



MIDWEST
RELIABILITY
ORGANIZATION

Meeting Agenda

Reliability Advisory Council (RAC)

Thursday, August 10, 2023
8:00 a.m. to 2:00 p.m. central

*MRO Corporate Offices, King Conference Center
St. Paul, MN & Webex*

Classification: **Public**

CLARITY
Outreach & Engagement

ASSURANCE
Oversight & Risk Management

RESULTS
Reliability Performance

VIDEO AND AUDIO RECORDING

Please note that Midwest Reliability Organization (MRO) may make a video and/or an audio recording of this organizational group meeting for the purposes of making this information available to board members, members, stakeholders and the general public who are unable to attend the meeting in person.

By attending this meeting, I grant MRO:

1. Permission to video and/or audio record the meeting including me; and
2. The right to edit, use, and publish the video and/or audio recording.
3. I understand that neither I nor my employer has any right to be compensated in connection with the video and/or audio recording or the granting of this consent.

Classification: Public

MRO ORGANIZATIONAL GROUP GUIDING PRINCIPLES

These MRO Organizational Group Guiding Principles complement charters. When the Principles are employed by members, they will support the overall purpose of the organizational groups.

Organizational Group Members should:

1. Make every attempt to attend all meetings in person or via webinar.
2. Be responsive to requests, action items, and deadlines.
3. Be active and involved in all organizational group meetings by reviewing all pre-meeting materials and being focused and engaged during the meeting.
4. Be self-motivating, focusing on outcomes during meetings and implementing work plans to benefit MRO and MRO's registered entities.
5. Ensure that the organizational group supports MRO strategic initiatives in current and planned tasks.
6. Be supportive of Highly Effective Reliability Organization (HERO™) principles.
7. Be supportive of proactive initiatives that improve effectiveness and efficiency for MRO and MRO's registered entities.

Classification: **Public**

MRO RELIABILITY ADVISORY COUNCIL Q3 MEETING AGENDA

Agenda Item

- 1 Call to Order and Determination of Quorum**
Gayle Nansel, Reliability Advisory Council Vice Chair
 - a. Determination of Quorum and Introductions
 - b. Robert's Rules of Order
- 2 Standards of Conduct and Antitrust Guidelines**
Bryan Clark, Director of Reliability Analysis, MRO
- 3 Vice Chair's Remarks**
Gayle Nansel, Reliability Advisory Council Vice Chair
- 4 Consent Agenda**
Gayle Nansel, Reliability Advisory Council Vice Chair
 - a. Approve May 18, 2023 meeting minutes
- 5 MRO Board of Directors, OGO and General Update**
Bryan Clark, Director of Reliability Analysis, MRO
- 6 2023 Reliability Conference Feedback**
Cris Zimmerman, Manager of Outreach and Stakeholder Engagement
- 7 Advisory Council Work Plans**
 - a. SAC
 - b. CMEPAC
- 8 Technical Presentation – Underfrequency Load Shedding (UFLS)**
Kevin Jones, Consulting Engineer, System Protection Engineering, Xcel Energy
- 9 Reliability and Security Technical Committee (RSTC) Meeting Update**
John Stephens, Reliability Advisory Council and RSTC Member

Break – 10:00 a.m.

- 10 MRO Representatives on NERC Subgroups – Written Reports**
Bryan Clark, Director of Reliability Analysis, MRO
 - a. NERC Electric Gas Working Group (EGWG) – *Jaimin Patel*
 - b. NERC Inverter-Based Resource Performance Subcommittee (IRPS) – *Open*
 - c. NERC System Planning Impacts from DER Working Group (SPIDERWG) – *Wayne Guttormson*
 - d. NERC System Protection and Control Working Group (SPCWG) – *Lynn Schroeder*
 - e. NERC Energy Reliability Assessment Working Group (ERAWG) – *Tom Whynot*
- 11 2023 Work Plan Update**
Gayle Nansel, Reliability Advisory Vice Chair
 - a. Review Action Items
- 12 Reliability Coordinator Updates**
 - a. MISO – *Durgesh Manjure, RAC Member*
 - b. SPC – *Binod Shrestha, RAC Member*
 - c. SPP – *CJ Brown, RAC Member*

Lunch 11:30 a.m.

- 13 Planning Coordinator Updates**
 - a. MISO – *Andy Witmeier, RAC Member*

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b. SPP – *Joshúa Pilgrim, Senior Engineer 2*

- 14 MRO Regional Risk Assessment (RRA)**
Mark Tiemeier, Principal Technical Advisor, MRO
- 15 NERC Standards Review Forum (NSRF) Update**
Gayle Nansel, Reliability Advisory Council Vice Chair
- 16 Protective Relay Subgroup (PRS) Update**
Jake Bernhagen, Manager of Reliability Performance, MRO
- 17 2023 Meeting Dates**
Gayle Nansel, Reliability Advisory Council Vice Chair
- 18 RAC Member Roundtable**
Reliability Advisory Council Members
- 19 Other Business and Adjourn**
Gayle Nansel, Reliability Advisory Council Vice Chair

Classification: **Public**

AGENDA

Call to Order and Determination of Quorum

a. Determination of Quorum

Gayle Nansel, Reliability Advisory Council Vice Chair

Name	Role	Company	Term
Andy Witmeier	Member	MISO	12/31/24
Binod Shrestha	Member	Saskatchewan Power Corporation	12/31/25
Bryn Wilson	Member	Oklahoma Gas & Electric	12/31/23
CJ Brown	Member	Southwest Power Pool	12/31/24
Dallas Rowley	Member	Oklahoma Gas & Electric	12/31/25
Derek Brown	Member	Evergy	12/31/23
Dick Pursley	Chair	Great River Energy	12/31/25
Durgesh Manjure	Member	MISO	12/31/23
Gayle Nansel	Vice Chair	Western Area Power Administration	12/31/25
Jason Weiers	Member	Otter Tail Power Company	12/31/24
Jeremy Severson	Member	Basin Electric Power Cooperative	12/31/24
John Stephens	Member	City Utilities of Springfield Missouri	12/31/23
Nandaka Jayasekara	Member	Manitoba Hydro	12/31/25
Ron Gunderson	Member	Nebraska Public Power District	12/31/23
Open			12/31/24

Classification: **Public**

AGENDA

Call to Order and Determination of Quorum

b. Robert's Rules of Order

Gayle Nansel, Reliability Advisory Council Vice Chair

Parliamentary Procedures. Based on Robert's Rules of Order, Newly Revised, Tenth Edition

Establishing a Quorum. In order to make efficient use of time at MRO organizational group meetings, once a quorum is established, the meeting will continue, however, no votes will be taken unless a quorum is present at the time any vote is taken.

Motions. Unless noted otherwise, all procedures require a "second" to enable discussion.

When you want to...	Procedure	Debatable	Comments
Raise an issue for discussion	Move	Yes	The main action that begins a debate.
Revise a Motion currently under discussion	Amend	Yes	Takes precedence over discussion of main motion. Motions to amend an amendment are allowed, but not any further. The amendment must be germane to the main motion, and cannot reverse the intent of the main motion.
Reconsider a Motion already resolved	Reconsider	Yes	Allowed only by member who voted on the prevailing side of the original motion. Second by anyone.
End debate	Call for the Question or End Debate	No	If the Chair senses that the committee is ready to vote, he may say "if there are no objections, we will now vote on the Motion." Otherwise, this motion is not debatable and subject to majority approval.
Record each member's vote on a Motion	Request a Roll Call Vote	No	Takes precedence over main motion. No debate allowed, but the members must approve by majority.
Postpone discussion until later in the meeting	Lay on the Table	Yes	Takes precedence over main motion. Used only to postpone discussion until later in the meeting.
Postpone discussion until a future date	Postpone until	Yes	Takes precedence over main motion. Debatable only regarding the date (and time) at which to bring the Motion back for further discussion.

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MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

Remove the motion for any further consideration	Postpone indefinitely	Yes	Takes precedence over main motion. Debate can extend to the discussion of the main motion. If approved, it effectively “kills” the motion. Useful for disposing of a badly chosen motion that cannot be adopted or rejected without undesirable consequences.
Request a review of procedure	Point of order	No	Second not required. The Chair or secretary shall review the parliamentary procedure used during the discussion of the Motion.

Notes on Motions

Seconds. A Motion must have a second to ensure that at least two members wish to discuss the issue. The “seconder” is not required to be recorded in the minutes. Neither are motions that do not receive a second.

Announcement by the Chair. The chair should announce the Motion before debate begins. This ensures that the wording is understood by the membership. Once the Motion is announced and seconded, the Committee “owns” the motion, and must deal with it according to parliamentary procedure.

Voting

Voting Method	When Used	How Recorded in Minutes
	When the Chair senses that the Committee is substantially in agreement, and the Motion needed little or no debate. No actual vote is taken.	The minutes show “by unanimous consent.”
Vote by Voice	The standard practice.	The minutes show Approved or Not Approved (or Failed).
Vote by Show of Hands (tally)	To record the number of votes on each side when an issue has engendered substantial debate or appears to be divisive. Also used when a Voice Vote is inconclusive. (The Chair should ask for a Vote by Show of Hands when requested by a member).	The minutes show both vote totals, and then Approved or Not Approved (or Failed).
Vote by Roll Call	To record each member’s vote. Each member is called upon by the Secretary, and the member indicates either “Yes,” “No,” or “Present” if abstaining.	The minutes will include the list of members, how each voted or abstained, and the vote totals. Those members for which a “Yes,” “No,” or “Present” is not shown are considered absent for the vote.

Classification: Public

MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

Notes on Voting.

Abstentions. When a member abstains, he/she is not voting on the Motion, and his/her abstention is not counted in determining the results of the vote. The Chair should not ask for a tally of those who abstained.

Determining the results. A simple majority of the votes cast is required to approve an organizational group recommendations or decision.

“Unanimous Approval.” Can only be determined by a Roll Call vote because the other methods do not determine whether every member attending the meeting was actually present when the vote was taken, or whether there were abstentions.

Electronic Votes – For an e-mail vote to pass, the requirement is a simple majority of the votes cast during the time-period of the vote as established by the Committee Chair.

Majorities. Per Robert’s Rules, as well as MRO Policy and Procedure 3, a simple majority (one more than half) is required to pass motions

Classification: **Public**

AGENDA

Standards of Conduct and Antitrust Guidelines *Bryan Clark, Director of Reliability Analysis, MRO*

Standards of Conduct Reminder:

Standards of Conduct prohibit MRO staff, committee, subcommittee, and task force members from sharing non-public transmission sensitive information with anyone who is either an affiliate merchant or could be a conduit of information to an affiliate merchant.

Antitrust Reminder:

Participants in Midwest Reliability Organization meeting activities must refrain from the following when acting in their capacity as participants in Midwest Reliability Organization activities (i.e. meetings, conference calls, and informal discussions):

- Discussions involving pricing information; and
- Discussions of a participants marketing strategies; and
- Discussions regarding how customers and geographical areas are to be divided among competitors; and
- Discussions concerning the exclusion of competitors from markets; and
- Discussions concerning boycotting or group refusals to deal with competitors, vendors, or suppliers.

Classification: Public

AGENDA

Consent Agenda

- a. Approve May 18, 2023 meeting minutes
Gayle Nansel, Reliability Advisory Council Vice Chair

Action

Discussion

Report

Vice Chair Nansel will lead this discussion during the meeting.

Classification: **Public**



Draft Minutes of the Reliability Advisory Council Meeting

Hybrid: St. Paul, MN and Webex

Thursday, May 18, 2023, 9:01 a.m. to 1:39 p.m. Central

*Notice for this meeting was electronically posted to the [MRO website](#) on April 20, 2023.
A final agenda, including advanced reading materials, was also posted on May 11, 2023.*

1. Call to Order and Determination of Quorum

The Reliability Advisory Council (RAC) Chair, Dick Pursley called the meeting to order at 9:01 a.m. Pursley welcomed everyone and introductions were made. Reliability Analysis Administrator, Rebecca Schneider, advised the chair that a quorum of the RAC was present. A complete list of attendees is included as [Exhibit A](#).

2. Standards of Conduct and Antitrust Guidelines

Pursuant to Policy and Procedure 4, Bryan Clark, MRO Director of Reliability Analysis, highlighted MRO's Standards of Conduct and Antitrust Guidelines.

3. Chair's Remarks

Chair Pursley discussed the Reliability Conference and thanked the RAC members, MRO staff and the conference emcee for their efforts in organizing and running the conference. Pursley highlighted news from the NERC website, including a white paper on BPS disturbances. He noted physical security challenges, recent industry events and NERC's evaluation of the CIP-014 standard. Pursley recapped the deadlines related to the NERC Alert III issued on May 15, 2023. He also commented on NERC's press release for the 2023 Summer Reliability Assessment (SRA) and potential energy shortfalls across two-thirds of the country.

4. Consent Agenda

The RAC reviewed the consent agenda, which included draft minutes from the March 1, 2023 meeting. There were a couple of minor recommended edits to the minutes and updates were made accordingly.

[Upon a motion duly made and seconded, the RAC approved the March 1, 2023 minutes with the recommended edits.](#)

5. MRO Board of Directors, OGOC and General Update

Clark provided a recap of the first quarter OGOC meeting on April 12, 2023. Clark noted that the OGOC approved the 2023 RAC work plan. He highlighted the expansion of the HERO Award nomination period and MRO's efforts to promote this award. Clark recapped the Insider Threat Risk roundtable discussion attended by RAC member, Dallas Rowley. He noted several items, such as limiting employee access to what is needed for their job role, developing a good baseline, and training staff to recognize detrimental behavior.

Rowley noted the importance of understanding employee morale in critical areas and providing ways for employees to seek help if targeted. Rowley also noted a need for clear procedures and policies around employee access.



Clark reminded members of the next Board of Directors meeting and solicited volunteers to attend the OGOC Risk Roundtable (closed session) on June 14, 2023. Gayle Nansel will attend the meeting on behalf of the RAC.

6. 2023 Reliability Conference Debrief

Reliability Advisory Council member, Bryn Wilson, provided a debrief of the 2023 Reliability Conference. Wilson recapped the conference speakers and topics in the order they were presented. There were 419 attendees (includes in person and virtual). There was discussion about the preliminary attendance numbers.

Clark thanked RAC member, Andy Witmeier for moderating the Facility Ratings Panel. He also recognized Cris Zimmerman and the Outreach Department for their support of the conference.

7. Reliability and Security Technical Committee Meeting Update

Reliability Advisory Council and RSTC member, John Stephens, provided a recap of the Reliability and Security Technical Committee (RSTC) meeting on March 22-23, 2023. Highlights included: NERC recently posted the 2023 Summer Reliability Assessment (SRA). The 2023 State of Reliability report is currently under review and scheduled for completion in June. The FERC-NERC Cold Weather Inquiry is proceeding. The RSTC discussed the impacts of Winter Storm Elliott and the on-going inquiry. Ambient Adjusted Ratings (AARs) are still a hot topic. Stephens did not have an update on the Electromagnetic Modeling Transients Task Force (EMTTF). The next meeting is scheduled for June 21-22, 2023 at the MRO office.

8. MRO Representatives on NERC Subgroups

NERC Electric Gas Working Group (EGWG) – Jaimin Patel

Patel provided a written report to the RAC but was not present at the meeting. The NAESB Gas-Electric Harmonization (GEH) forum survey is out and a link to the survey was provided.

NERC Inverter Based Resource Performance Subcommittee (IRPS) – Open

David Brauch is no longer the NERC Representative for the IRPS, and this position is now open. No update was provided. Clark noted that the IRPS seat is open, and if anyone is interested they should contact MRO.

NERC System Planning Impacts from DER Working Group (SPIDERWG) – Wayne Guttormson

Guttormson provided a written report to the RAC but was not present at the meeting. Stephens noted that the RSTC approved a SPIDERWG Standard Authorization Request (SAR) for modifications to FAC-001 and FAC-002.

NERC System Protection and Control Working Group (SPCWG) – Lynn Schroeder

The SPCWG has completed a position paper related to FERC Order 881 and Order 881-A to determine the impacts to PRC-023. The SPCWG's position is that no changes to PRC-023 are needed. Next, the paper will go to the RSTC for endorsement at their June meeting. Chair Pursley asked if the position paper might lend itself to a webinar once it is endorsed. The other item gaining attention is the Technical Reference related to maintenance for Ethernet based P&C.



Schroeder has been elevated to Chair of SPCWG, and Manish Patel is the new Vice Chair. The next meeting is June 12, 2023.

NERC Energy Reliability Assessment Task Force (ERATF) – Tom Whynot

Tom Whynot provided an update on the ERATF. The standards drafting team is meeting weekly. The draft version of Volume 1 of the ERATF white paper has been published with no notable changes. It identifies the need for Energy Assessments in addition to Capacity Assessments. There has been request for commentary. The next step is for approval by the RSTC in June. Work on Volume 2 has begun. There was a clarification regarding one standards drafting team with sub teams for planning and operations. Clark asked if the ERATF white paper could be a topic for a future webinar.

Due to administrative challenges, the charters were reviewed later in the meeting (Agenda Items 4b & 4c). These minutes reflect the order of business.

The RAC reviewed redlined versions of the RAC and PRS charters.

Upon a motion duly made and seconded, the RAC approved the redlined versions of the RAC and PRS charters for recommendation to the OGOC for approval.

9. 2023 Work Plan Update

Action Item Review

Chair Pursley reviewed the action items in the 2023 work plan. Updates were made accordingly. Discussion ensued.

10. Reliability Coordinator Updates

Midcontinent Independent System Operator (MISO)

RAC member, Andy Witmeier, provided an oral report. MISO is expecting sufficient capacity for the 2023-2024 planning year. This is MISO's first year with all four seasons included in the Planning Resource Auction. They saw some price separation in fall and winter for Zone 9 (Louisiana and Texas). The energy transition may still cause issues with capacity in the future. MISO expects to be frontloaded if summer temperatures are normal or slightly above normal. There was discussion around price separation and reliability concerns.

Saskatchewan Power Corporation (SPC)

RAC member, Binod Shrestha, was not present. No update was provided.

Southwest Power Pool (SPP)

RAC member, C.J. Brown, provided an oral report. Brown reported that SPP has issued several resource alerts in the last month. The output of the SPP fleet is getting harder to predict. In a traditional summer outlook, SPP should have sufficient capacity, but they are in the two-thirds of the country addressed in NERC's Summer Reliability Assessment (SRA). If the wind doesn't blow to accreditation, it could force SPP to issue Energy Emergency Alerts (EEAs). There was discussion around how summer assessment numbers were reported in 2023 vs. 2022. It was noted that SPP did not report "behind the meter generation" in their resource adequacy numbers. A member asked about large generation/transmission additions in the SPP footprint this year. Brown reminded the group that SPP



changed their Planning Reserve Margin (PRM) from 12 to 15 percent last year. Brown noted that most new additions to SPP this year will be renewables.

11. MRO Regional Summer Assessment (RSA)

MRO Principal Reliability Assessment Engineer, Salva Andiappan, provided an overview of the upcoming 2023 Regional Summer Assessment (RSA). Andiappan reported key findings from the 2023 RSA. He noted that MISO, SPC and SPP will need to issue EEAs for extreme summer peak load and outages. If wind output is below normal, MISO and SPP can face challenges in meeting normal or extreme peak load. Andiappan also reported that long-term trends indicate increasing generation forced outage rates. Human errors are the primary contributing factor for system protection misoperations. There was a lengthy discussion about planning and EEAs. Discussion ensued.

Andiappan solicited dates for the RAC to review the 2023 LTRA results. MRO will send out a Doodle poll to the RAC members.

12. Feedback on 2023 Regional Risk Assessment

MRO Principal Technical Advisor, Mark Tiemeier, shared feedback solicited from the MRO advisory councils via a survey on the 2023 Regional Risk Assessment (RRA). Some respondents disagreed that “Insider Threat” should be a high priority. There was a question about the definition of “Supply Chain Compromise” in the RRA. The respondents felt there was no unnecessary overlap in the identified risks. Several potential risks were identified for the 2024 RRA, including Electromagnetic Transient (EMT) modeling and the changing resource mix. A member suggested that supply chain risks be separated into generation and transmission risks.

Tiemeier reviewed the RRA process improvements noted in the survey results. He shared two options for the 2024 RRA Risk Ranking Workshop and solicited volunteers from the RAC. RAC members, Bryn Wilson and C.J. Brown were identified as the volunteers who will participate in the 2024 RRA Risk Ranking Workshop. Discussion ensued.

13. NERC Lessons Learned Review

MRO Principal Systems Protection Engineer, John Grimm, provided an overview of recent NERC lessons learned. Grimm noted the “in-process” lessons learned submitted to NERC as well as the lessons learned published in 2022 and 2023. He shared links to the recent activity since the last RAC meeting. Grimm also explained the goal of publishing lessons learned is to provide industry with technical and understandable information that assists them with maintaining the reliability of the bulk power system. Discussion ensued.

14. NERC Standards Review Forum Update

Vice Chair, Gayle Nansel, provided an update on behalf of the NERC Standards Review Forum (NSRF) to the RAC via email on May 10, 2023. No further information was requested.

15. Protective Relay Subgroup Update

MRO Senior Systems Protection Engineer, Jake Bernhagen, provided an update on behalf of the Protective Relay Subgroup (PRS). Bernhagen noted the ERO Misoperation Workshop NERC is planning to host in Atlanta in the fall. The speakers and topics are still in development. Bernhagen



plans to implement NERC's impact score when the PRS reviews MRO's quarterly misoperations at the second quarter meeting on June 27, 2023.

16. 2023 Meeting Dates

Chair Pursley reviewed the 2023 meeting dates for the RAC, as well as the other councils and subgroups. Pursley highlighted the adjacent council meetings in August and noted that Vice Chair Nansel will be leading the RAC meeting on August 10, 2023. A member requested that the third quarter RAC meeting start time be changed to 8:00 AM central.

Chair Pursley encouraged the RAC members to help promote the other MRO advisory councils' upcoming conferences within their organizations.

