9-WW line out
TS9-WW STAB; 1/07; T=0 3P FLT TS9500;FLSH CAPS;
4C CLR FLT W/TS9-WW;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

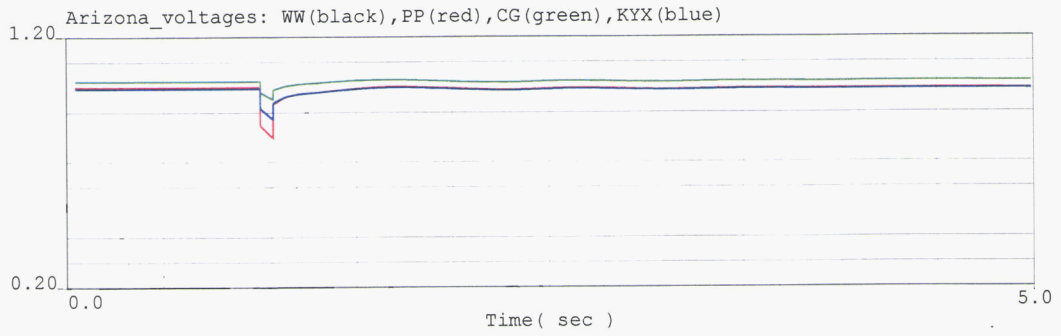


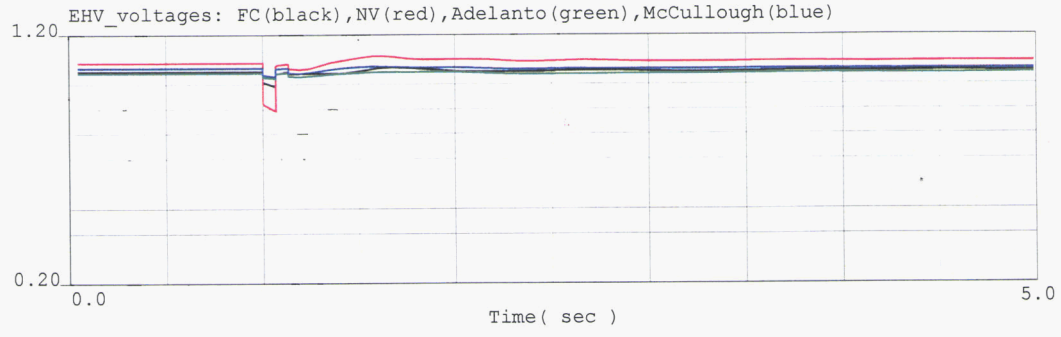


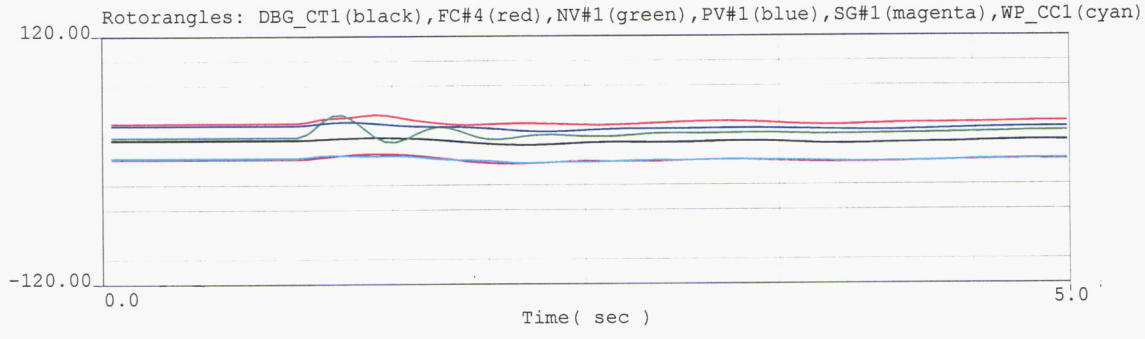


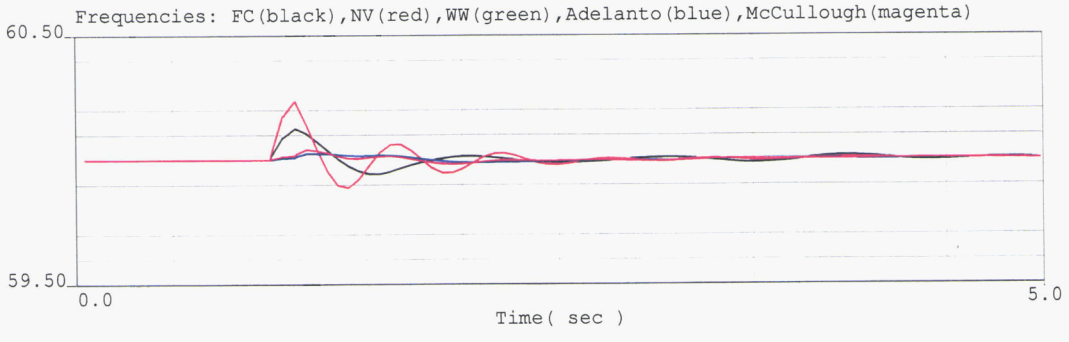


VV1 FLT VV1-NV LINE OUT
VV1-NV STAB; 1/07; T=0 3P FLT VV1500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/VV1-NV;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