17. RAC Member Roundtable

Chair Pursley invited member participants to share other relevant industry observations. No roundtable topics were shared.

18. Other Business and Adjourn

Having no further business to discuss, the meeting was adjourned at 1:39 p.m.

Prepared by: Rebecca Schneider, Reliability Analysis Administrator.

Reviewed and Submitted by: Bryan Clark, Director of Reliability Analysis



Exhibit A – Meeting Attendees

Reliability Advisory Council Members Present	
Name	Organization
Dick Pursley, Chair	Great River Energy
Gayle Nansel, Vice Chair	Western Area Power Administration
Andy Witmeier	MISO
Bryn Wilson	Oklahoma Gas & Electric
C.J. Brown	Southwest Power Pool
Dallas Rowley	Oklahoma Gas & Electric
Derek Brown	Evergy
Jason Weiers	Otter Tail Power Company
Jeremy Severson	Basin Electric Power Cooperative
John Stephens	City Utilities of Springfield Missouri
Nandaka Jayasekara	Manitoba Hydro
Ron Gunderson	Nebraska Public Power District
MRO Staff Present	
Name	Title
Bryan Clark	Director of Reliability Analysis
Rebecca Schneider	Reliability Analysis Administrator
Margaret Eastman	Security Administrator
Mark Tiemeier	Principal Technical Advisor
Salva Andiappan	Principal Reliability Assessment Engineer
Jake Bernhagen	Manager of Reliability Performance
John Grimm	Principal Systems Protection Engineer
Max Desruisseaux	Senior Power Systems Engineer
Jeff Norman	Director of Compliance Monitoring



Steen Fjalstad	Director of Security
Cris Zimmerman	Manager of Outreach and Stakeholder Engagement
Shawn Keller	Outreach Coordinator
Kabir Dogubo	Sr. Risk Assessment and Mitigation Engineer, O&P
Daniel Son	Systems Administrator
Other Attendees	
Name	Organization
Lynn Schroeder	Sunflower Electric Power Corporation
Tom Whynot	Manitoba Hydro
John Roemen	Western Area Power Administration
Tina Adams	Western Farmers Electric Cooperative
Andrew Coffelt	Kansas City Board of Public Utilities
Ellen Watkins	Sunflower Electric Power Corporation
Eric Hammes	Dairyland Power Cooperative
Jessica Burdette	Minnesota Department of Commerce
Mary Agnes Nimis	FERC
Matt Alvarado	Iowa Utilities Board
Steve McGie	Kansas City Board of Public Utilities
Larry Brusseau	Corn Belt Power Cooperative

AGENDA

MRO Board of Directors, OGOC and General Update
Bryan Clark, Director of Reliability Analysis, MRO

Action

Information

Report

Bryan Clark will lead this discussion during the meeting.

Classification: Public



MIDWEST
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OGOC and BOD Update

Bryan Clark, P.E.
Director of Reliability Analysis
August 10, 2023

CLARITY

ASSURANCE

RESULTS

OGOC Q2 Meeting Summary

- **Energy Reliability Planning Risk Discussion**
- **RAC and PRS Charters Approved**



Joint Council Meeting

- **Q3 OGOC Meeting Risk Roundtable**
 - September 13th, 2023
 - ***Energy Reliability Planning***



Future Meeting Dates

- **Q3 OGOC Meeting**
 - September 13, 2023
- **Q3 BOD Meeting**
 - September 14, 2023
- **Q4 OGOC Strategy Session**
 - December 13, 2023
- **Q4 BOD Meeting**
 - December 14, 2023





Questions

AGENDA

2023 Reliability Conference Feedback

Cris Zimmerman, Manager of Outreach and Stakeholder Engagement, MRO

Action

Discussion

Report

Cris Zimmerman will lead this discussion during the meeting.

Classification: **Public**



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2023 Hybrid Reliability Conference Summary Survey Results

Cris Zimmerman Manager, Outreach &
Stakeholder Engagement

2023 Hybrid Reliability Conference Survey Results

- **396 total attendees**
 - 80 in-person
 - 316 Virtual
- **6 question survey**
- **45 survey respondents**
- **1–5 Rating scale - 1 low & 5 excellent**
- **Overall average score of 4.31**



Survey Questions & Scores

MRO Goal & KPI **4.2 – 5.0**

Average Score **4.31**

1. Overall, how would you rate this event? **4.16**
2. How relevant was the material provided to the work you do? **4.09**
3. How likely are you to attend this or other MRO outreach events again? **4.36**
4. For in-person attendees, how would you rate the location and conference facilities?
4.53
5. For virtual attendees, how would you rate your experience with attending this event
virtually? **4.39**
6. If there is one thing you would have changed about this event, what would it be?



Analyzing the Survey Data

MRO Goal & KPI 4.2 low end of KPI threshold – 5.0 Highest KPI level

Average Score **4.31**

1. Overall, how would you rate this event? **4.16**
2. How **relevant** was the **material** provided to the work you do? **4.09**
3. How **likely** are you to **attend** this or other MRO outreach events again? **4.36**
4. For **in-person** attendees, how would you **rate** the **location** and **conference facilities**? **4.53**
5. For virtual attendees, how would you **rate** your **experience** with attending this event virtually? **4.39**



Analyzing Survey Feedback Data

6. If there is one thing you would have changed about this event, what would it be?

13 Total Responses – following summary of key responses

- (4) Good content all around - run extremely well - Well done! Kudos! - Excellent conference with great topics
- Kinda felt like a series of sales pitches for products
- More engagement, hands-on opportunities, smaller group breakouts, questions on screen while being read to presenters
- Add more materials for smaller entities
- It would be great if we could have one more presentation in the afternoon session.
- As a virtual attendee the audio cut out several times
- (2) Presentations available prior to event
- Physical security especially when related to access and visitor management



Take Aways & Improvement Opportunities

- **Overall positive feedback & successful event**
- **Attendees for hybrid events**
 - Virtual attendance 4 times more than In-person
- **Opportunities for improvement**
 - Relevant materials – improve analysis of conference materials during planning
 - Virtual - Improve engagement & add reference materials (handouts)
 - In-person – stay the course – add more interaction or breakout sessions



AGENDA

Advisory Council Work Plans

- a. SAC
- b. CMEPAC

Action

Discussion

Report

Members from the SAC and CMEPAC will review their work plans during the meeting.

Classification: **Public**



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MRO Security Department and Security Advisory Council (SAC)

Steen Fjalstad, Director of Security

Ian Anderson, SAC Chair

CLARITY

ASSURANCE

RESULTS

MRO Security Department

- **Identifies emerging risks, collaborates with entities and others to develop and support mitigation strategies**
- **Supports and collaborates with Security Advisory Council (SAC) and Security Advisory Council Threat Forum (SACTF), including the weekly SACTF threat call**
- **Supports Regional Security Risk Assessment**
- **Coordinates webinars and other outreach**
- **Supports GridEx**



SAC and SACTF 2023 Accomplishments

- **The SAC sponsored a webinar on the topic of Network Exposure on June 28, 2023**
- **The weekly Security Advisory Council Threat Forum Threat Call continues, with an average attendance of 68 attendees from 34 unique companies.**
- **Members of the SAC participated in an online round table working session to expand on the Regional Security Risk Assessment survey and engaged in discussion with representatives of member entities on security threats and priorities.**



Upcoming SAC Events

- **The 10th annual MRO Security Conference will be held September 26-28, 2023 in Oklahoma City**
- **A webinar on the topic of IT/OT Convergence is scheduled for August 29, 2023**
- **Potential additional webinars are under discussion**





Questions



MIDWEST
RELIABILITY
ORGANIZATION

Welcome from the CMEPAC

Terri Pyle, CMEPAC Chair

Tasha Ward, Director of Enforcement and External Affairs

Mark Flanary, Director of Risk Assessment and Mitigation

Bill Steiner, Director of Compliance Monitoring

CLARITY

ASSURANCE

RESULTS

CMEP Advisory Council

Purpose

The MRO Compliance Monitoring and Enforcement Program Advisory Council (MRO CMEPAC) is an MRO Organizational Group that provides advice and counsel to MRO's Board of Directors (board), the board's Organizational Group Oversight Committee (OGOC), staff, members and registered entities on topics such as the development, retirement, and application of NERC Reliability Standards, risk assessment, compliance monitoring, and the enforcement of applicable standards. The MRO CMEPAC increases outreach and awareness in these key areas.



CLARITY

ASSURANCE

RESULTS

CMEPAC Outreach

- **MRO CMEP Conference (July 26, 2023)**
 - This year's theme: Understanding Risk for Reliability & Compliance
- **Other CMEPAC Outreach**
 - Monthly Calls
 - Newsletters
 - Webinars
- **Supports NERC Standards Review Forum (NSRF)**



CMEPAC Initiatives

1. Requirement Specific RFI – CIP-007 R2, FAC-008 R6
2. RRA and associated NERC Reliability Standards
3. Readiness Assessment – EOP-012-1 R2



CMEPAC Achievements

- **Held Hybrid MRO CMEP Conference (over 350 online/in-person attendees)**
- **Had kick off of requirement specific RFI initiative**
- **Held 7 monthly calls**
- **Held weekly NSRF calls**



AGENDA

Technical Presentation – Underfrequency Load Shedding (UFLS)
Kevin Jones, Consulting Engineer, System Protection Engineering, Xcel Energy

Action

Information

Report

Kevin Jones will lead the discussion during the meeting.

Classification: **Public**



BLANCO TO FLOYD COUNTY FAULT AND SUBSEQUENT OPERATIONS

Prepared by Kevin W. Jones, P.E.

Consulting Engineer, System Protection Engineering

Presented to MRO Reliability Advisory Council

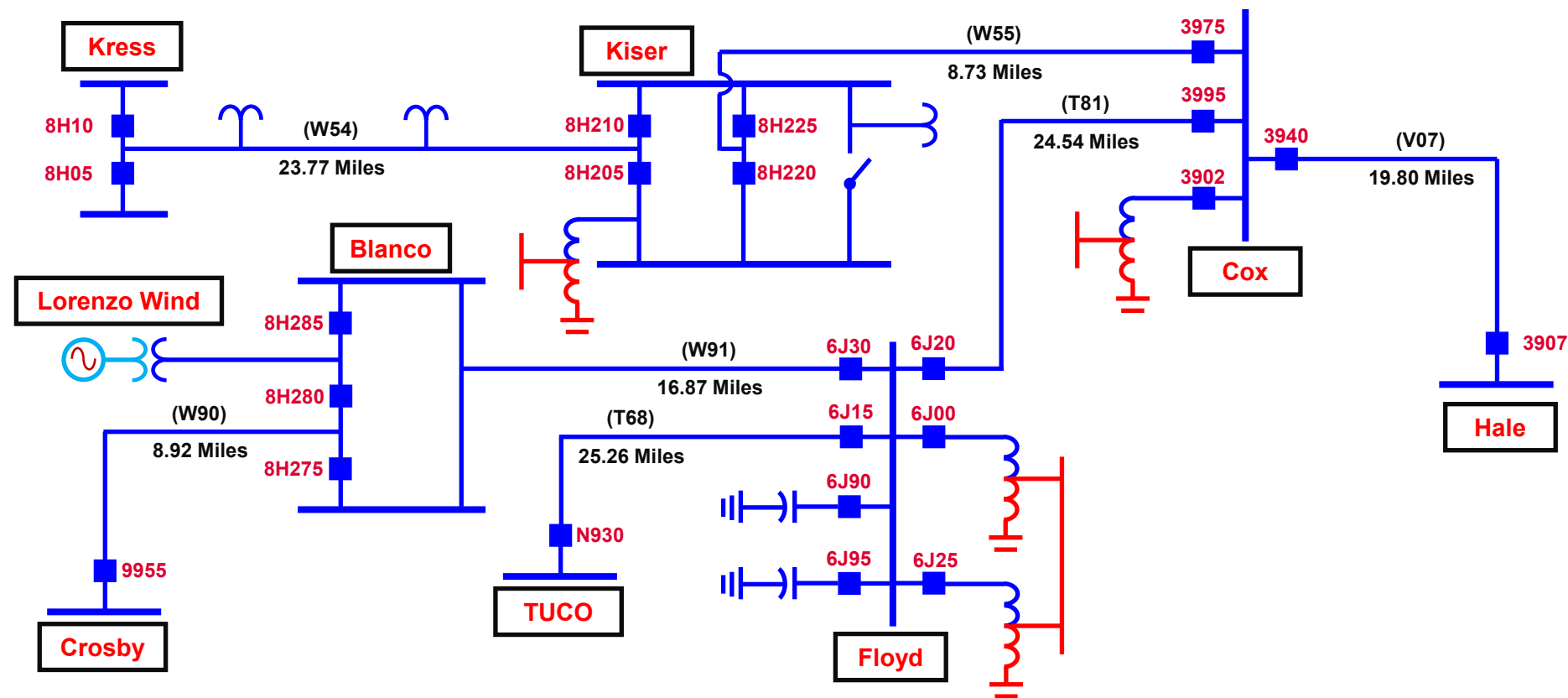
August 10, 2023

EVENT SETUP

- **Initiating fault occurred on October 28, 2020, at 11:53:07.912 CDT**
- **Fault location was shown to be 0.24 miles away from Blanco Substation on 115 kV circuit W91 (Blanco to Floyd County)**
- **Weather at the time of the event was ice, snow and wind due to Winter Storm Billy impacting Eastern New Mexico, the Oklahoma and Texas Panhandles and Western/Central Oklahoma**



One-Line of Affected System



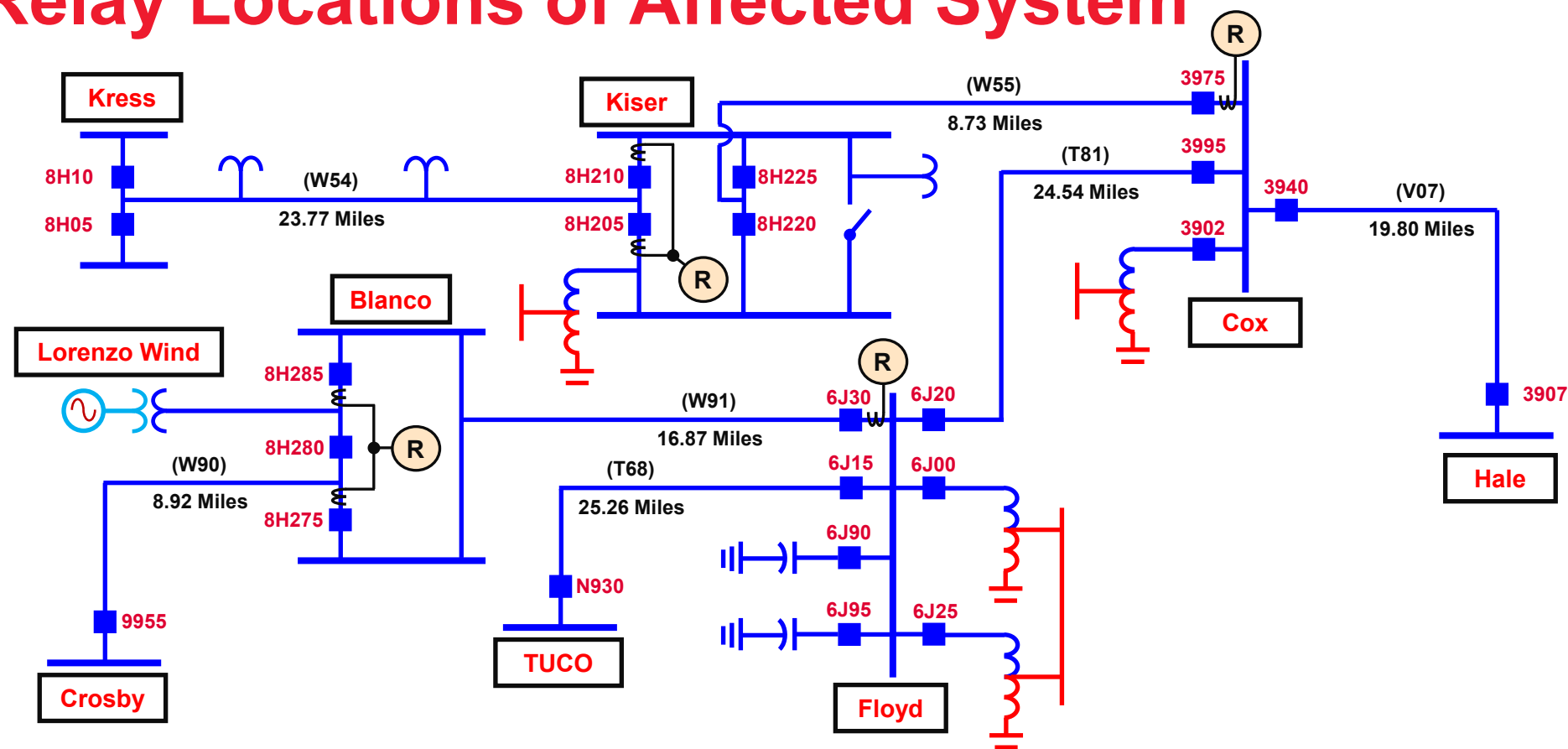
Legend

69 kV

115 kV

Distribution Load

Key Relay Locations of Affected System



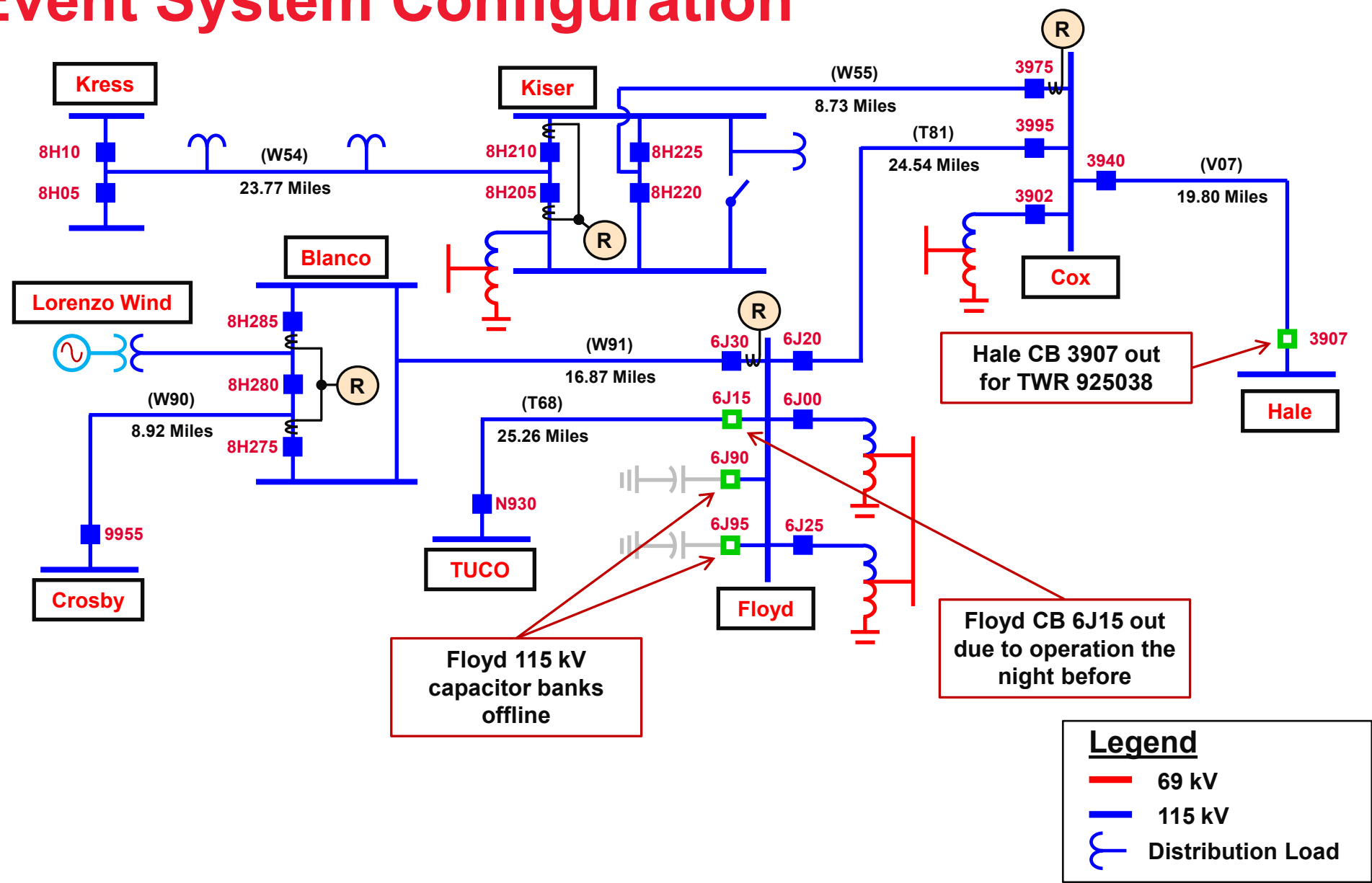
Legend

69 kV

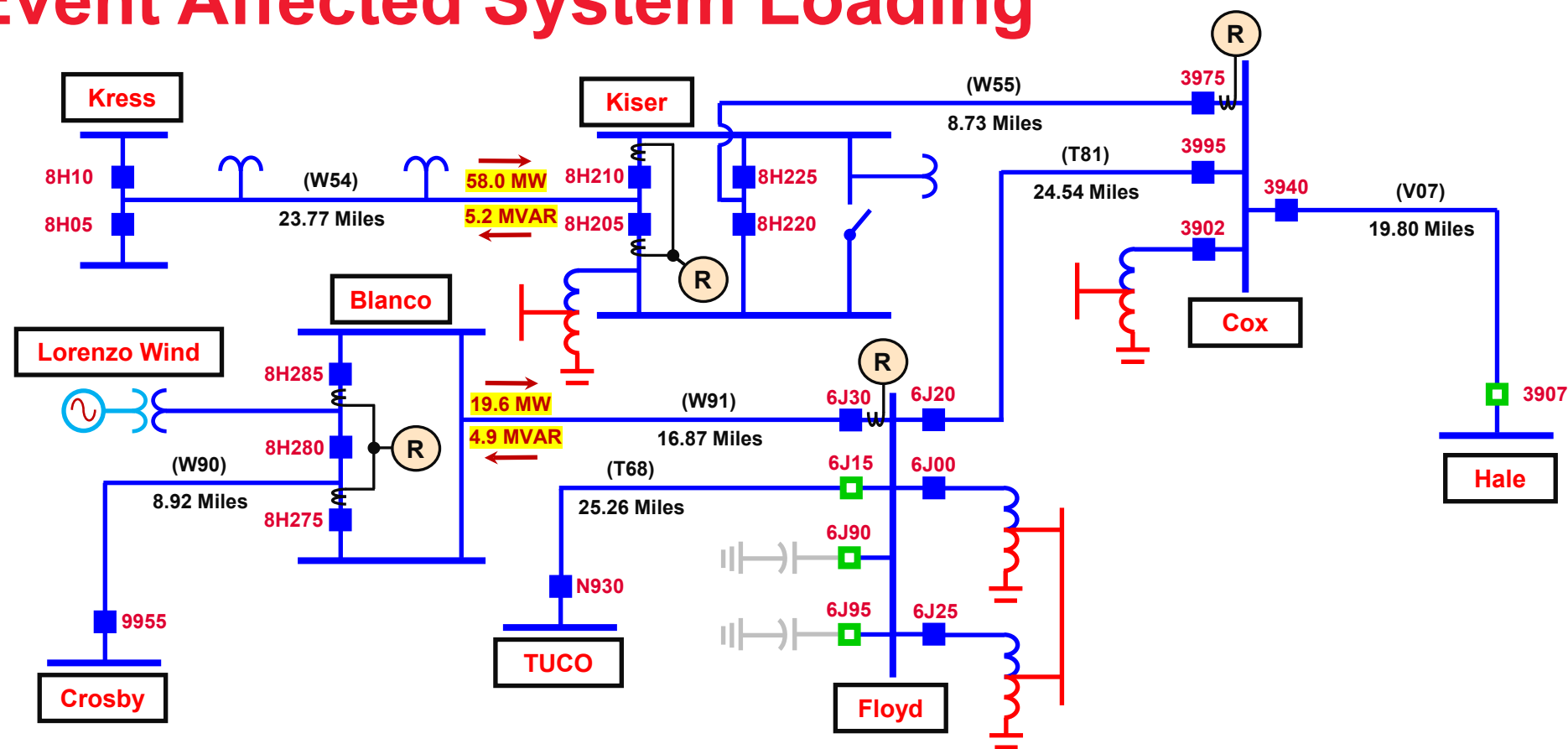
115 kV

Distribution Load

Pre-Event System Configuration



Pre-Event Affected System Loading



- Kiser/Cox/Floyd load just prior to the event was 77.6 MW based on event record power calculations
- Load sources into the area are from Kress to Kiser and Blanco to Floyd