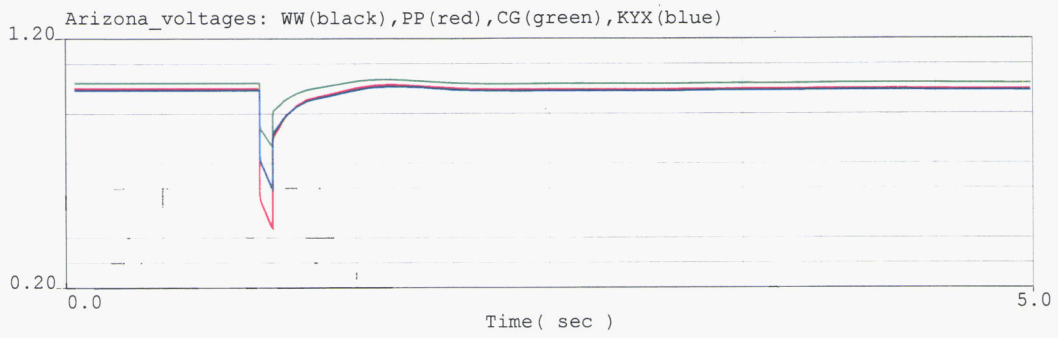


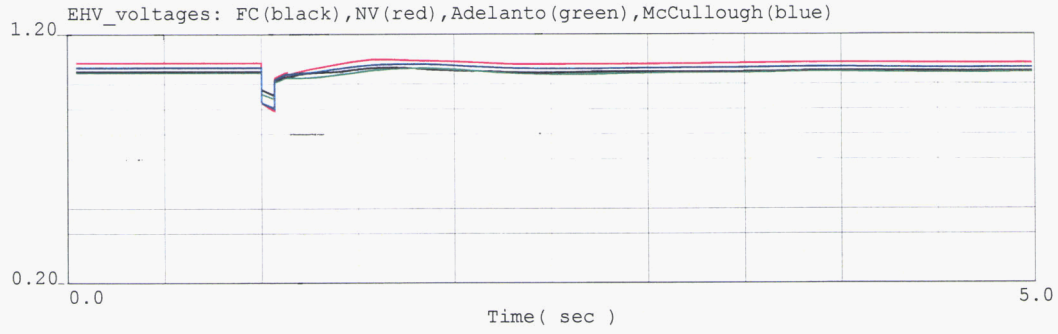


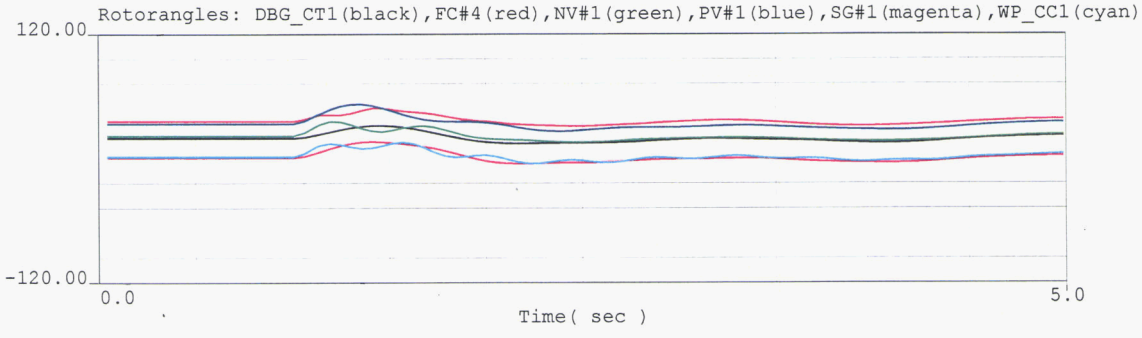


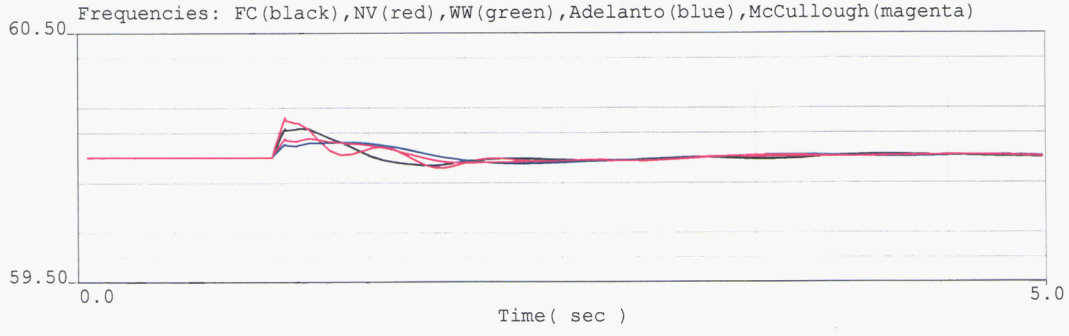


VV1 FLT VV1-TS9 LINE OUT
VV1-TS9 STAB; 1/07; T=0 3P FLT VV1500; 6% FLT DMPING;FLSH CAPS;
4C CLR FLT W/VV1-TS9;8C REIN;2016.dyd;WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