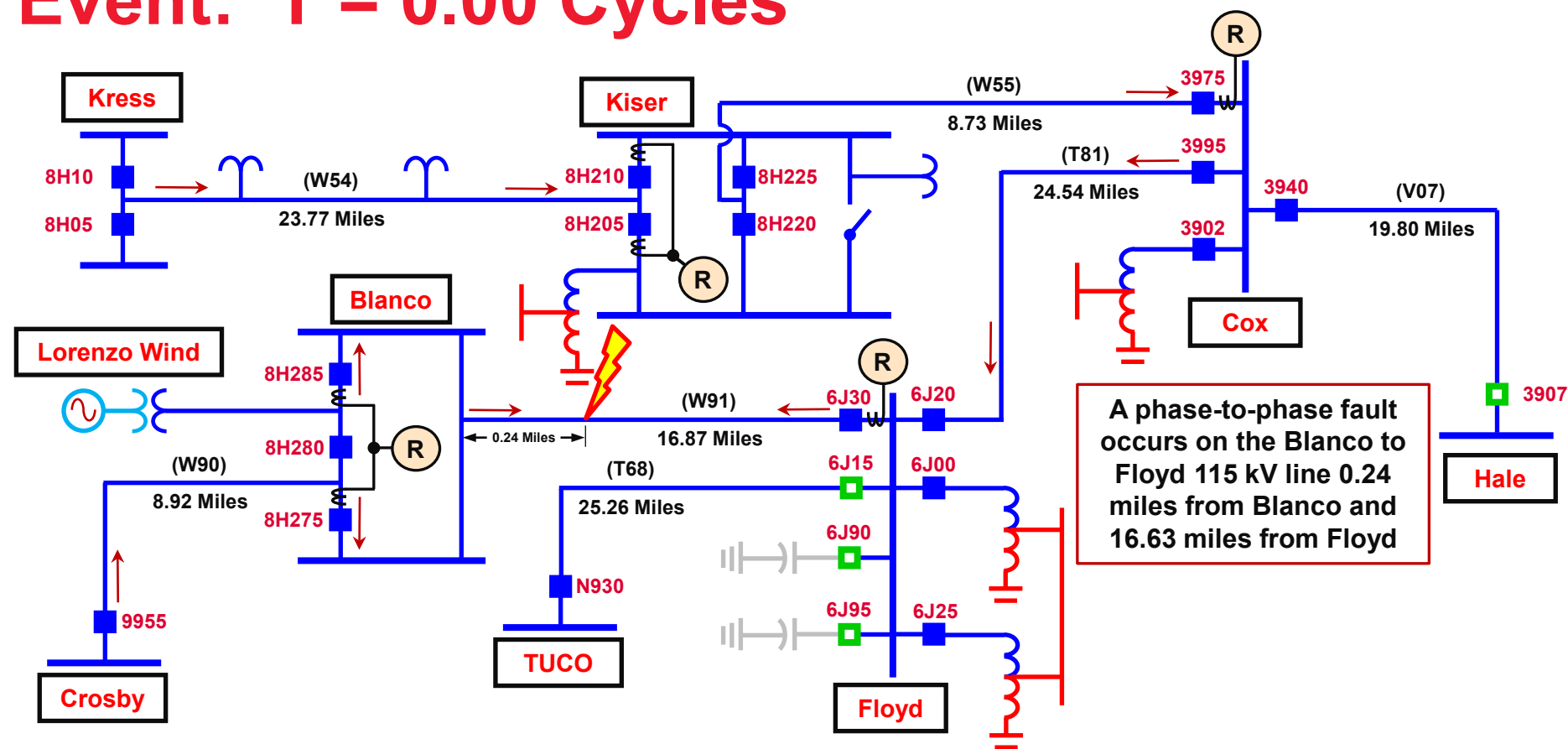
Legend

69 kV

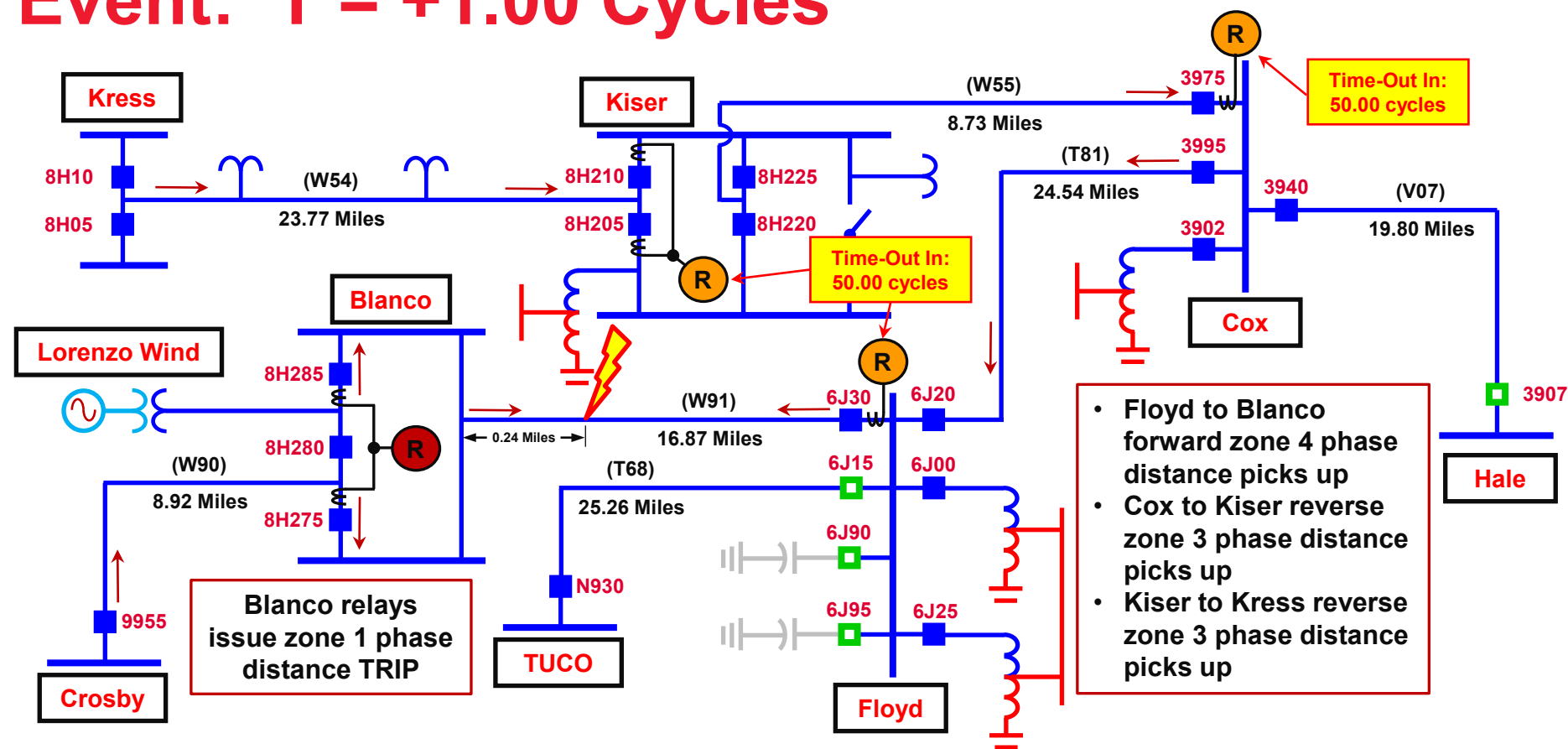
115 kV

Distribution Load

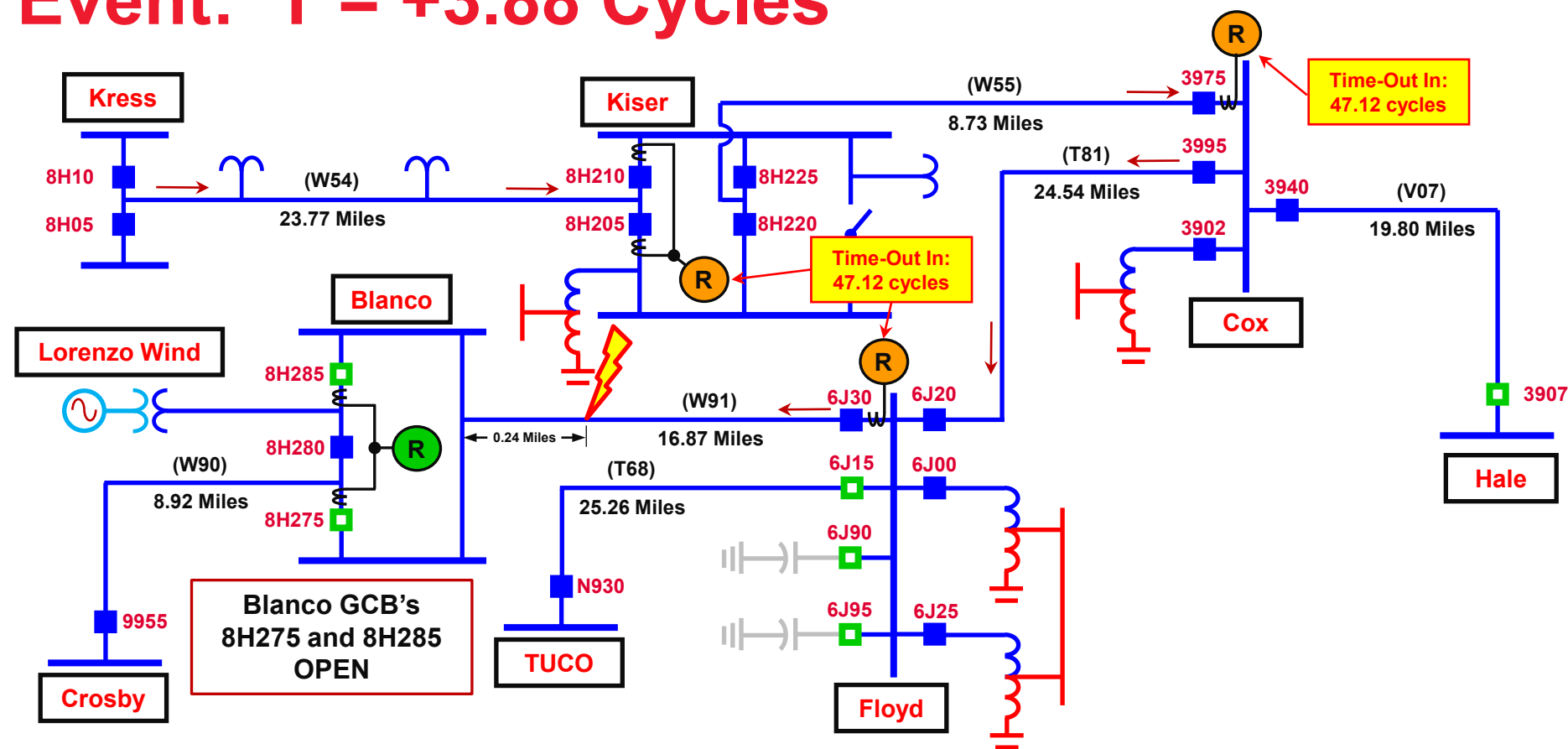
Fault Event: T = 0.00 Cycles



Fault Event: T = +1.00 Cycles



Fault Event: T = +3.88 Cycles



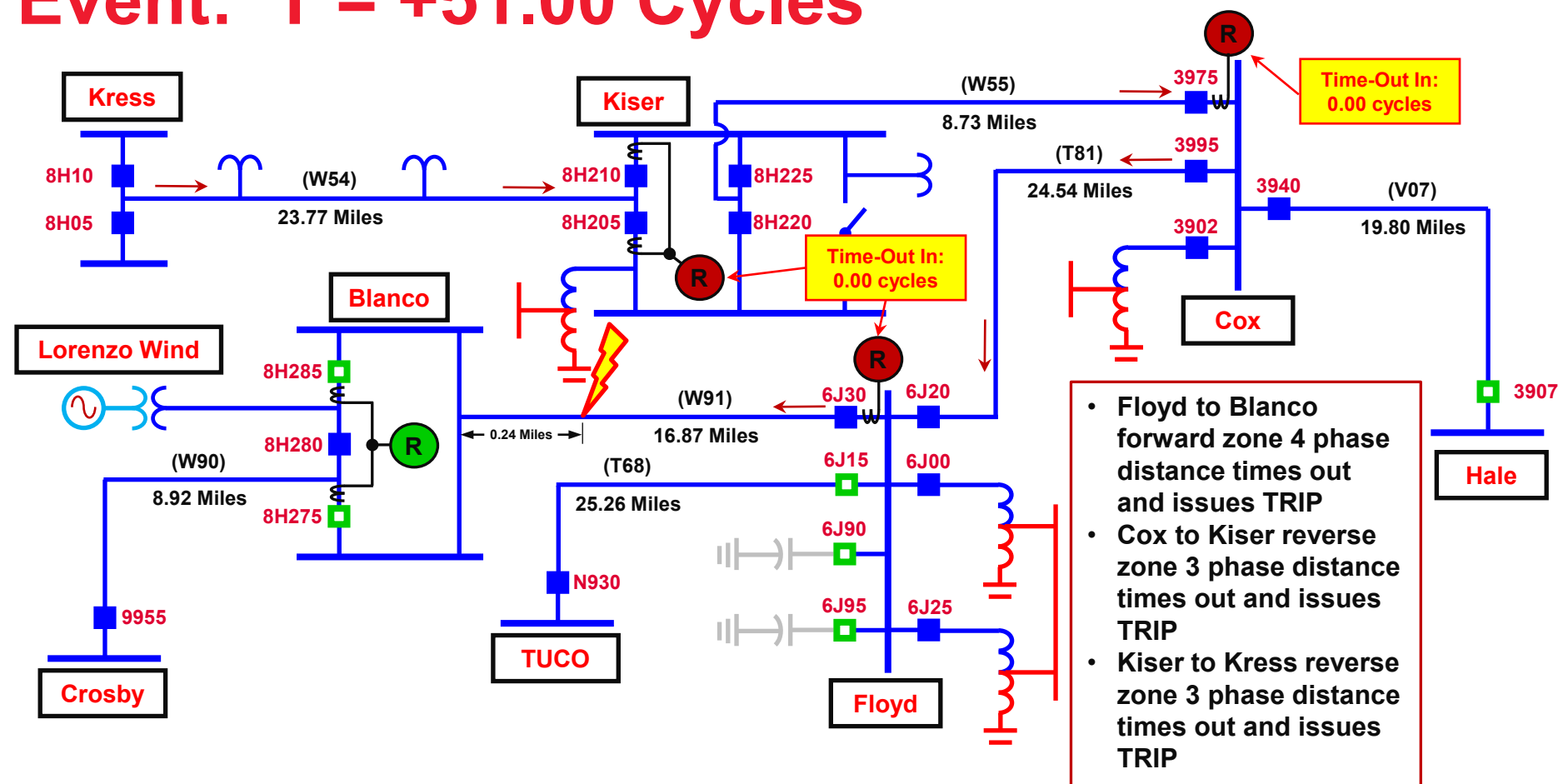
Legend

69 kV

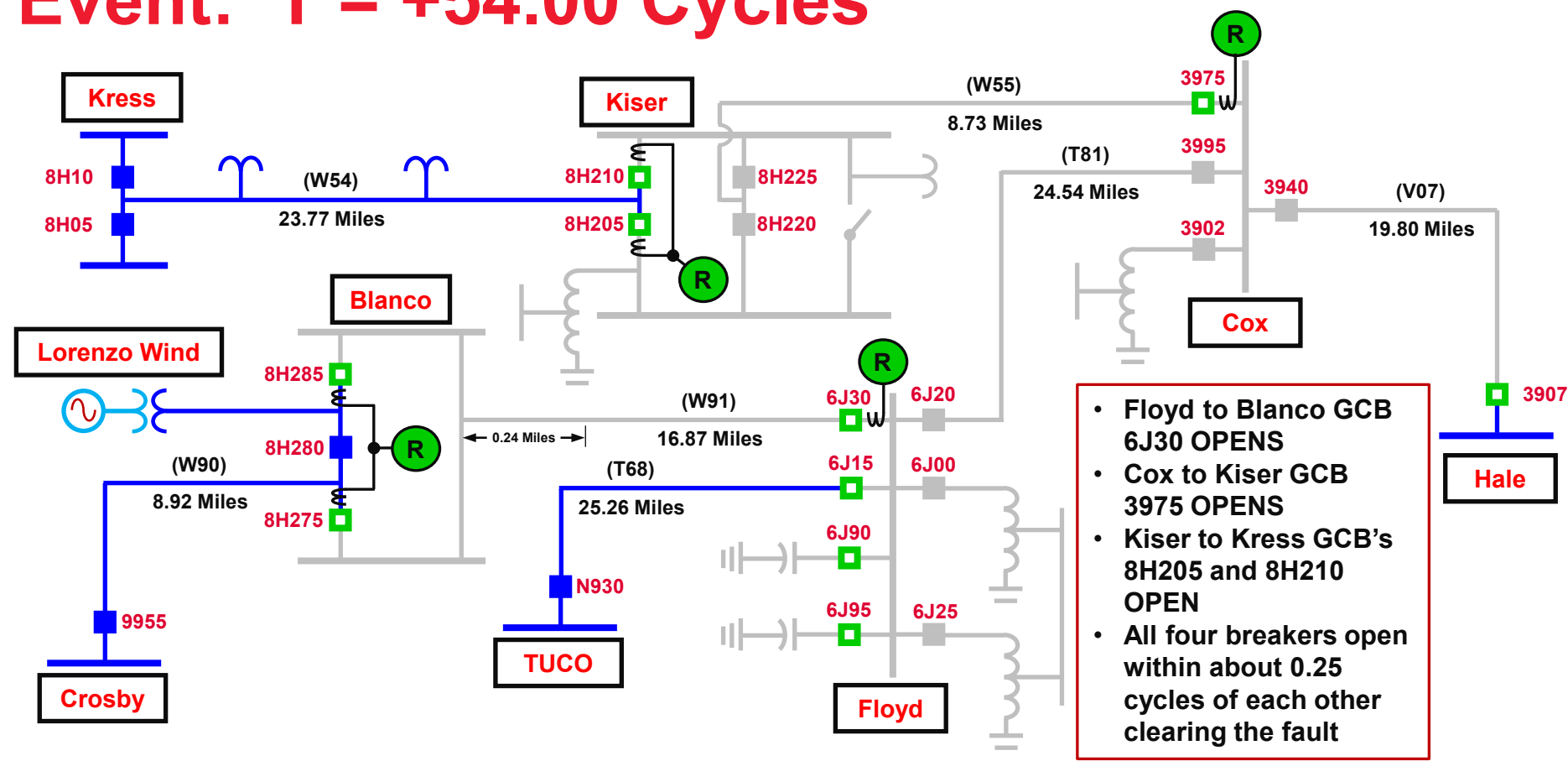
115 kV

Distribution Load

Fault Event: T = +51.00 Cycles



Fault Event: T = +54.00 Cycles



Event Summary

- Total event fault duration was 54 cycles
- Blanco to Floyd zone 1 phase distance element correctly tripped for the fault
- Floyd to Blanco zone 2 phase distance element did NOT see the fault
- Floyd to Blanco zone 4 phase distance element asserted and tripped for the fault
- Reverse zone 3 phase distance elements at Cox to Kiser and at Kiser to Kress saw the fault and tripped at the same time as the Floyd to Blanco zone 4 phase distance element
- 78 MW's of load was lost for this event
- No auto reclosing occurred at Blanco due to sync-check conditions not being met (needed HB-HL or DB-HL)
- No auto reclosing at Kiser to Kress since reclose initiate does not occur for remote backup tripping elements

Event Investigation Results

■ What caused the initiating fault?

- The center phase contacted an outside phase due to galloping, ice covered conductors 0.24 miles from Blanco to Floyd
- Preliminary fault location is mid-span between structures 108 and 109

Navigation: Copy Record Close Original

Tower ID T-0-102 on 65 Foot Poles **Tag:** 39

Design Title H-Frame with Porcelain Insulators

Max. Design Voltage 115 kV

Coordinate Units Feet

Phase Conductor Coordinates

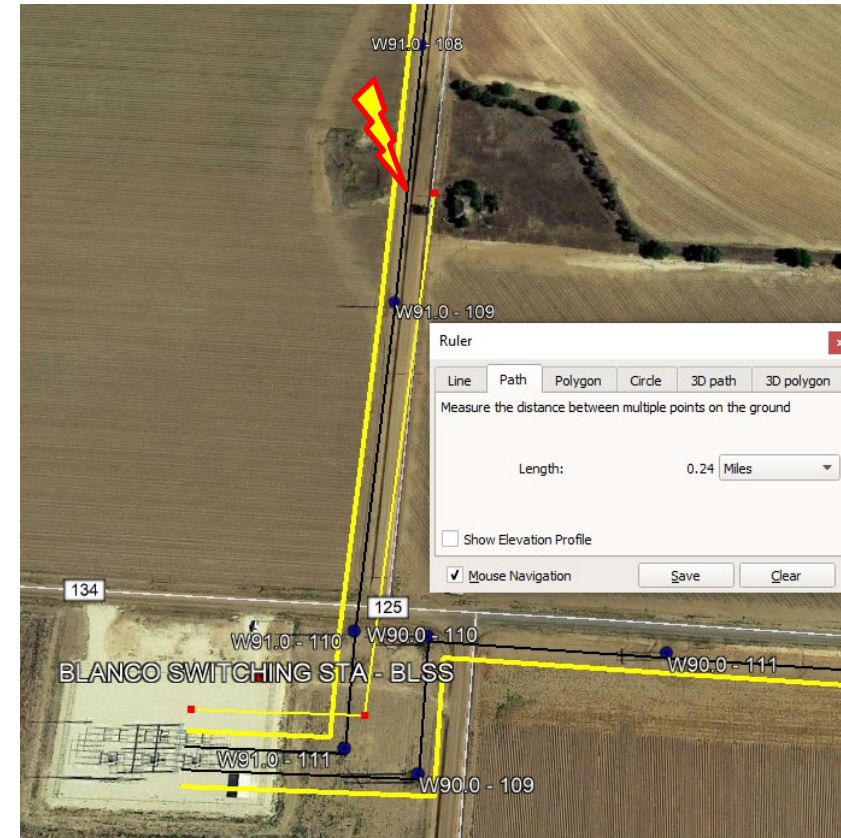
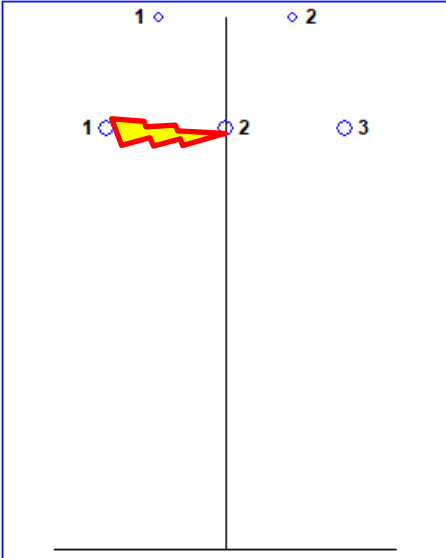
Position	X	Y
1	-12.50	44.00
2	0.00	44.00
3	12.50	44.00

Add Position Delete Position

Neutral Conductor Coordinates

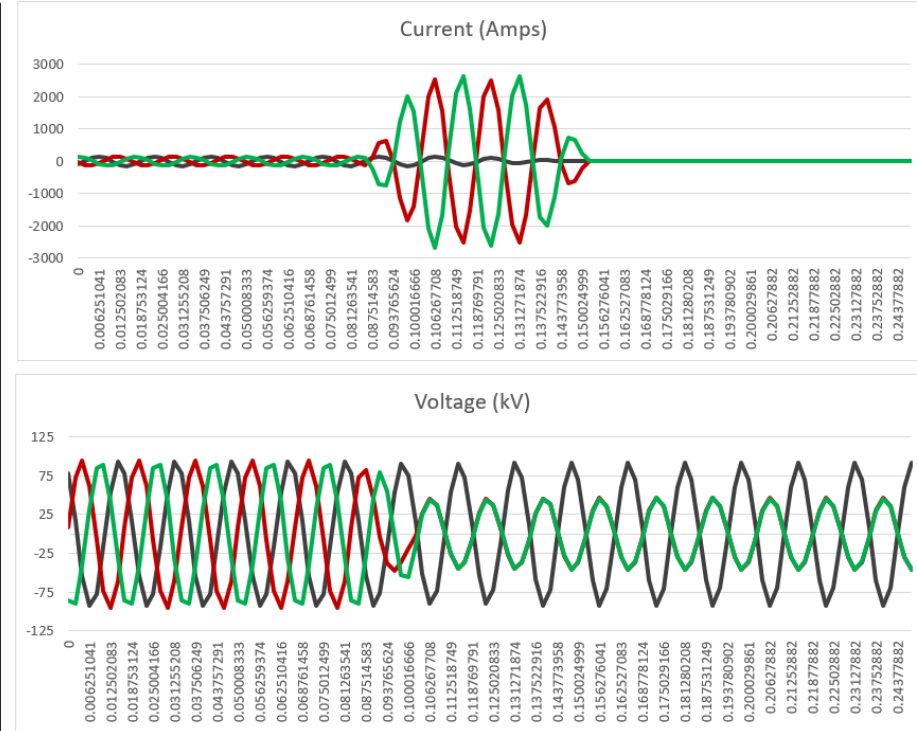
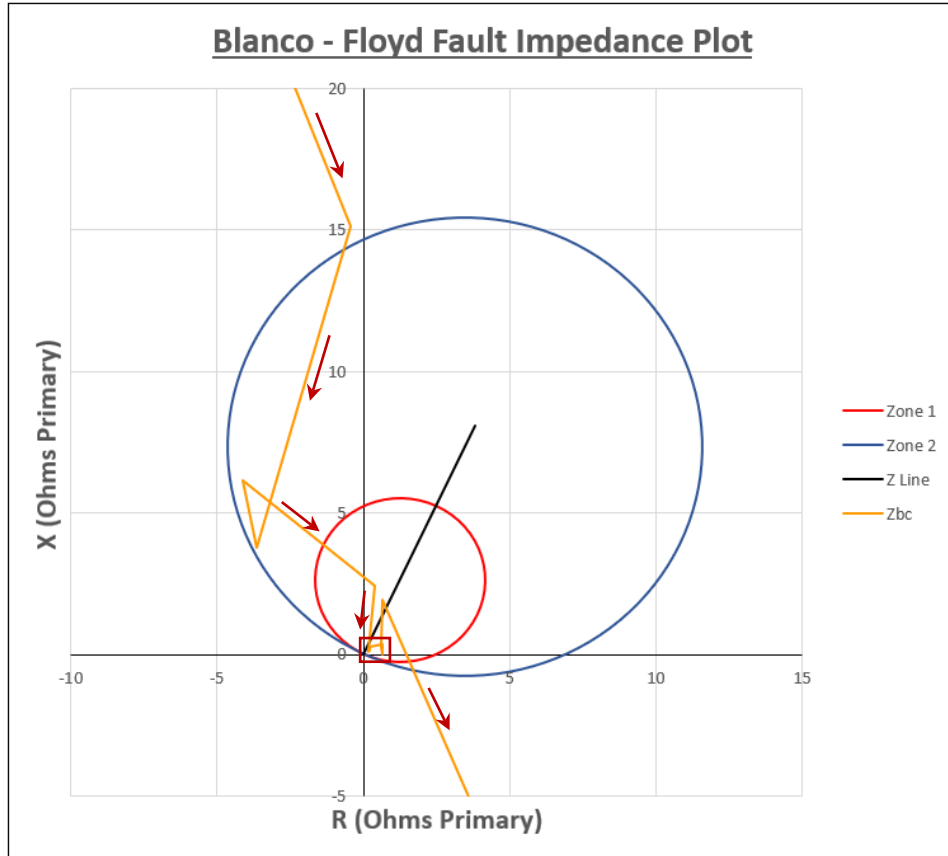
Position	X	Y
1	-7.00	55.50
2	7.00	55.50

Add Position Delete Position



Event Investigation Results

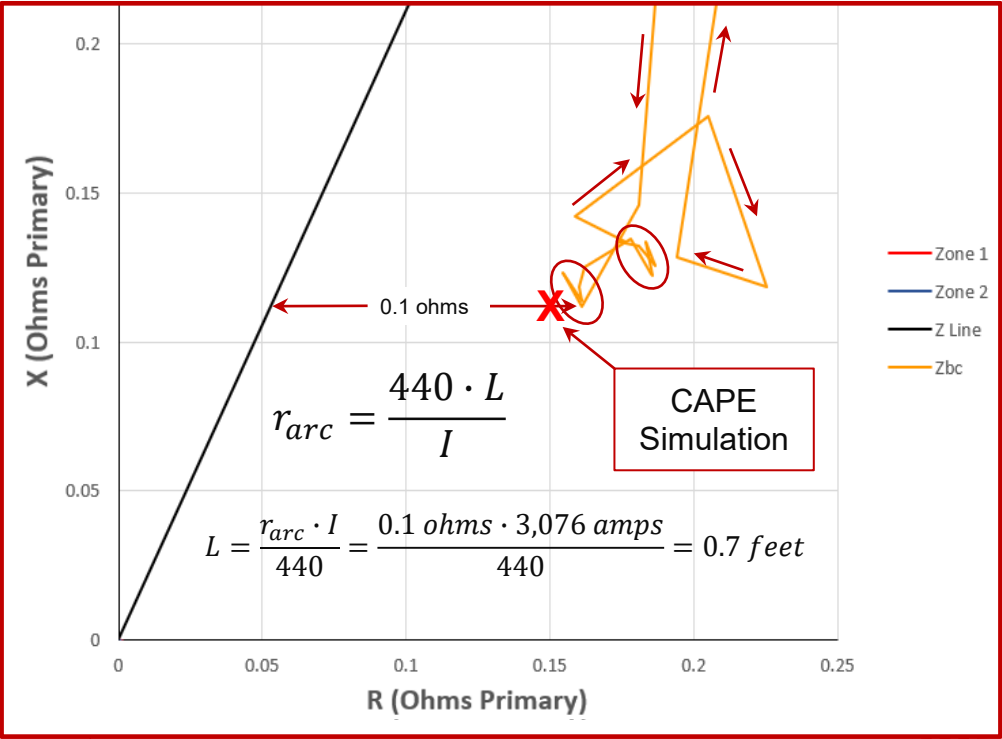
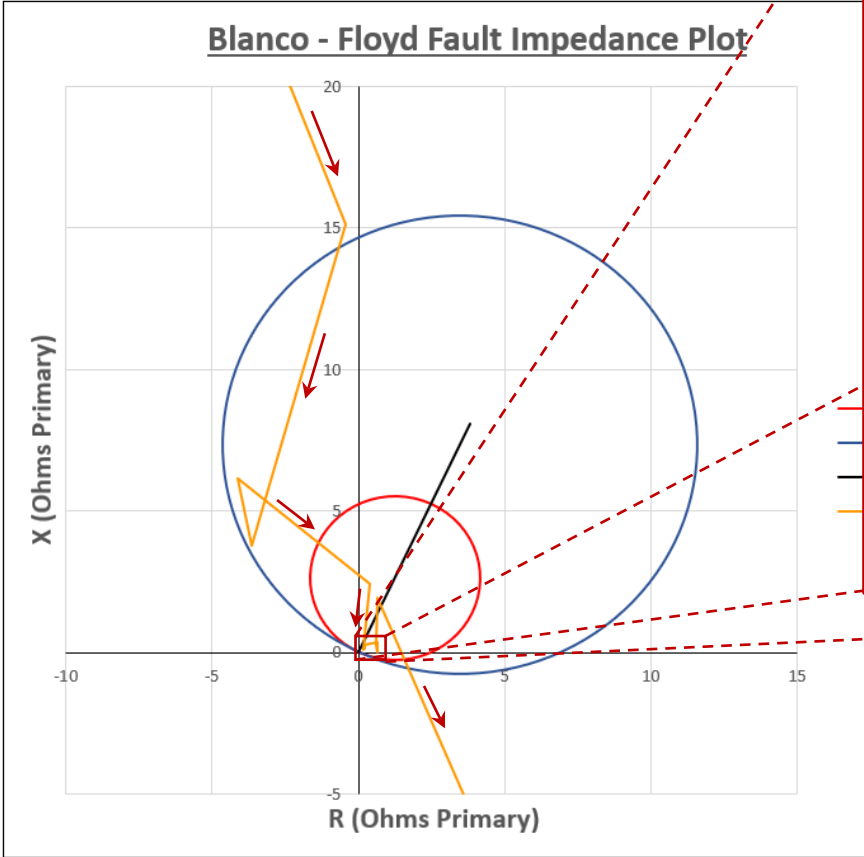
■ Blanco Relay Event Analysis:



- Fault as seen by Blanco is a B-C phase-to-phase fault with about 0.1 – 0.12 ohms of arc resistance
- Fault is cleared from the Blanco end in about 4-cycles

Event Investigation Results

■ Blanco Relay Event Analysis:

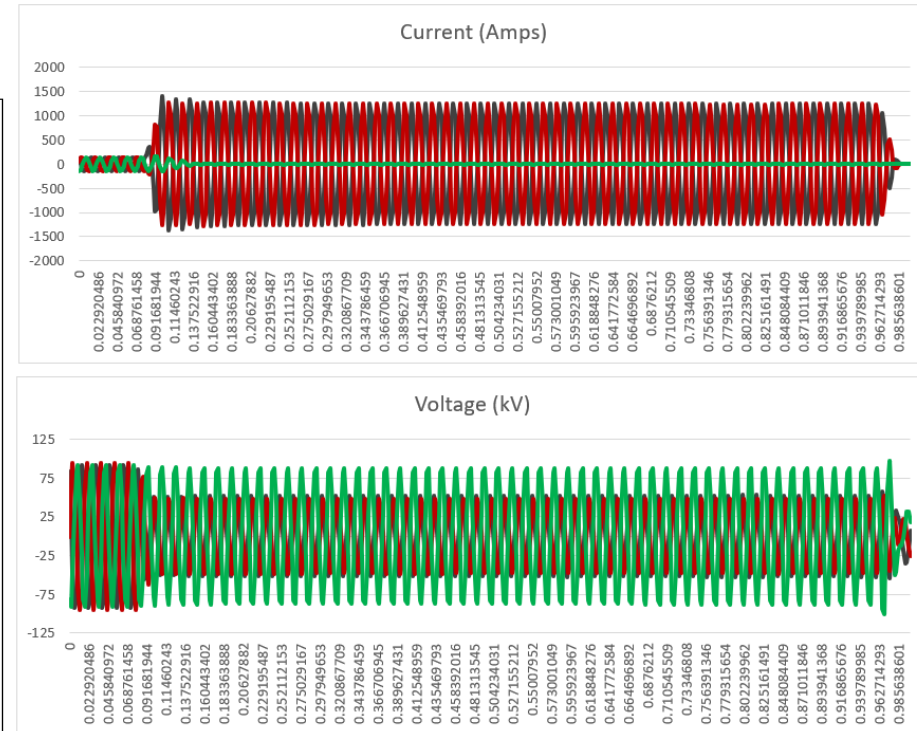
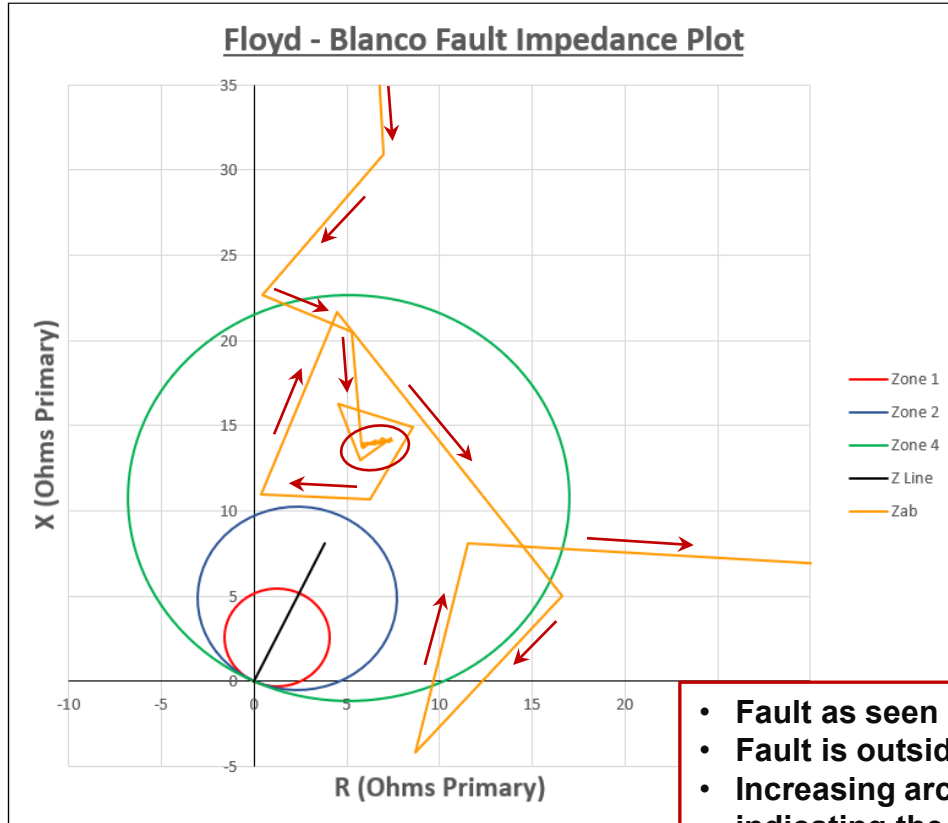


- With arc resistance of about 0.1 ohms, conductors got within a foot of each other at fault inception

Correct Operation!!!

Event Investigation Results

■ Floyd Relay Event Analysis:



- Fault as seen by Floyd is an A-B phase-to-phase fault
- Fault is outside zone 2 reach, but within zone 4
- Increasing arc impedance is shown from left-to-right in the circled area, indicating the conductors are moving apart and the arc is getting bigger
- Apparent impedance has both resistance and reactance, indicating that the fault is beyond the end of the line, or there is an error in CT/PT ratio or settings, or line constants
- Fault is cleared in 54-cycles by zone 4 phase distance

Event Investigation Results

■ Why didn't the zone 2 distance element see the fault?

- Wrong CT/PT ratio? Checked, but **OK**.
- Wrong line constants? Checked and **NOT OK!!!**

#	ID	Calculated By	Length (Miles)
1	4/0 ACSR SLG T-0-102	Line Constants	8.41516
2	4/0 ACSR SLG T-0-184	Line Constants	2.65619
3	397.5 ACSR SLG T-0-174	Line Constants	5.0303
4	397.5 ACSR SLG T-0-174	Line Constants	0.769881

Line Constants Data Line Parameter Data Impedances Miscellaneous Data				
Section Impedance Data				
Impedance Unit <input type="radio"/> Per Unit <input checked="" type="radio"/> Ohms				
	Series Z (Ohms)		Shunt Y (MicroMhos)	
	R	X	G	B
+ Sequence	3.65336	7.49354	0.00060	44.19874
0 Sequence	7.75727	22.24238	0.00059	30.38282

Line Constants Data Line Parameter Data Impedances Miscellaneous Data				
Section Impedance Data				
Impedance Unit <input type="radio"/> Per Unit <input checked="" type="radio"/> Ohms				
	Series Z (Ohms)		Shunt Y (MicroMhos)	
	R	X	G	B
+ Sequence	0.17836	0.60413	0.00000	4.21955
0 Sequence	0.62944	1.81035	0.00000	2.92270

Line Constants Data Line Parameter Data Impedances Miscellaneous Data				
Section Impedance Data				
Impedance Unit <input type="radio"/> Per Unit <input checked="" type="radio"/> Ohms				
	Series Z (Ohms)		Shunt Y (MicroMhos)	
	R	X	G	B
+ Sequence	0.00000	0.00000	0.00000	0.00000
0 Sequence	0.00000	0.00000	0.00000	0.00000

- Nearly half of the line didn't get calculated.