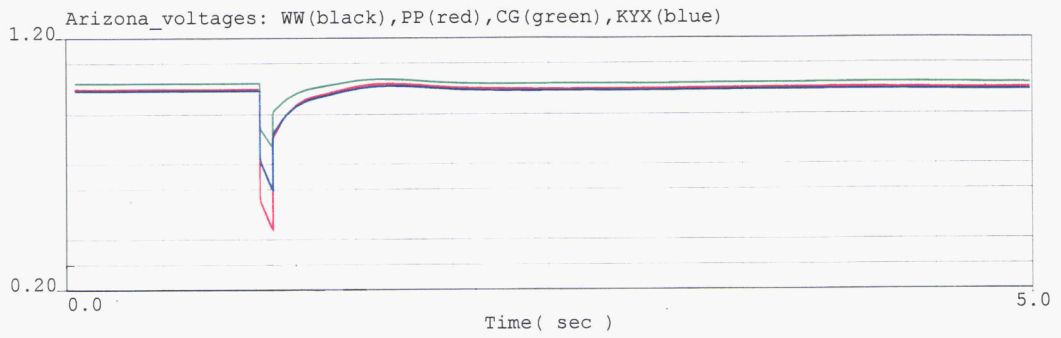


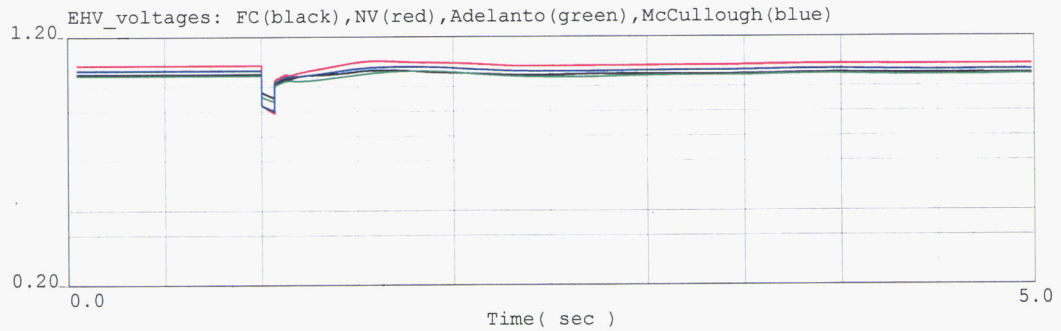


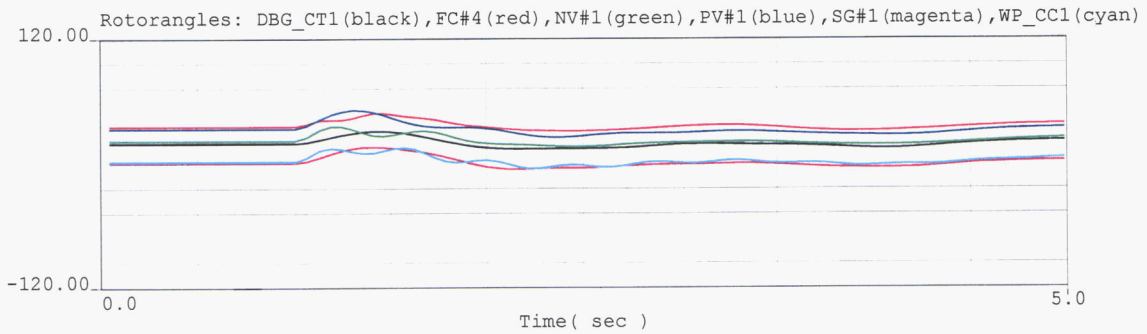


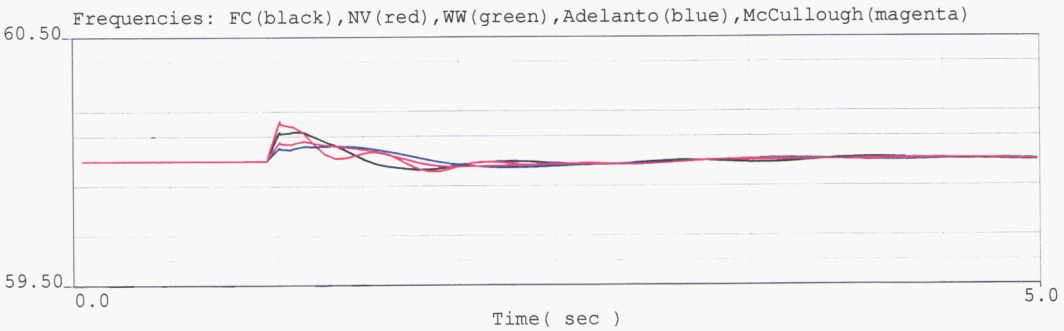


WESTWING FLT. WW-PLX line out
WW-PLX STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-PLX;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

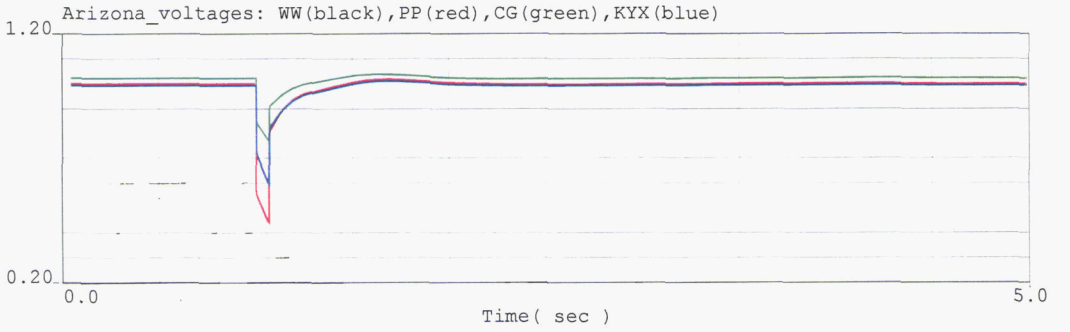


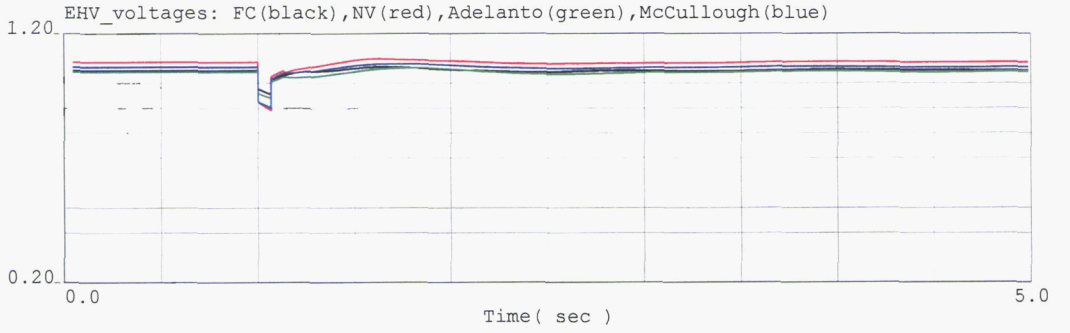


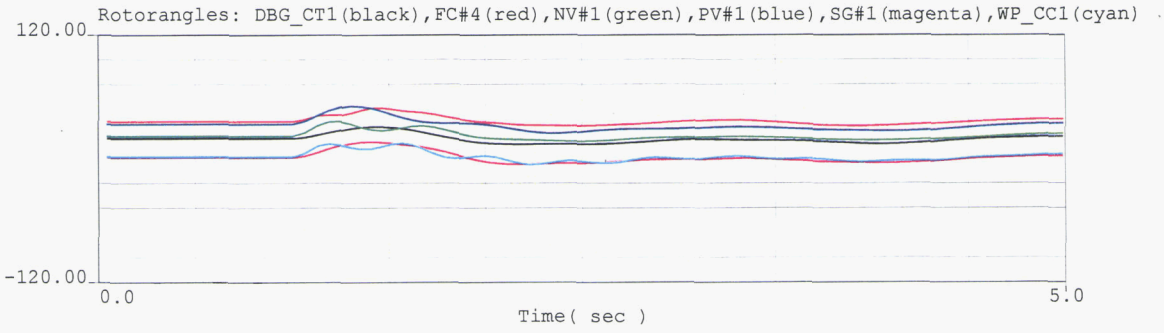


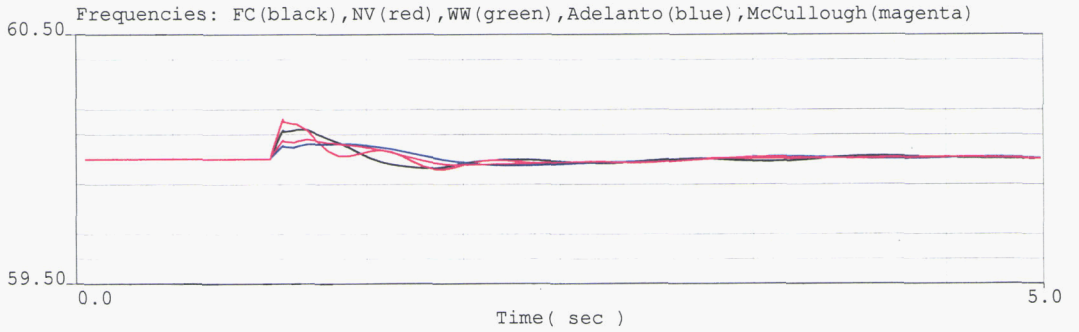


WESTWING FLT. WW-TS9 line out
WW-TS9 STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-TS9;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