Line Constants Data Line Parameter Data Impedances Miscellaneous Data				
Section Impedance Data				
Impedance Unit <input type="radio"/> Per Unit <input checked="" type="radio"/> Ohms				
	Series Z (Ohms)		Shunt Y (MicroMhos)	
	R	X	G	B
+ Sequence	0.00000	0.00000	0.00000	0.00000
0 Sequence	0.00000	0.00000	0.00000	0.00000

Event Investigation Results

■ Corrected line constants:

Line kV: 115.00
Length: 16.87 miles
Surge impedance: 418.01 ohms Loading: 31.638 MW

Two Port Data (shunt values are for entire line)

	-----Ohms-----		-----MicroMhos-----	
	Series R	Series X	Shunt G	Shunt B
Positive Seq New	6.13448	14.43326	0.00410	89.75433
Positive Seq Old	3.83163	8.09757	0.00070	48.41861
Negative Seq New	6.13448	14.43326	0.00410	89.75433
Negative Seq Old	3.83163	8.09757	0.00070	48.41861
Zero Seq New	14.53152	43.60246	0.00462	61.68108
Zero Seq Old	8.38625	24.05214	0.00076	33.30598

Section Number: 1 ID: 4/0 ACSR SLG T-0-102
Right of Way: FLCO-BLSS W91
Length: 8.42 miles Impedance Source: Line Constants
Tower String ID: W91 (Str 32 to 110)

	-----Ohms-----		-----MicroMhos-----	
	Series R	Series X	Shunt G	Shunt B
Positive Seq New	3.65336	7.49354	0.00060	44.19874
Positive Seq Old	3.65336	7.49354	0.00060	44.19874
Zero Seq New	7.75727	22.24238	0.00059	30.38282
Zero Seq Old	7.75727	22.24238	0.00059	30.38282

Section Number: 3 ID: 397.5 ACSR SLG T-0-174
Right of Way: FLCO-BLSS W91
Length: 5.03 miles Impedance Source: Line Constants
Tower String ID: W91 (Str 264 to 210)

	-----Ohms-----		-----MicroMhos-----	
	Series R	Series X	Shunt G	Shunt B
Positive Seq New	1.16442	3.94762	0.00007	27.54093
Positive Seq Old	0.00000	0.00000	0.00000	0.00000
Zero Seq New	3.68441	12.60003	0.00011	18.87614
Zero Seq Old	0.00000	0.00000	0.00000	0.00000

Section Number: 2 ID: 4/0 ACSR SLG T-0-184
Right of Way: FLCO-BLSS W91
Length: 2.66 miles Impedance Source: Line Constants
Tower String ID: W91 (Str 1 to 32)

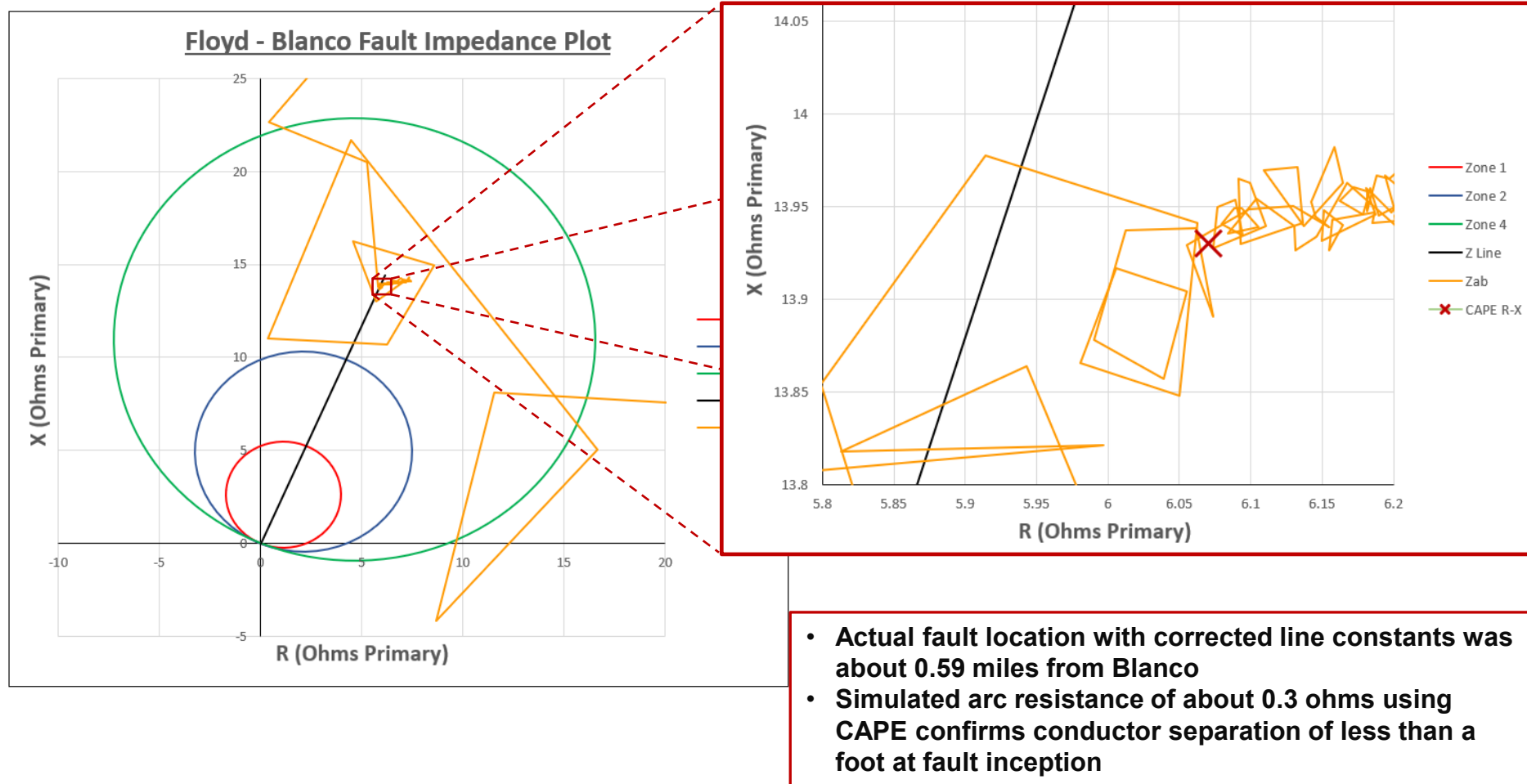
	-----Ohms-----		-----MicroMhos-----	
	Series R	Series X	Shunt G	Shunt B
Positive Seq New	1.14053	2.39015	0.00002	13.78689
Positive Seq Old	0.00000	0.00000	0.00000	0.00000
Zero Seq New	2.47135	6.96435	0.00002	9.48772
Zero Seq Old	0.00000	0.00000	0.00000	0.00000

Section Number: 4 ID: 397.5 ACSR SLG T-0-174
Right of Way: FLCO-BLSS W91
Length: 0.77 miles Impedance Source: Line Constants
Tower String ID: W91 (Str 273 to 264)

	-----Ohms-----		-----MicroMhos-----	
	Series R	Series X	Shunt G	Shunt B
Positive Seq New	0.17836	0.60413	0.00000	4.21955
Positive Seq Old	0.17836	0.60413	0.00000	4.21955
Zero Seq New	0.62944	1.81035	0.00000	2.92270
Zero Seq Old	0.62944	1.81035	0.00000	2.92270

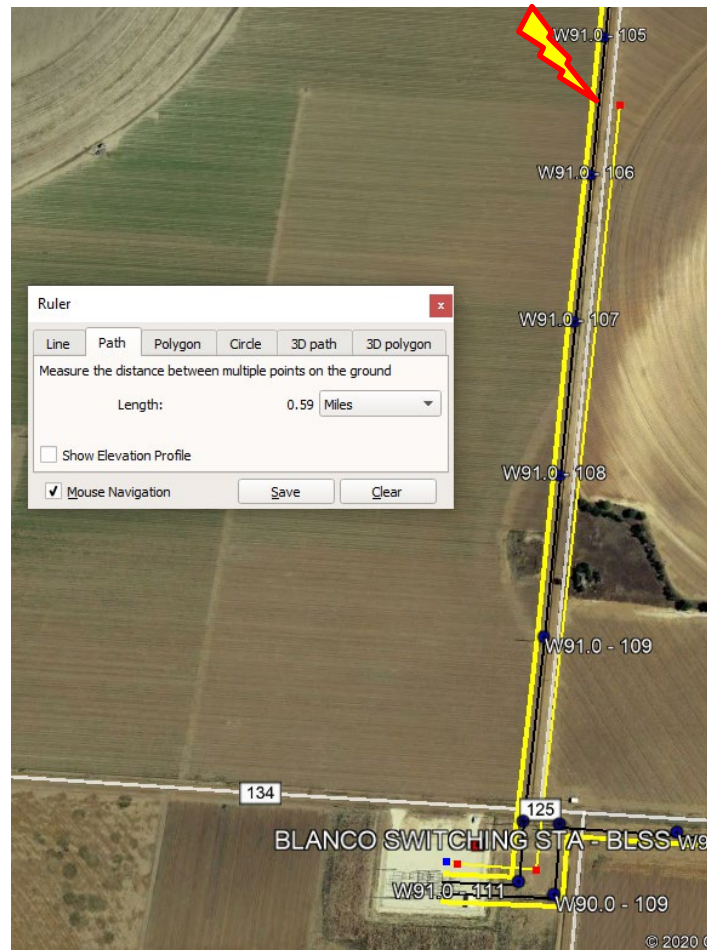
Event Investigation Results

■ Corrected line constants with existing settings:



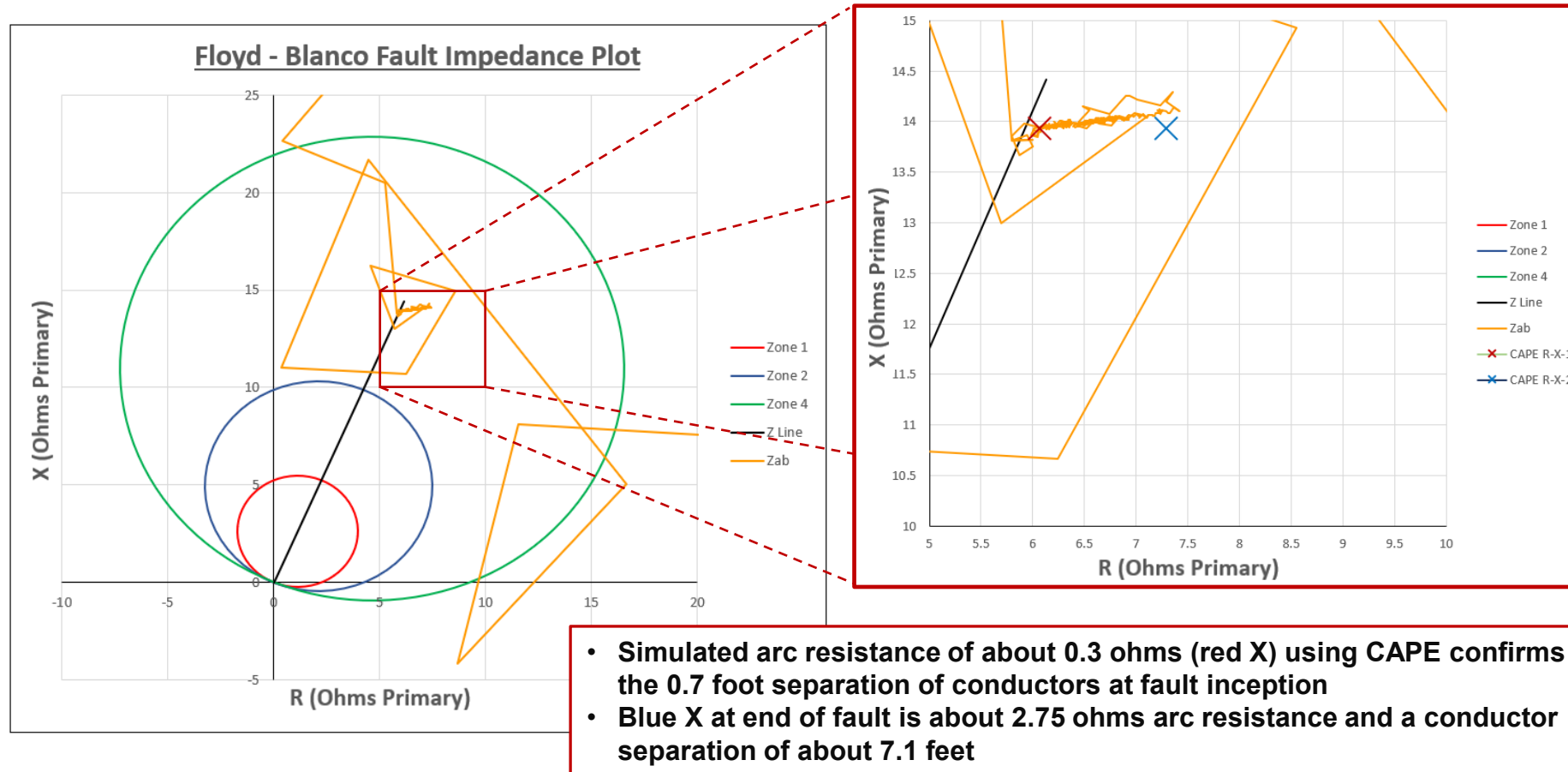
Event Investigation Results

- Fault location with corrected line constants is about 0.59 miles from Blanco to Floyd
 - This puts the new fault location between structures 105 and 106



Event Investigation Results

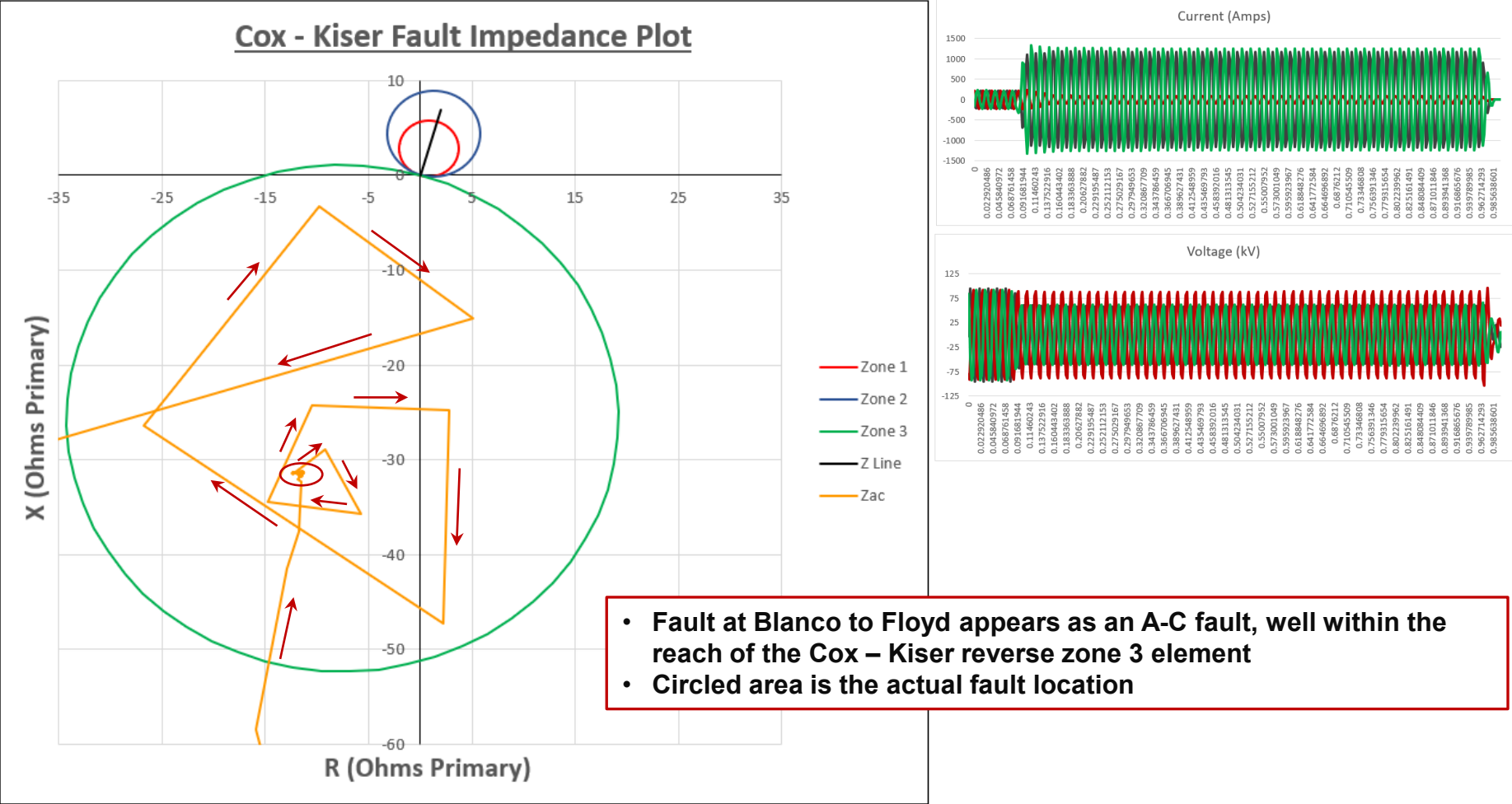
■ Corrected line constants with existing settings:



Incorrect Operation!!!

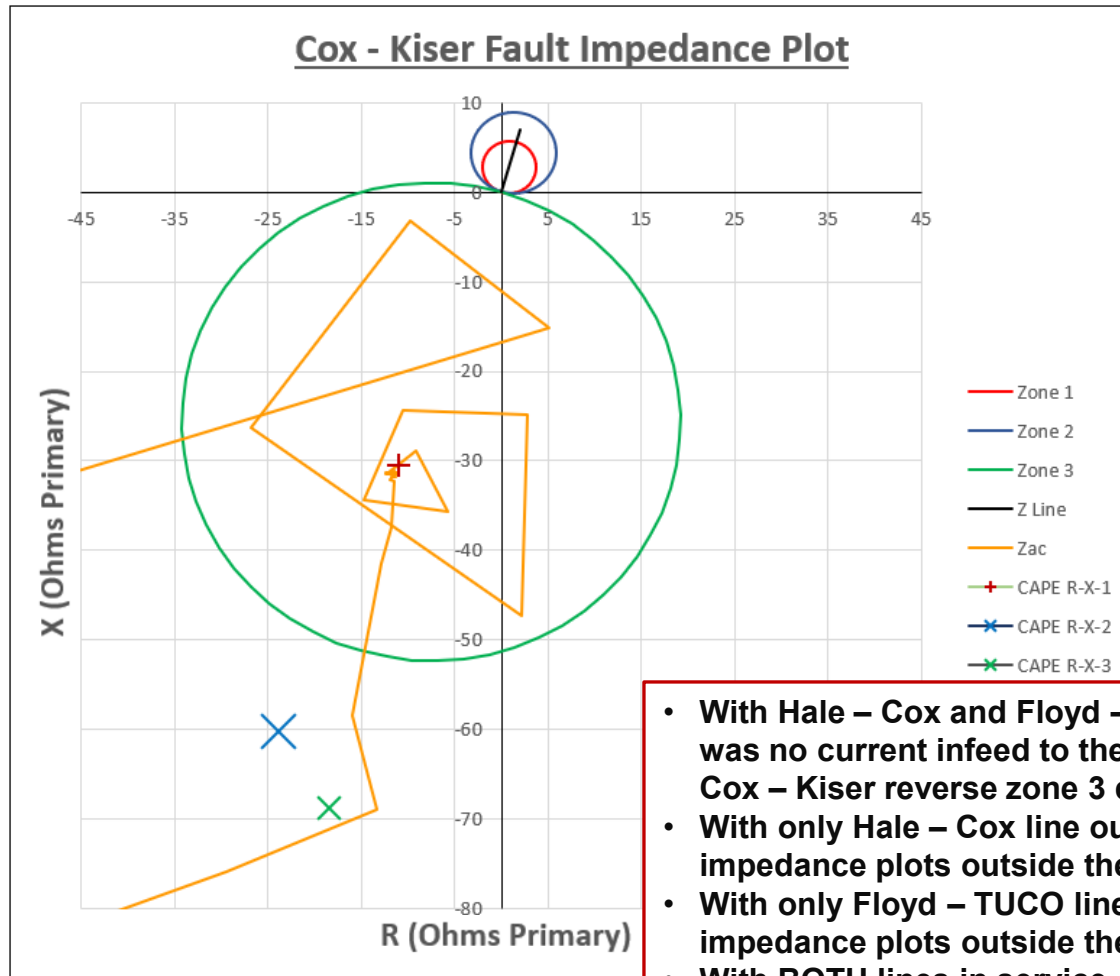
Event Investigation Results

■ Cox to Kiser (W55) Relay Event Analysis:



Event Investigation Results

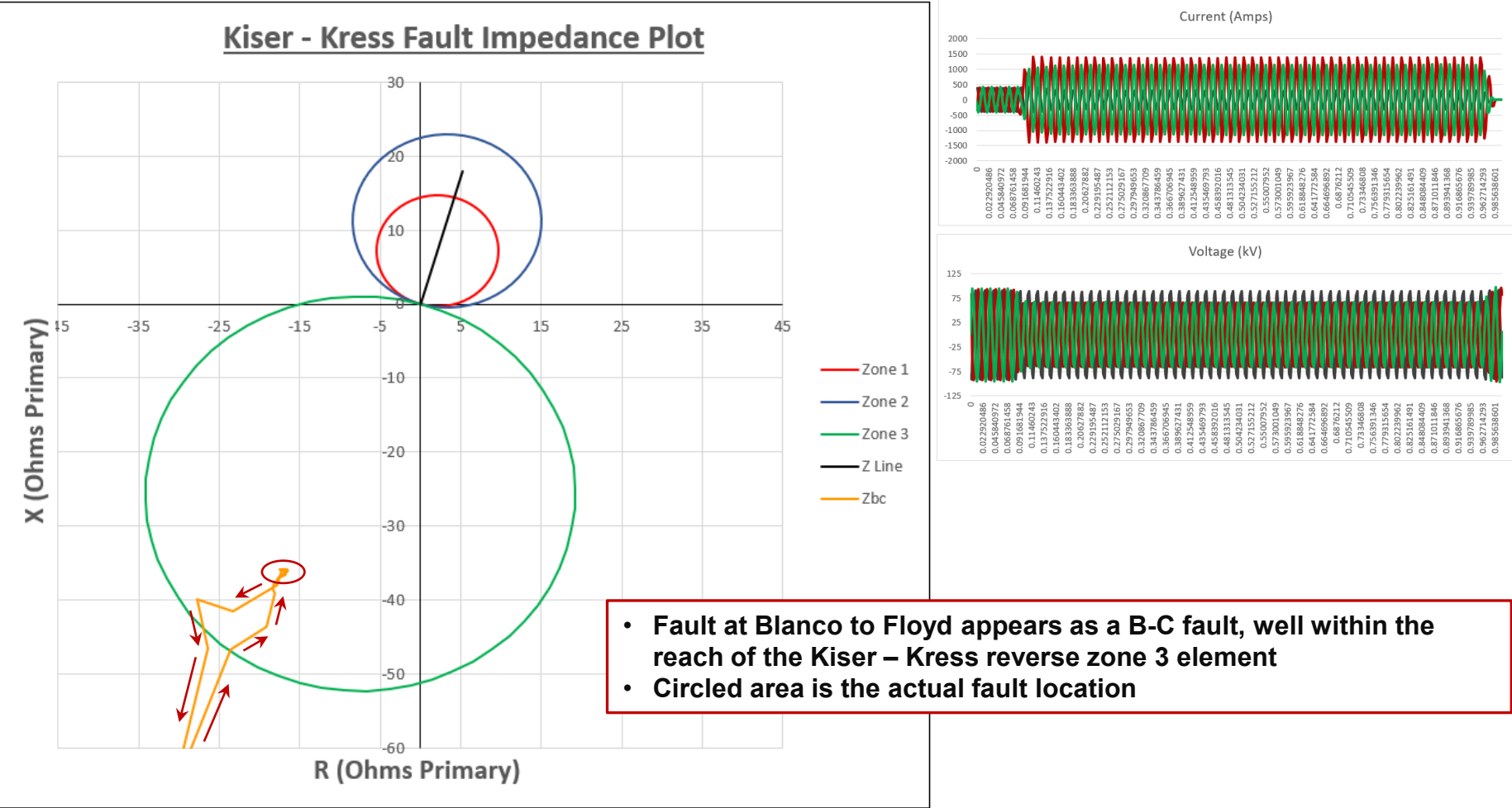
■ Why did Cox to Kiser reverse zone 3 trip?