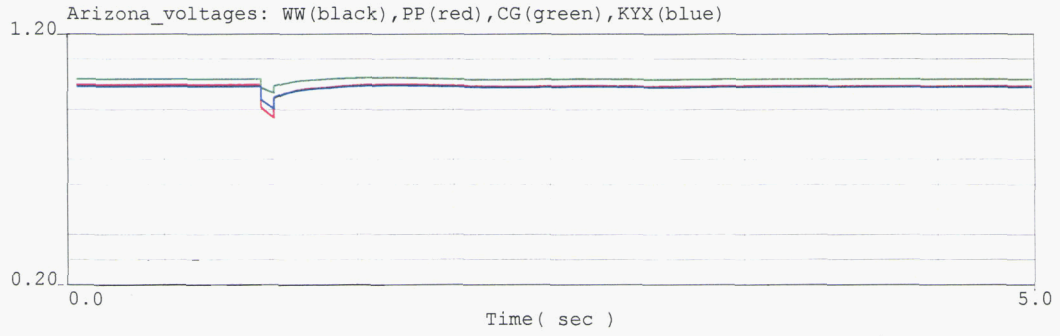


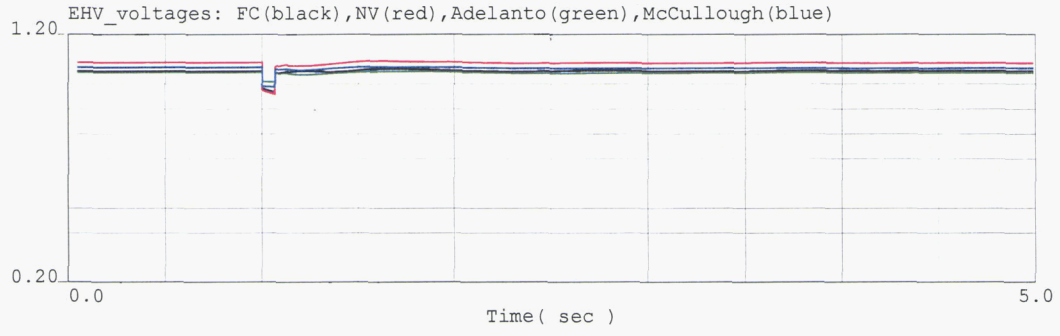


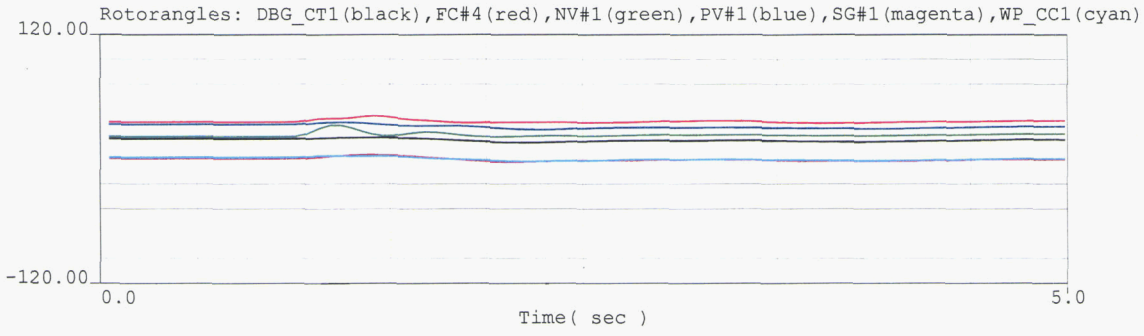


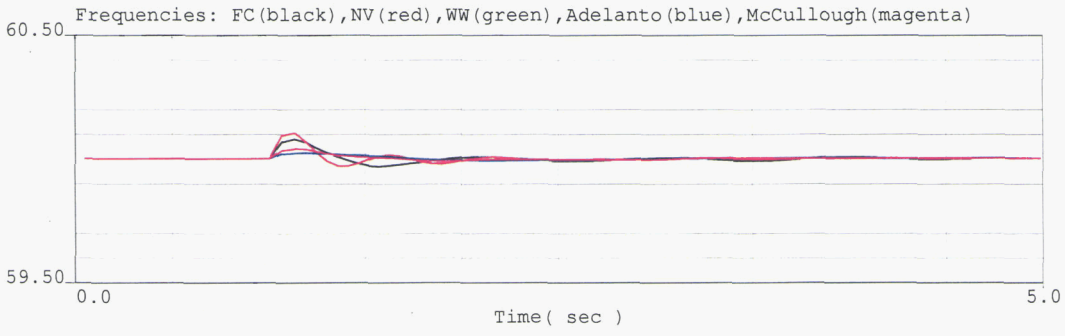


WESTWING FLT. WW-YP line out
WW-YP STAB; 1/07; T=0 3P FLT WW500;FLSH CAPS;
4C CLR FLT W/WW-YP;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.