- With Hale – Cox and Floyd – TUCO lines OUT (N – 2 conditions), there was no current infeed to the fault location, resulting in overreach of the Cox – Kiser reverse zone 3 distance element (red +)
- With only Hale – Cox line out and infeed from Floyd – TUCO, the apparent impedance plots outside the Cox – Kiser reverse zone 3 reach (blue X)
- With only Floyd – TUCO line out and infeed from Hale – Cox, the apparent impedance plots outside the Cox – Kiser reverse zone 3 reach (green X)
- With BOTH lines in service, the apparent impedance plots outside the graph shown

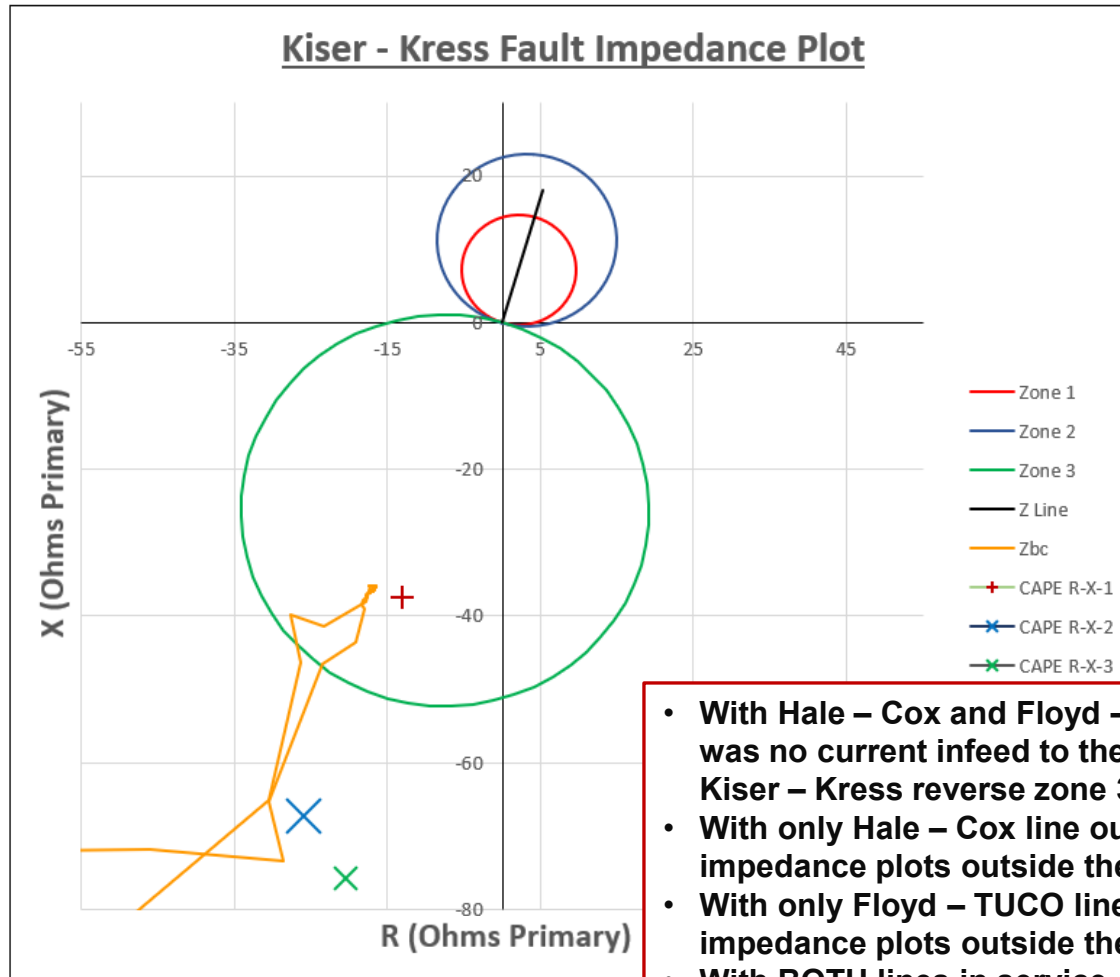
Event Investigation Results

■ Kiser to Kress (W54) Relay Event Analysis:



Event Investigation Results

■ Why did Kiser to Kress reverse zone 3 trip?



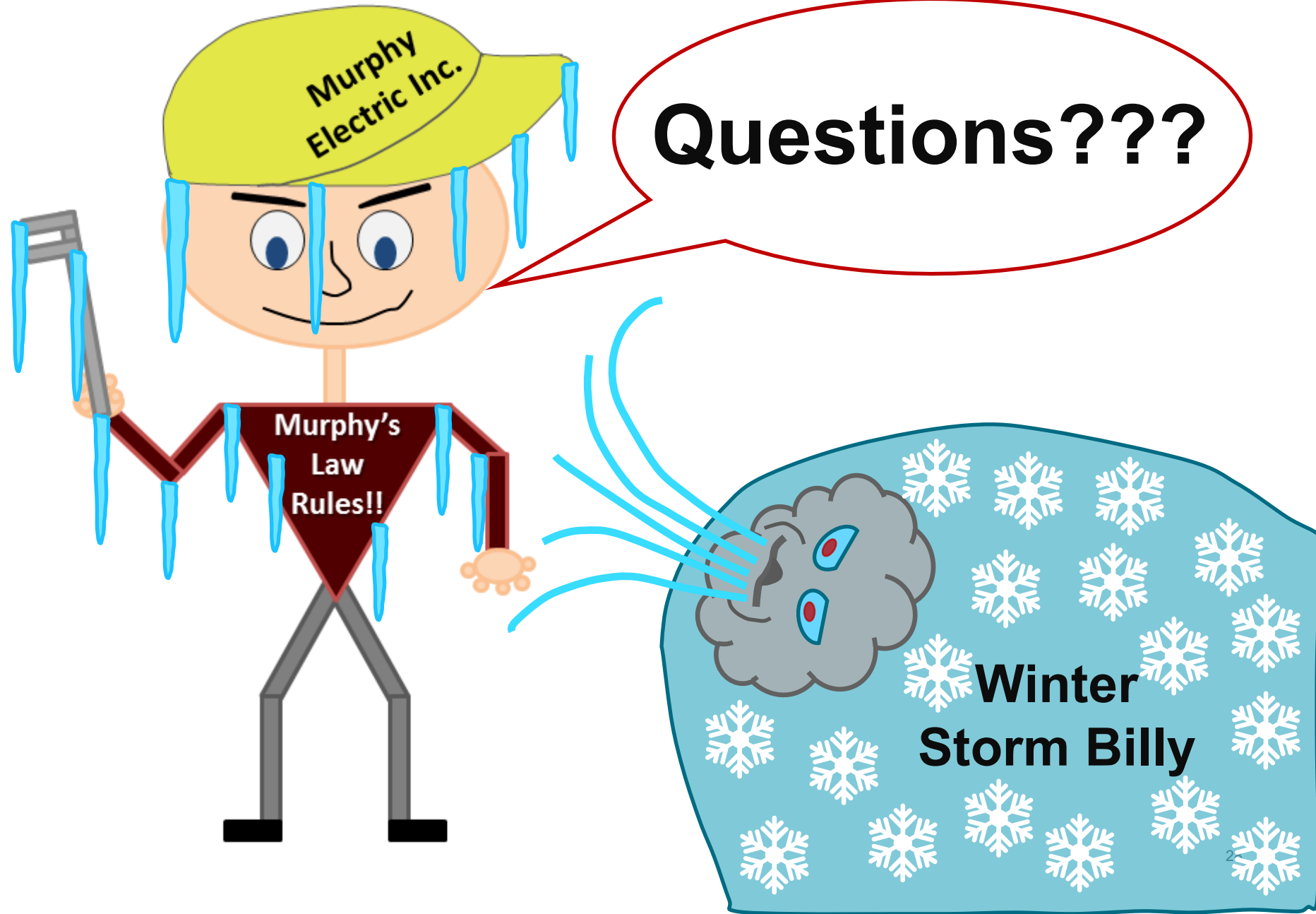
- With Hale – Cox and Floyd – TUCO lines OUT (N – 2 conditions), there was no current infeed to the fault location, resulting in overreach of the Kiser – Kress reverse zone 3 distance element (red +)
- With only Hale – Cox line out and infeed from Floyd – TUCO, the apparent impedance plots outside the Kiser – Kress reverse zone 3 reach (blue X)
- With only Floyd – TUCO line out and infeed from Hale – Cox, the apparent impedance plots outside the Kiser – Kress reverse zone 3 reach (green X)
- With BOTH lines in service, the apparent impedance plots outside the graph shown

Conclusions

- Incompletely calculated line constants on the Blanco to Floyd 115 kV line resulted in wrong relay settings being applied, thus resulting in a slow trip mis-operation of the Floyd to Blanco composite protection system and an unnecessary trip during a fault of the Kiser to Kress composite protection system
- The Cox to Kiser trip was a correct remote backup protection system operation
- The reverse zone 3 trips at Cox to Kiser and Kiser to Kress would not have occurred if either the Hale to Cox or Floyd to TUCO lines were in service

Recommendations

- Correct the line constants for Blanco to Floyd circuit W91 and correct settings at both ends
- Re-evaluate all remote backup settings at Kiser, Cox and Floyd to ensure settings conform to Xcel Energy relay settings philosophy
- Ensure coordination of remote backup elements for the N-2 event described in this presentation to prevent a repeat occurrence





AGENDA

Reliability and Security Technical Committee (RSTC) Update *John Stephens, Reliability Advisory Council and RSTC Member*

Action

Information

Report

John Stephens will provide an oral report during the meeting.

Classification: **Public**

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

- a. NERC Electric Gas Working Group (EGWG)
Jaimin Patel, SaskPower

Action

Information

Report

Since the last RAC meeting, the EGWG had WebEx meetings on June 15, 2023, and July 27, 2023. The meeting agenda is posted on the [NERC website](#). Future meeting date/time is included in the meeting agenda.

Following is a summary of EGWG activity.

Areas of Focus

- **Reliability Guideline Update**
 - Draft reliability guideline was released for 45-day industry comment period on June 30, 2023.
 - The comment period will close on August 14, 2023.
 - Draft reliability guideline is posted on [NERC website](#).
- **NAESB Gas-Electric Harmonization Forum Update**
 - Refer to the link below to follow this forum activities/updates/meetings.
[NAESB Gas-Electric Harmonization Forum](#)
 - Gas Electric Harmonization (GEH) forum report was published on July 28, 2023. Refer to above link for the final report.
- **Single Point of Disruption Study**
 - An update on the single point of disruption study was provided. Please refer to [NERC website](#) for the details/presentation.
- **Energy Scenarios – Transmission Planning Considerations**
 - An update on the Energy Scenario Transmission Planning Considerations was provided in the meeting on June 15th. Please refer to [NERC website](#) for the details/presentation.
 - In addition to above meeting, EGWG had a joint meeting with ERAWG to discuss draft technical justification document and SAR on Transmission Planning Energy Scenarios on July 18, 2023, and follow-up on July 26, 2023 to discuss and coordinate comments on the SAR.
 - The draft technical justification and SAR documents are posted on [NERC website](#).

MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

Accomplishments

- Draft reliability guideline was completed and released for industry comment.

Challenges

- None identified for this report.

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

b. NERC Inverter-Based Resource Performance Subcommittee (IRPS)

Open

Action

Information

Report

Classification: **Public**

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

- c. NERC System Planning Impacts from DER Working Group (SPIDERWG)
Wayne Guttormson, SaskPower

Action

Information

Report

The last SPIDERWG meeting was held on August 1st and 2nd. The meeting was virtual and covered the following coordination and analysis sub-group activities of the working group.

- Agenda packages and minutes are posted on SPIDERWG site ([System Planning Impacts from DER Working Group \(SPIDERWG\) \(nerc.com\)](#)).
 - o August meeting to be posted.
- SPIDERWG work plan posted at [Report \(nerc.com\)](#)
- RTSC strategic plan posted at [Report \(nerc.com\)](#)
- RSTC work plan posted at <https://www.nerc.com/comm/RSTC/Documents/RSTC-Work-Plan.xlsx>
- RSTC Newsletter [Document Portrait \(nerc.com\)](#)

General Activities:

- Work Plan Review
- Discussion of the Transmission Planning Energy Scenarios Technical Justification Document and associated SAR that the WG has been asked to comment on from NERC from a DER perspective.

Coordination Activities:

- Standards Committee Engagement
 - o Engagement with ongoing Standards Projects from SARs that originated from SPIDERWG work:
 - Project 2022-02 for TPL-001 and MOD-032 SARs
 - FAC-001 and FAC-002 project number TBD.
- White Paper Update: Security Risks Posed by DER and DER Aggregator
 - o Finalized for submission to the RSTC.
- White Paper Update: Variability, Uncertainty, and Data Collection for the BPS with DER Aggregators
 - o Review of internal survey and re-release for updated responses.
- Proposed SARs Update:
 - EOP-004 – Finalized for submission to the RSTC.
 - EOP-005 – Requirements for DERs and/or DPs
 - Collaborating with NERC RTOS and EAS
 - PRC-006
 - Collaborating with NERC SPCWG
 - o Work on lower priority SAR's continuing:
 - BAL-003, TOP-001, -002, -003, and -010

MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

Analysis Activities:

- Guideline Review Update: BPS Planning Practices under Increasing Penetrations of DER
 - o ISO-NE presented their approach to acquiring DER data from TO's and EMT assessment processes.
- White Paper Review: Modeling of DER Aggregator and DERMS Functional Impacts
- WG members identified three additional reliability guidelines that stem from its *White Paper: NERC Reliability Standards Review*. Guidelines will cover DER forecasting, detection of aggregate DER response during grid disturbances, and aggregate DER response for emergency operations and cold weather.

Next meeting:

- Scheduled for October 24th and 25th, may be held at the NERC Atlanta offices or virtually. No additional meeting dates scheduled for 2023.

Areas of Focus

Following work plan deliverables will be submitted for RSTC action at the September 2023 meeting.

- SAR for revisions to EOP-004 – for **Endorsement**
- Whitepaper: Security Risks Posed by DER and DER Aggregators – for **Approval**

Accomplishments

- SAR for revisions to MOD-031 – **Endorsed** at June 2023 RSTC meeting.
- Reliability Guideline Update: DER Data Collection and Model Verification of Aggregate DER – **Approved** at June 2023 RSTC meeting.

Challenges

- Nothing to report currently.

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

- d. NERC System Protection and Control Working Group (SPCWG)
Lynn Schroeder, Sunflower Electric Power Corporation

Action

Information

Report

Areas of Focus (Limit to 3-5 points)

1. Position paper related to FERC order 881 related to PRC-023 has been endorsed by the RSTC. Roll-out to industry pending with possible additions/revisions to come.

881 requires transmission providers to use at least four seasonal line ratings when evaluating longer-term point-to-point transmission service ending more than 10 days in the future. It also requires that AARs be determined for at least every hour for near-term (10 days into the future) point-to-point network service. The paper goes through four examples for arriving at these highest seasonal facility ratings (what PRC023 is based on). The examples also demonstrate that if the existing method uses a winter emergency rating, there will likely be a small increase in rating with an AAR calculated using the historic low temperature. In the examples, there is less than a 10-20% change. The paper also notes that PRC-023 is only a subset of the protection systems to which the order 881/881A applies.

Based on these findings, the SPCWG believes that protection systems that are presently applicable and compliant with PRC-023 based on winter seasonal ratings do not need to be revised to meet the margin required in PRC-023 (150%) for the AAR that are determined by the entities. SPCWG recommends receiving loadability for all protection systems that fall under the order to ensure sufficient margin above normal and emergency AARs. This is expected to require most entities to expend significant resources and will likely exceed the implementation time frame in 881 and 881A.

2. PRC024 IBR Whitepaper draft is complete and ready for SPCWG review at the upcoming meeting.
3. Technical Reference related to maintenance for ethernet based P&C. With changes in technology, there is a need to review NERC Standards and how maintenance for Ethernet based P&C systems fit into those standards. The SPCWG is developing a Technical Reference Document to provide industry guidance for impacts of systems such as 61850 architectures on NERC Protection System definition and related standards. A presentation has been made to WECC, as development continues.
4. Review of “Determination of Practical Transmission Relaying Loadability Settings” IG. SPCWG final review is complete. The next step is finalization by the NERC technical writers and then onto the RSTC for acceptance expected as part of their September meeting. This is a minor revision to the IG bringing it up to date with the PRC-023-5 version of the standard, and includes recommendations from the PRC-023 SDT to Appendix C.
5. IBRS is exploring possible modifications to PRC027 based on large changes in fault value as IBRs continue to become more prevalent and synchronous machines are being retired.

MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

Accomplishments (Limit to 3-5 points)

- 881/881A position paper was endorsed by the RSTC in their June 2023 meeting.
- PRC024 IBR Whitepaper draft completed.

Challenges

1. Increased IBR across the grid and their impacts to system protection, such as modeling and injection characteristics during fault conditions.

Future meeting schedule:

SPCWG and Subgroup Meeting Dates	Time (Eastern Prevailing Time)	Location
August 10, 2023	1:00 – 5:00 p.m.	WebEx
October 24, 2023 *	1:00 – 5:00 p.m.	Atlanta
December 14, 2023	1:00 – 4:00 p.m.	WebEx
*MIDAS - October 24, 2023	8-noon	Atlanta
*Misop Workshop - October 25-26, 2023	8-5 pm, 8-noon	Atlanta

AGENDA

MRO Representatives on NERC Subgroups – Written Reports

- e. NERC Energy Reliability Assessment Working Group (ERAWG)
Tom Whynot, Manitoba Hydro

Action

Information

Report

Joint ERAWG and EGWG Meeting held July 26, 2023

This report is centered on ERAWG related information.

Transmission Planning Energy Scenarios

Where the Energy Reliability working Group is focusing on upstream Generation Supply-chain assurance via Energy Assessments, a separate SAR that focuses on the transmission capabilities is to be drafted.

The NERC Board of Trustees as of Nov 22, 2023, directed NERC to submit a SAR to the Standards drafting committee, focused on transmission planning energy scenarios:

- Normal and extreme Events
- Gas-Electric interdependencies
- Distributed energy resource (DER) events
- Cyber-Informed
- Compliant to Order No. 896 – Extreme Heat and Cold

A meeting was held July 18th on the Draft for technical justification for a Transmission Planning SAR, the following week on July 26, 2023, a follow up meeting to review comments was provided.

Participation in the SAR Draft will help parse the responsibilities of Energy Assurance between what risks are Generation dominant and Transmission dominant in scope,

Ex: The Transmission Planning SAR Draft will:

- Outline responsibilities of transmission planners to ensure sufficient transmission capacity between source and sink.

Ex: The Energy Assurance Planning Standard will:

- Outline responsibilities of generation planners to ensure the fuel assurance of Generation sources.

Classification: Public

AGENDA

2023 Work Plan Update

- a. Review Action Items

Gayle Nansel, Reliability Advisory Council Vice Chair

Action

Discussion

Report

Vice Chair Nansel will lead this discussion during the meeting.

Classification: **Public**



MIDWEST
RELIABILITY
ORGANIZATION

2023 Reliability Advisory Council Work Plan

Bryan Clark, P.E.
Director of Reliability Analysis
August 10, 2023

CLARITY

ASSURANCE

RESULTS

#1 Conduct Outreach and Awareness

- Conduct a minimum of 2 webinars/outreach in 2023 to increase reliability and decrease risk to the reliable and secure operations of the bulk power system.



#2 Provide Reliability Standard Reviews

- Periodically attend NSRF meetings
 - *Energy Reliability Planning*
 - *Generation Unavailability During Extreme Cold Weather*



#3 Review Significant Events or Disturbances on the BES

- Review of an entity event at the Q3 Meeting
 - *Misoperations Due to Human Errors*
 - *Overhead Transmission Line Ratings*



#4 Development of the MRO Regional Risk Assessment

- Quarterly Risk Discussions
- Two resources provided from the RAC to support the Annual Risk Ranking exercise
 - *All MRO Reliability Risks*



#5 Support Regional Representation on NERC Organizational Groups

- Five different NERC groups with a representative
 - System Planning Impacts from Distributed Energy Resources Working Group (SPIDERWG)
 - Inverter Based Resource Performance Subcommittee (IRPS)
 - Energy Reliability Assessment Working Group (ERAWG)
 - Electric Gas Working Group (EGWG)
 - System Protection and Control Working Group (SPCWG)



#6 Review the Summary of Misoperations across the MRO Region

- Accomplished through the Protective Relay Subgroup (PRS)
 - *Misoperations Due to Human Errors*





Questions

AGENDA

Reliability Coordinator Updates

- a. Midcontinent Independent System Operator (MISO)
Durgesh Manjure, MISO and RAC Member

Action

Information

Report

Durgesh Manjure will provide an oral report during the meeting.

Classification: **Public**

AGENDA

Reliability Coordinator Updates

- b. Saskatchewan Power Corporation (SPC)
Binod Shrestha, SPC and RAC Member

Action

Information

Report

Binod Shrestha will provide an oral report during the meeting.

Classification: **Public**

AGENDA

Reliability Coordinator Updates

c. Southwest Power Pool (SPP)

C.J. Brown, SPP and RAC Member

Action

Information

Report

C.J. Brown will provide an oral report during the meeting.

Classification: **Public**

AGENDA

Planning Coordinator Updates

- a. Midcontinent Independent System Operator (MISO)
Andy Witmeier, MISO and RAC Member

Action

Information

Report

Andy Witmeier will provide an oral report during the meeting.

Classification: **Public**



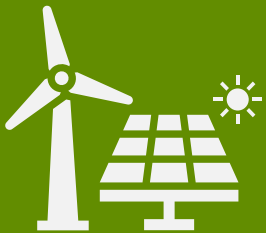
MISO System Planning Update

MRO Reliability
Advisory Council
August 10, 2023

Transformation is progressing at an astonishing pace and will speed up over the next several years

Fleet Changes

MISO members and states have set ambitious goals to partially or fully decarbonize



Fuel Assurance

Availability of resources may be challenged by economic, supply chain or other issues



Extreme Weather

Severe weather events are becoming more extreme and occurring more frequently



Electrification

Demand for electricity will grow as electric vehicles increase, industry sectors trend towards renewables



Transmission planning provides a comprehensive approach that covers short and long term needs to address generation additions, ongoing reliability, market efficiency and policy trends

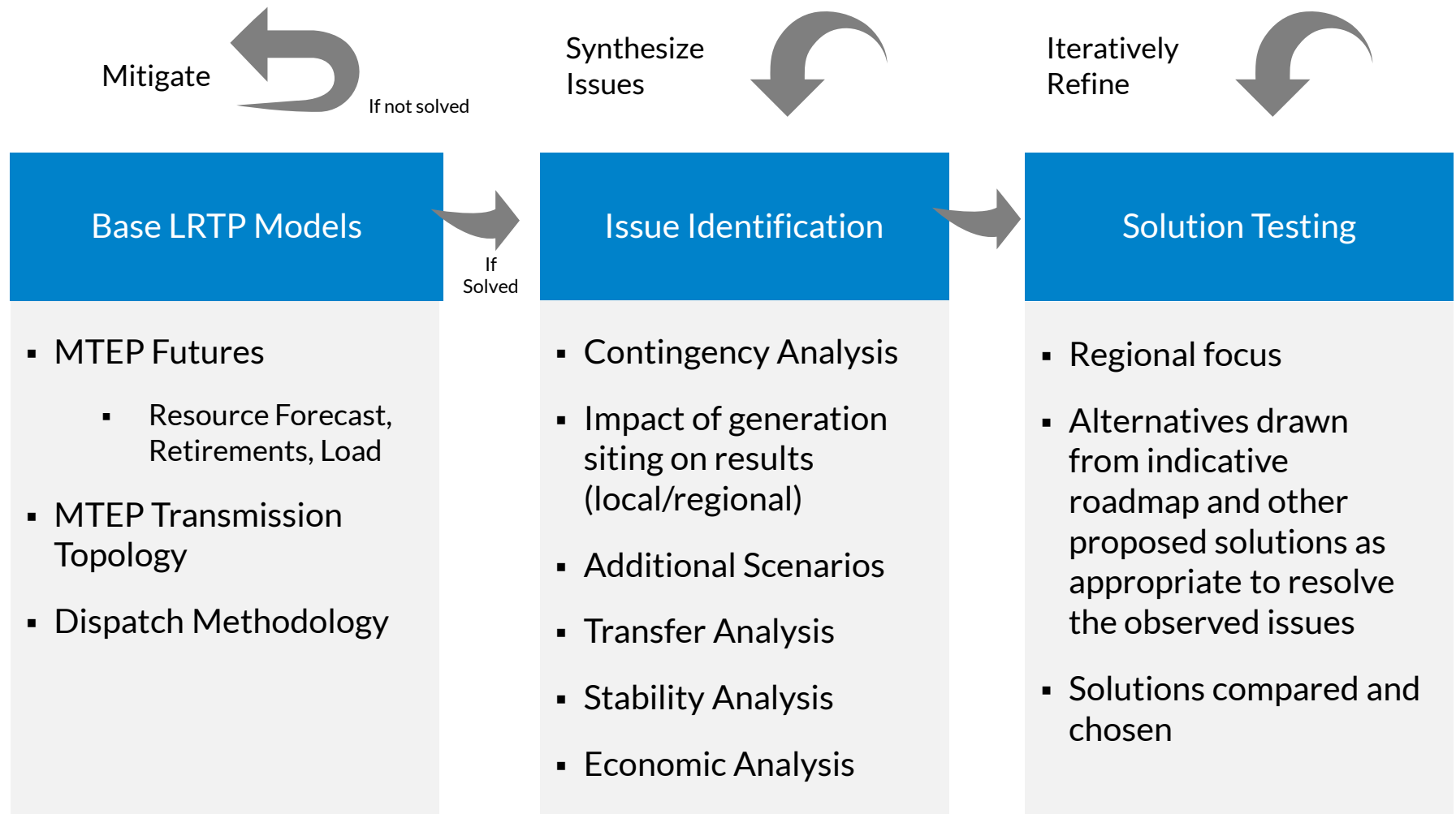
Transmission Studies | Resource Adequacy | Policy Landscape | Regional Energy Adequacy

COMMON MTEP PROJECT CATEGORIES

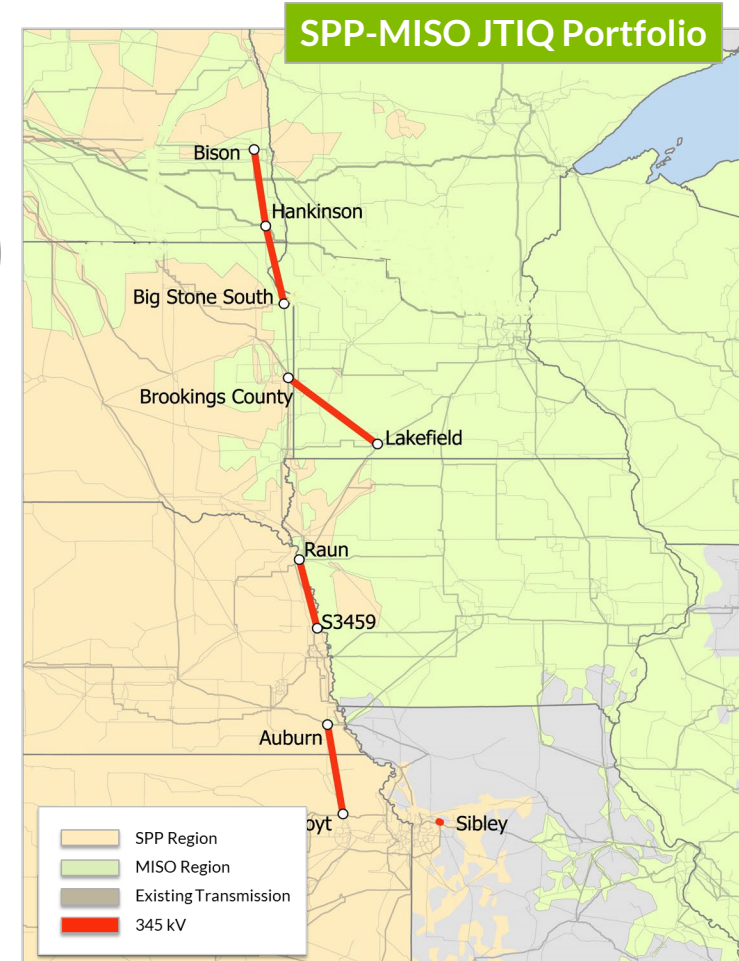
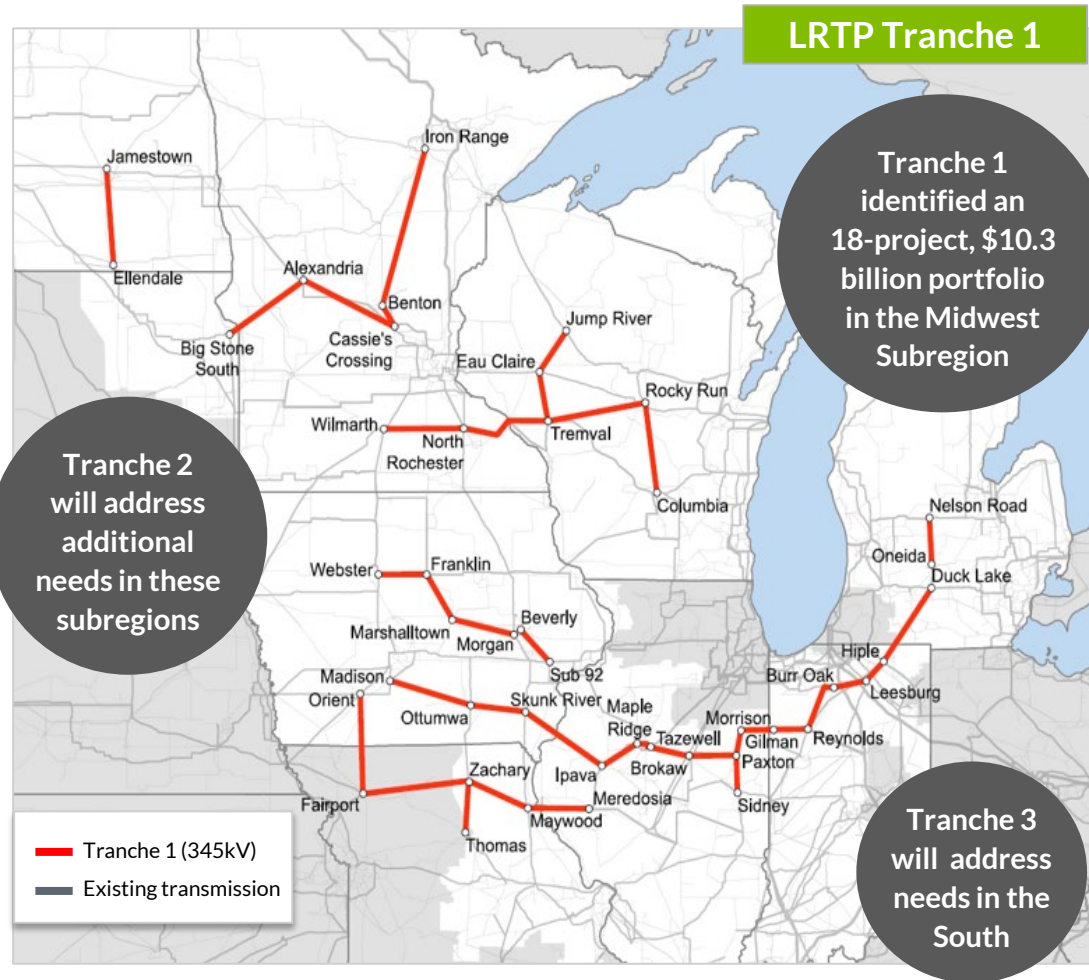
Multi Value Projects	Market Efficiency Projects	Baseline Reliability Projects	Generator Interconnection Projects	Transmission Deliverability Service Projects	Other Projects
Meet a combination of reliability, economic, and public policy goals	Address market transmission congestion	Required to meet standards for both NERC and regional reliability	Needed to reliably connect new generation to the transmission grid	Enable transmission service	Address local reliability issues and/or provide local economic benefit

Stakeholder Input and Consideration

Planning analysis involves iterative phases to identify issues and test solutions ...



MISO's Long Range Transmission Plan (LRTP) and the SPP-MISO Joint Targeted Interconnection Queue (JTIQ) Portfolio are helping address Transmission Evolution

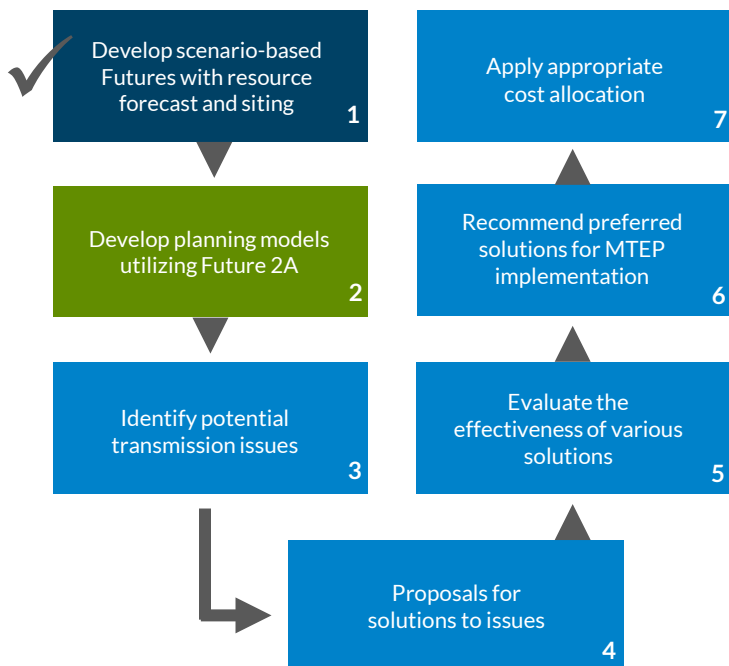


MISO continues efforts to ensure the build of Tranche 1 solutions while planning Tranche 2 and developing cost allocation for Tranches 3 and 4

Tranche	Key Milestones	Status
Tranche 1	Identify transmission solutions based on Future 1	✓
	Select developers through Competitive Transmission process	➡
	Provide post-approval transparency and support as required	➡
Tranche 2	Identify transmission solutions based on Future 2A	➡
	Select developers through Competitive Transmission process	TBD
	Provide post-approval transparency and support as required	TBD
Tranches 3 & 4	Identify transmission solutions	TBD
	Identify cost allocation approach	➡
	Select developers through Competitive Transmission process	TBD
	Provide post-approval transparency and support as required	TBD

Tranche 2 work is progressing with strong stakeholder engagement through meetings, workshops, feedback tools and discussions

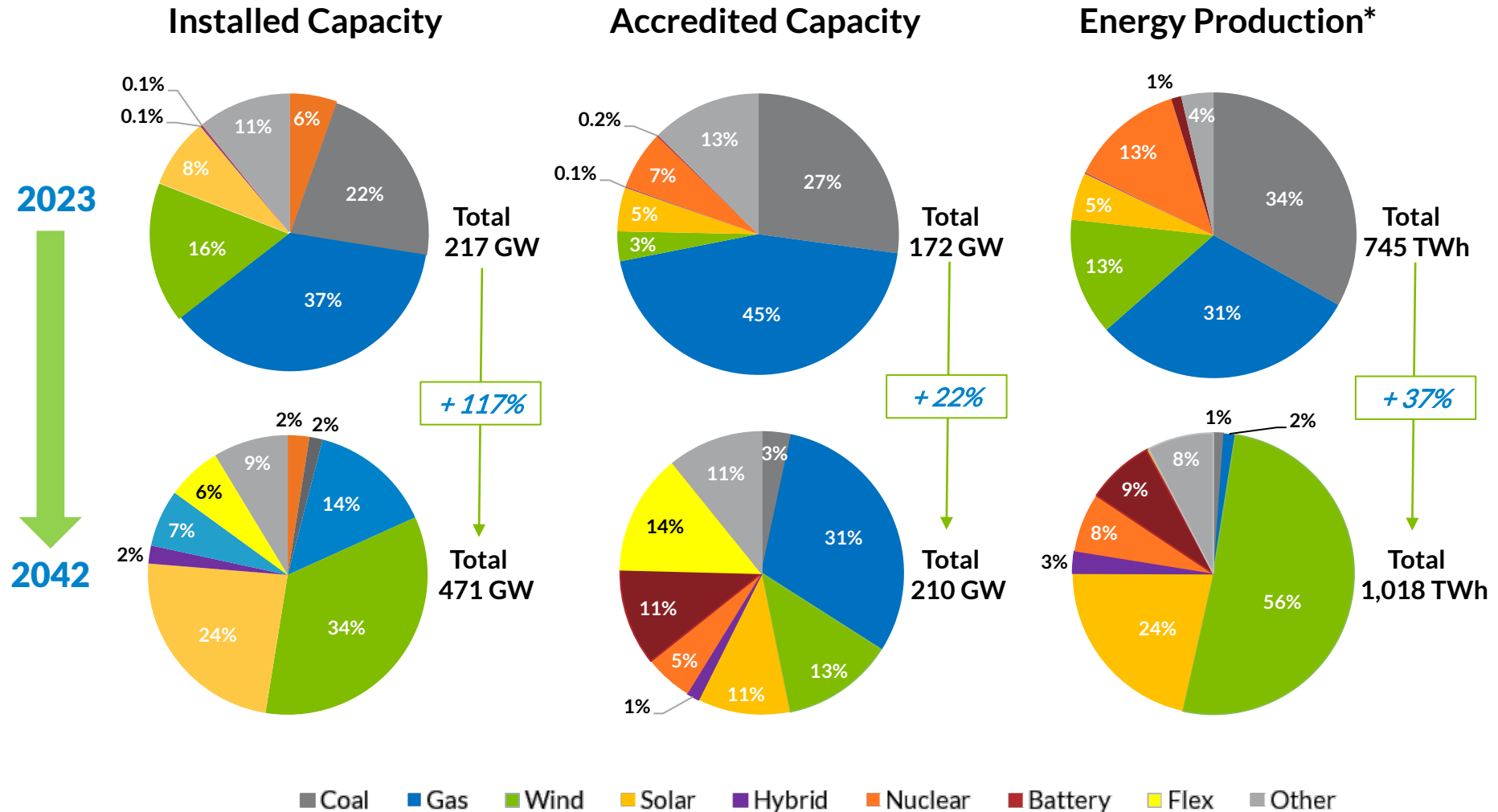
Tranche 2 progress in 7-step process



■ Complete ■ In Process ■ Not Started

- Step 1** Futures establish potential scenarios for resource mix and load in the 20-year horizon; key parameters are load, reserves, costs, emissions, renewable energy targets, etc.
- Step 2** Models capture a range of conditions, for steady state, dynamic reliability, resilience and economic values
- Step 3-5** Applicable reliability and economic criteria are applied to find potential issues
- Step 4-5** Alternatives are provided by MISO and stakeholders
- Step 6** Recommend projects to ensure reliability, cost-effectiveness over time and economic values with stakeholder review and input
- Step 7** Tariff-based cost allocation depending on project classification tied to project benefits

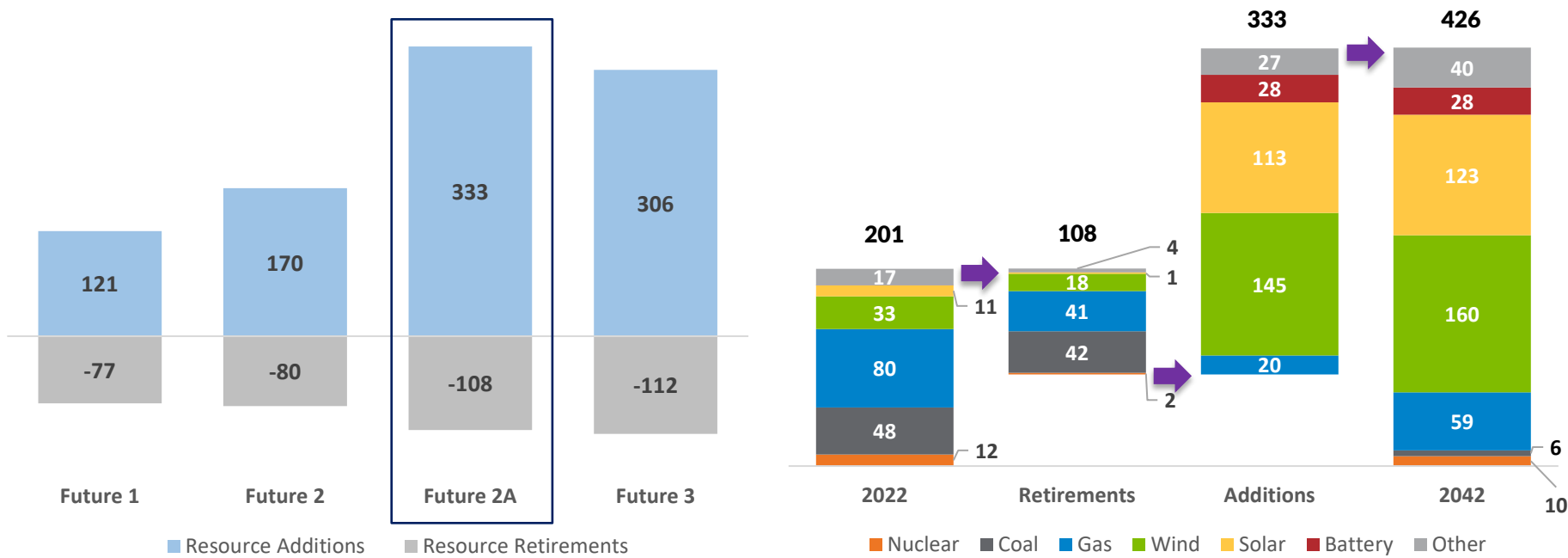
MISO's Future 2A anticipates significant resource additions, retirements and load growth with a trend towards increasing renewables



Data updated July 10, 2023. Futures do not account for all operational-level reliability needs and attributes that may require different levels of resources. Resource additions may be subject to adjustment based on new accreditation rules. "Other" includes biomass, geothermal, hydro, oil, pumped hydro, demand response, and non-pv distributed generation (and energy efficiency for installed capacity). *Pie chart is greater than 100% due to energy storage charging and discharging.