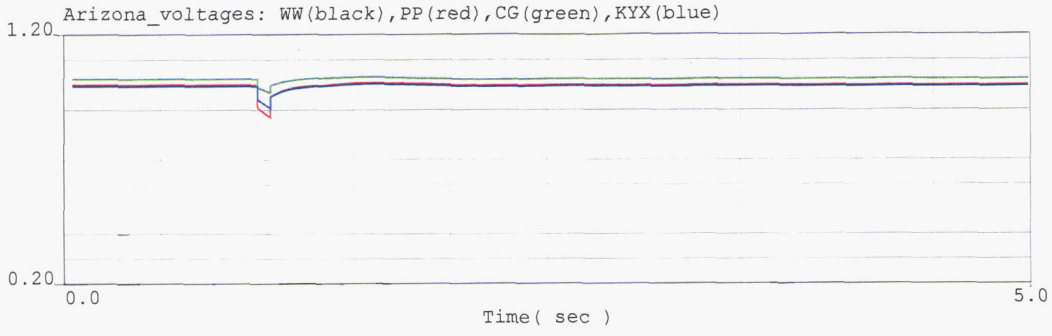


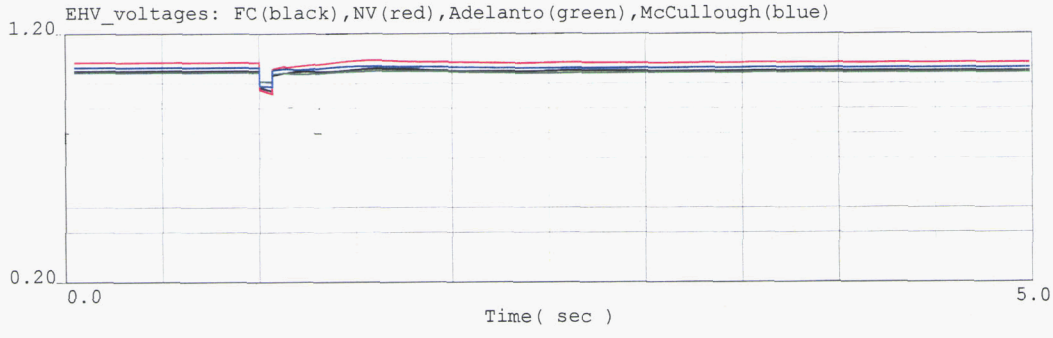


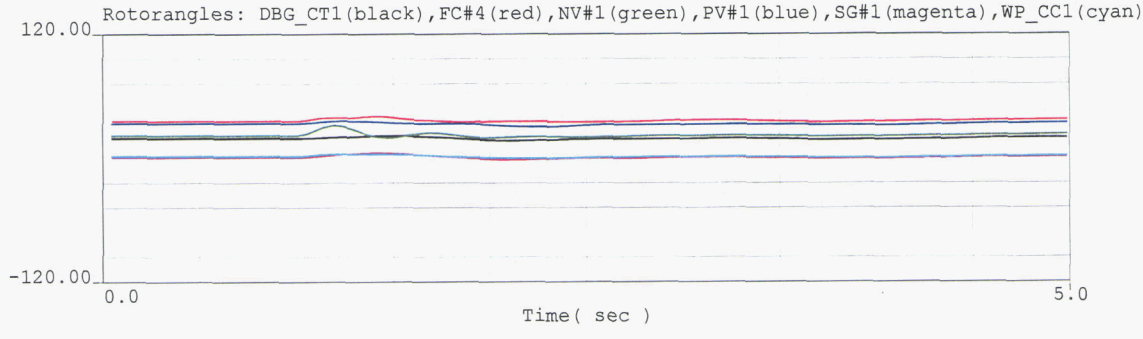


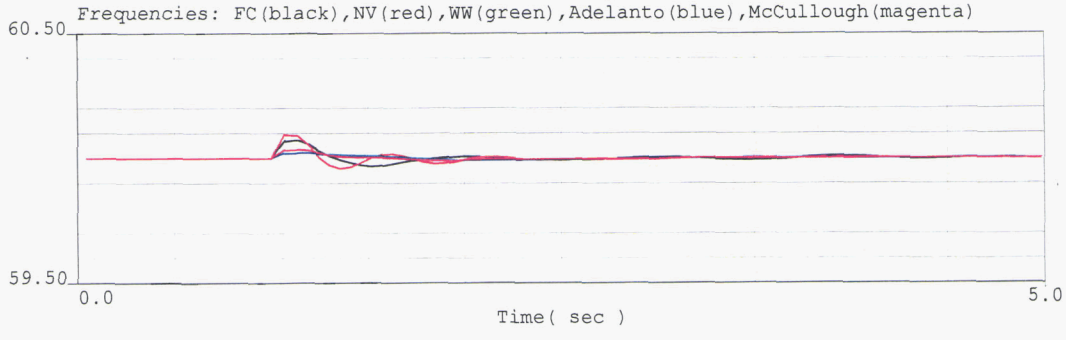


YAVAPAI FLT. YP-MK line out
YP STAB; 1/07; T=0 3P FLT YP500;FLSH CAPS;
4C CLR FLT W/YP-MK;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.









YAVAPAI FLT. YP-WW line out
YP STAB; 1/07; T=0 3P FLT YP500;FLSH CAPS;
4C CLR FLT W/YP-WW;8C REIN;2016.dyd WSCC.bat
ALL COMMENTS RESULTING FROM THE TSS REVIEW HAVE BEEN ADDED.