Future 2A's expansion and retirements approaches/surpasses levels seen in Future 3, which will transform our current resource fleet

Installed capacity of new and retired resources (GW)*



* Data as of March 7, 2023. Futures do not account for all operational level reliability needs and attributes that may require different levels of dispatchable resources. Resource additions may be subject to adjustment based on new accreditation rules.

LRTP is contemplating a regional backbone with larger HVDC or 765 kV components

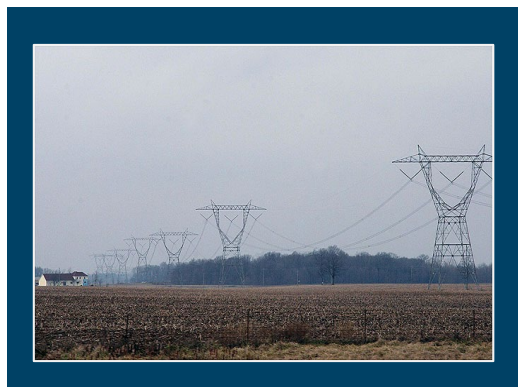
	345 kV	765 kV	HVDC
Incremental Need	Pro		
Cost per MW-Mile ¹		Pro	
Land Use per MW-Mile		Pro	Pro
Flow Control ²			Pro
Long Distance Transmission Capability ³	Good	Better	Best
Contingency Impact	Pro		
Transmission Losses		Pro	Pro

Notes: 1) Pro for HVDC on very long lines

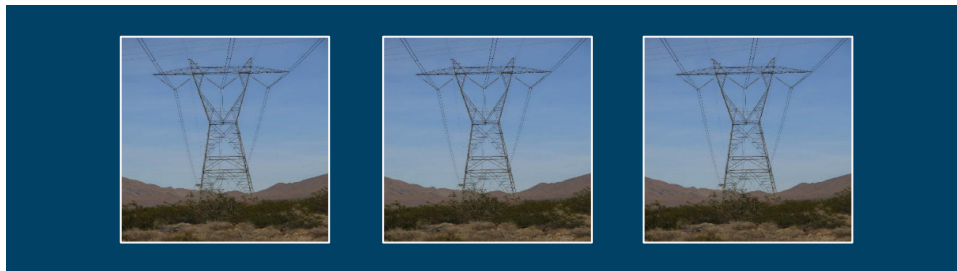
2) Flow control not needed everywhere

3) Long distance transmission capability is best on HVDC and proportional to voltage on AC

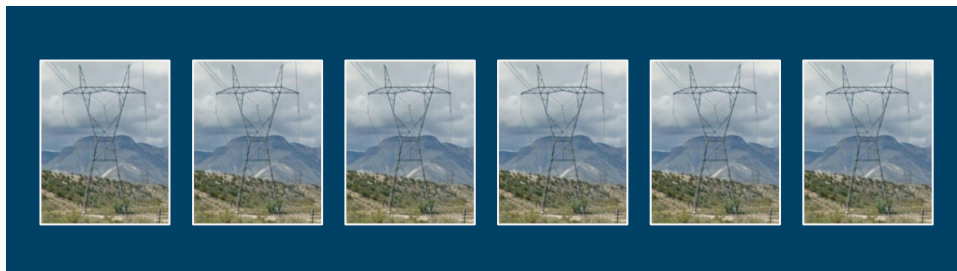
Land use considerations also factor into transmission planning



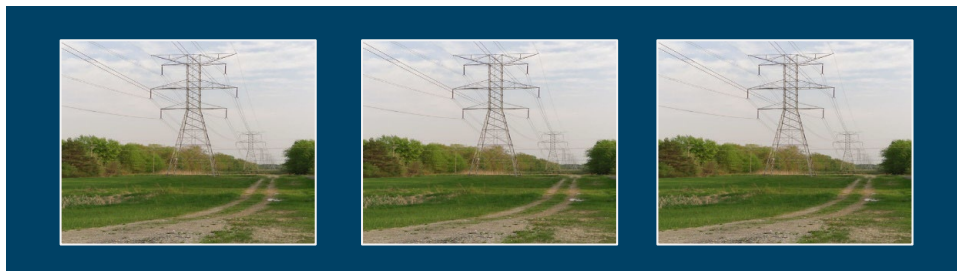
1 - 765 kV Circuit



3 - 500 kV Circuits



6 - 345 kV Single Circuits

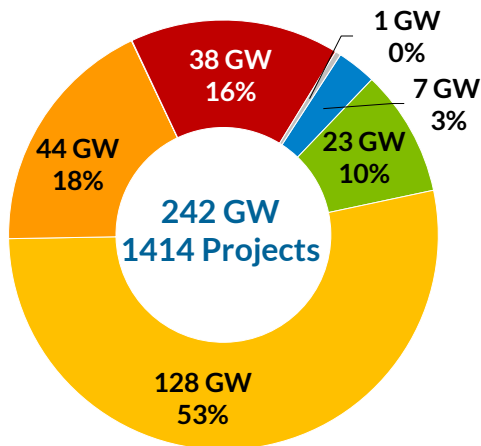


3 - 345 kV Double Circuits

While MISO's Interconnection Queue currently contains 242 GWs, 49 GW of approved resources are awaiting construction – having delayed operation by an average of more than 650 days

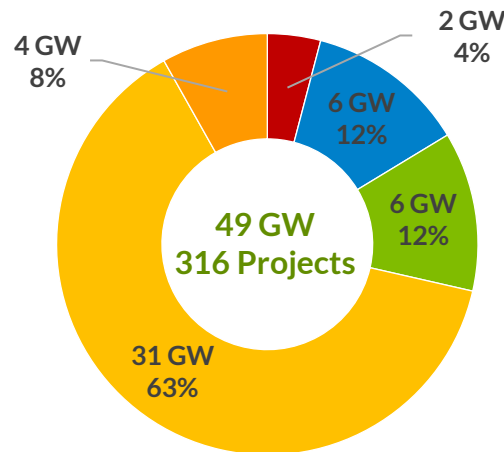
ACTIVE PROJECTS

In addition to 242 GW of active projects in the queue process...



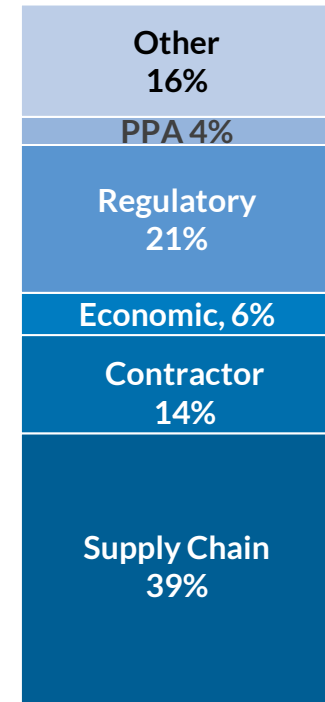
MISO APPROVED PROJECTS

...49 GW of MISO approved projects with a Generator Interconnection Agreement are not yet in-service...



REASONS FOR DELAY

...primarily due to supply chain, regulatory, and contractor issues



Fuel Type

Other Gas Wind Solar Hybrid Storage

AGENDA

Planning Coordinator Updates

- b. Southwest Power Pool (SPP)
Joshua Pilgrim, Senior Engineer 2

Action

Information

Report

Joshua Pilgrim will provide an oral report during the meeting.

Classification: **Public**



SPP UPDATE ON PLANNING COORDINATION

AUGUST 10, 2023

*Helping our members work together to keep
the lights on... today and in the future.*



SouthwestPowerPool



SPPorg



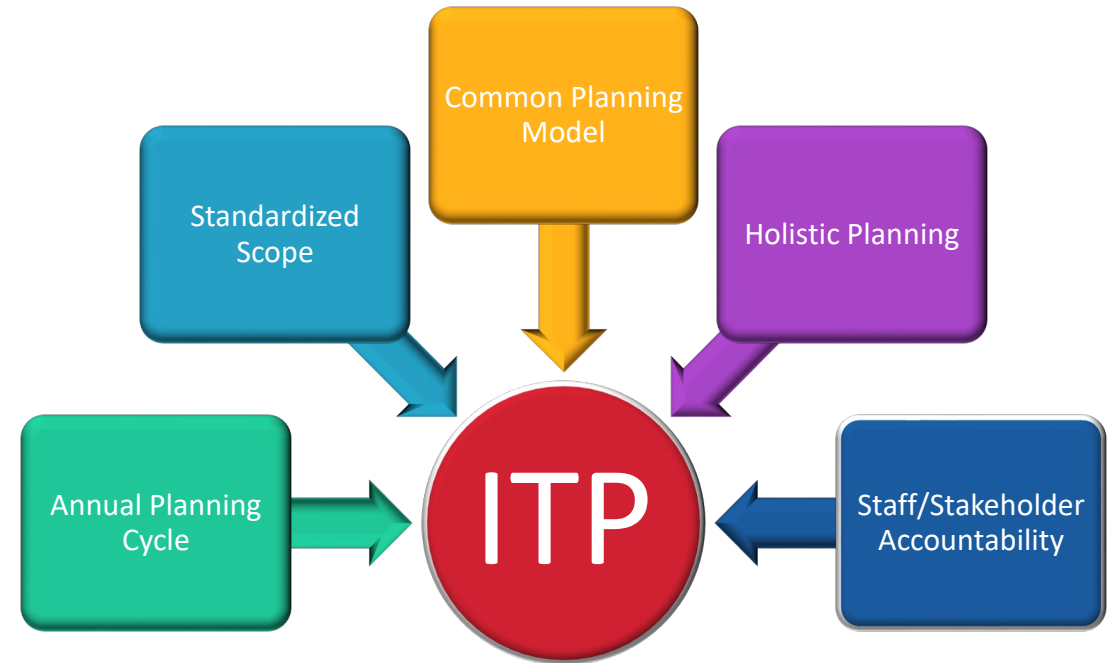
southwest-power-pool

OVERVIEW

- Integrated Transmission Planning
 - Covers reliability and economic upgrades on a yearly basis
- Transmission Services
 - Provides upgrades for load additions within the footprint
- Generation Interconnection
 - Allows for new generation to be safely integrated into the SPP footprint
- ITP 20
 - Covers long range planning initiatives and supports other studies

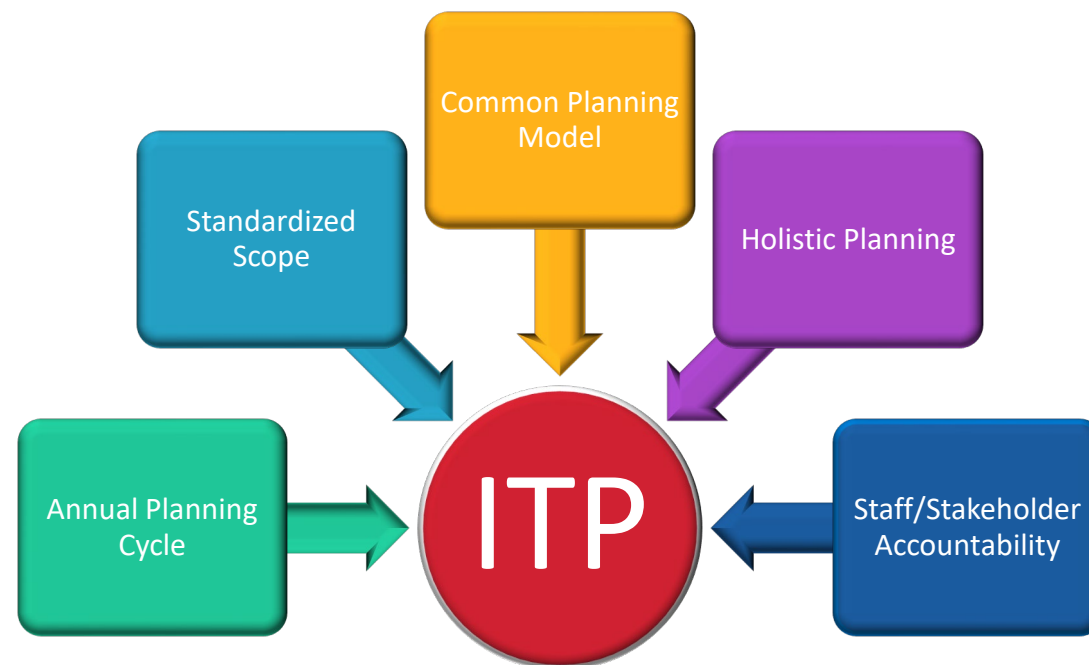
FOUNDATIONS OF THE ITP

- Annual Planning Cycle
 - Planning study completes each year
- Standardized analysis and methodologies
 - Limits discussion/rework/ approvals on items that are done each study
- Common Planning Models
 - Tariff and NERC compliance studies now completed on one model series
- Holistic Planning
 - Single planning process addressing reliability, economics, public policy, compliance, operations
- Staff/Stakeholder Accountability
 - Reporting on staff and stakeholder support of study milestones and transparent review of assumption/process changes prior to implementation



ADDITIONAL ITP PROCESS BENEFITS

- Full reliability analysis through Year 10
- Economic analysis in the near-term horizon
- Consideration of persistent operational needs
- Short Circuit Assessment
- Bigger, better, quicker
- Staff efficiency



LONG-TERM TRANSMISSION SERVICE STUDIES



Aggregate

Attachment Z1



Delivery point transfer

Attachment AR

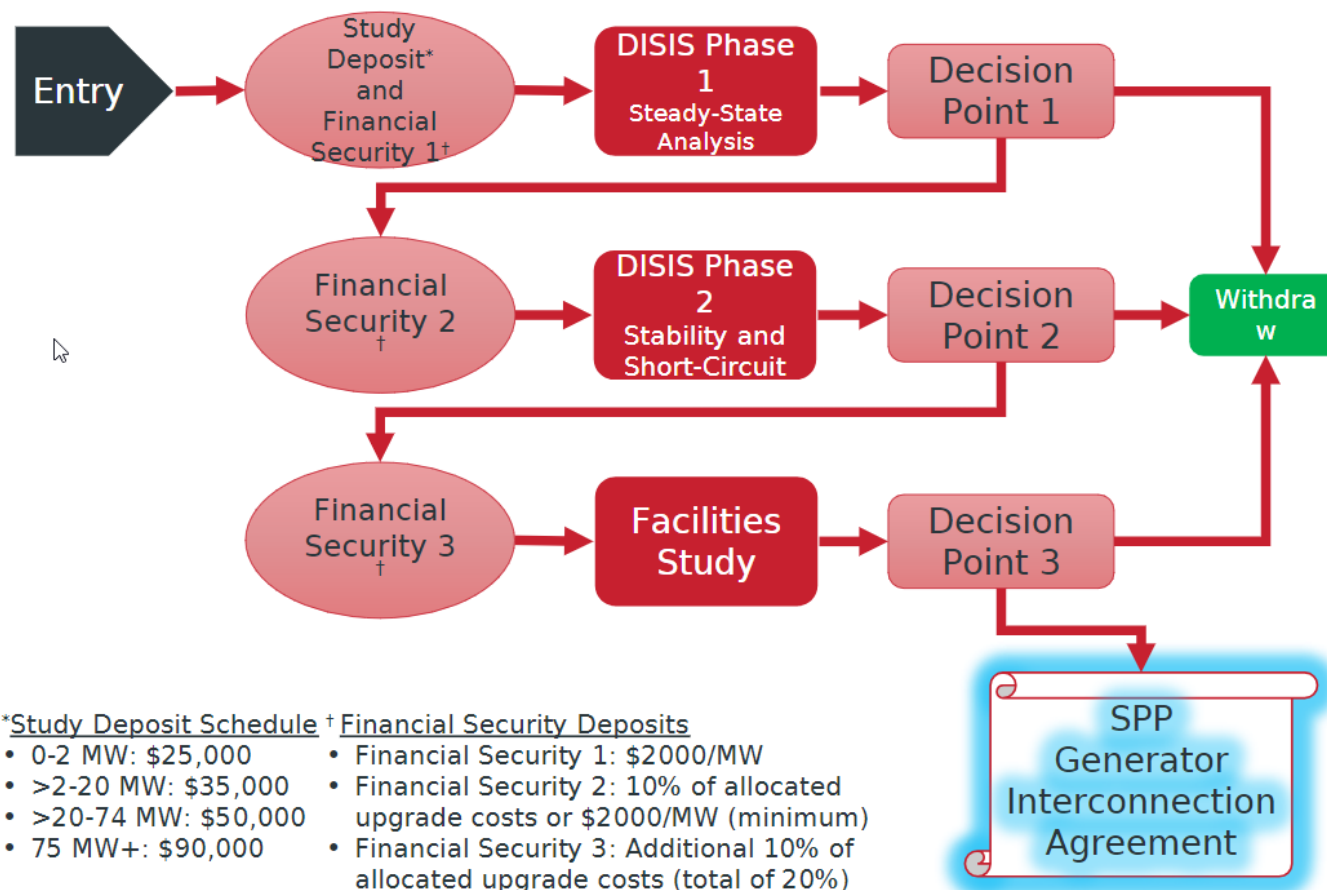


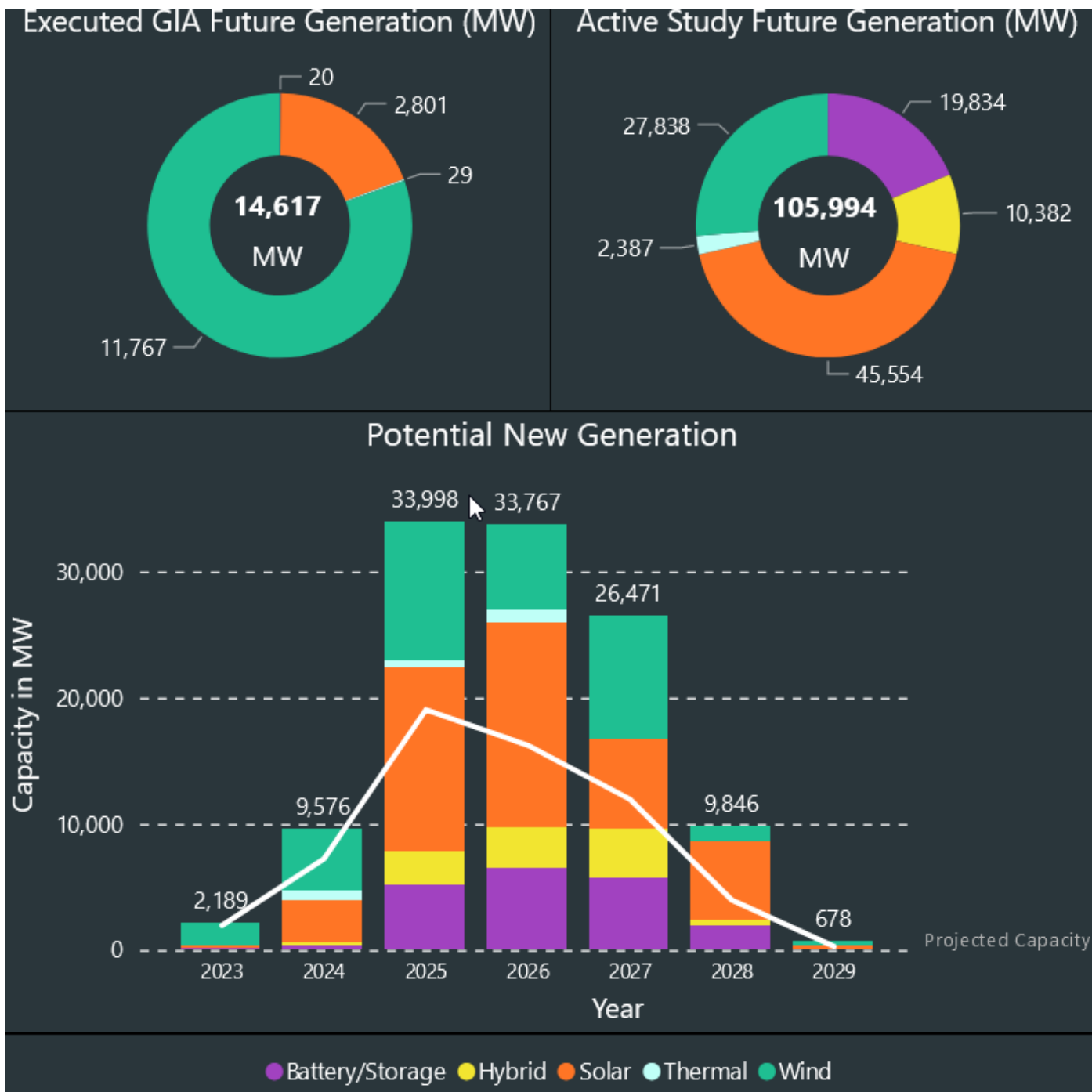
Delivery point addition

Attachment AQ

GI PROCESS

DEFINITIVE INTERCONNECTION SYSTEM IMPACT STUDIES (DISIS)





ITP 20 YEAR ASSESSMENT

- 5- year planning cycle
- Multiple futures, including emerging technologies and varied environmental policy changes, as well as fuel and load sensitivities
- Focuses on high-voltage projects
- Informs other processes with in-depth analysis of various projects

SPP'S 20-YEAR ASSESSMENT

Collaboration

- 6 organizational groups, 100+ meetings
- Evaluated > 463 solutions
- 35-month study

Results

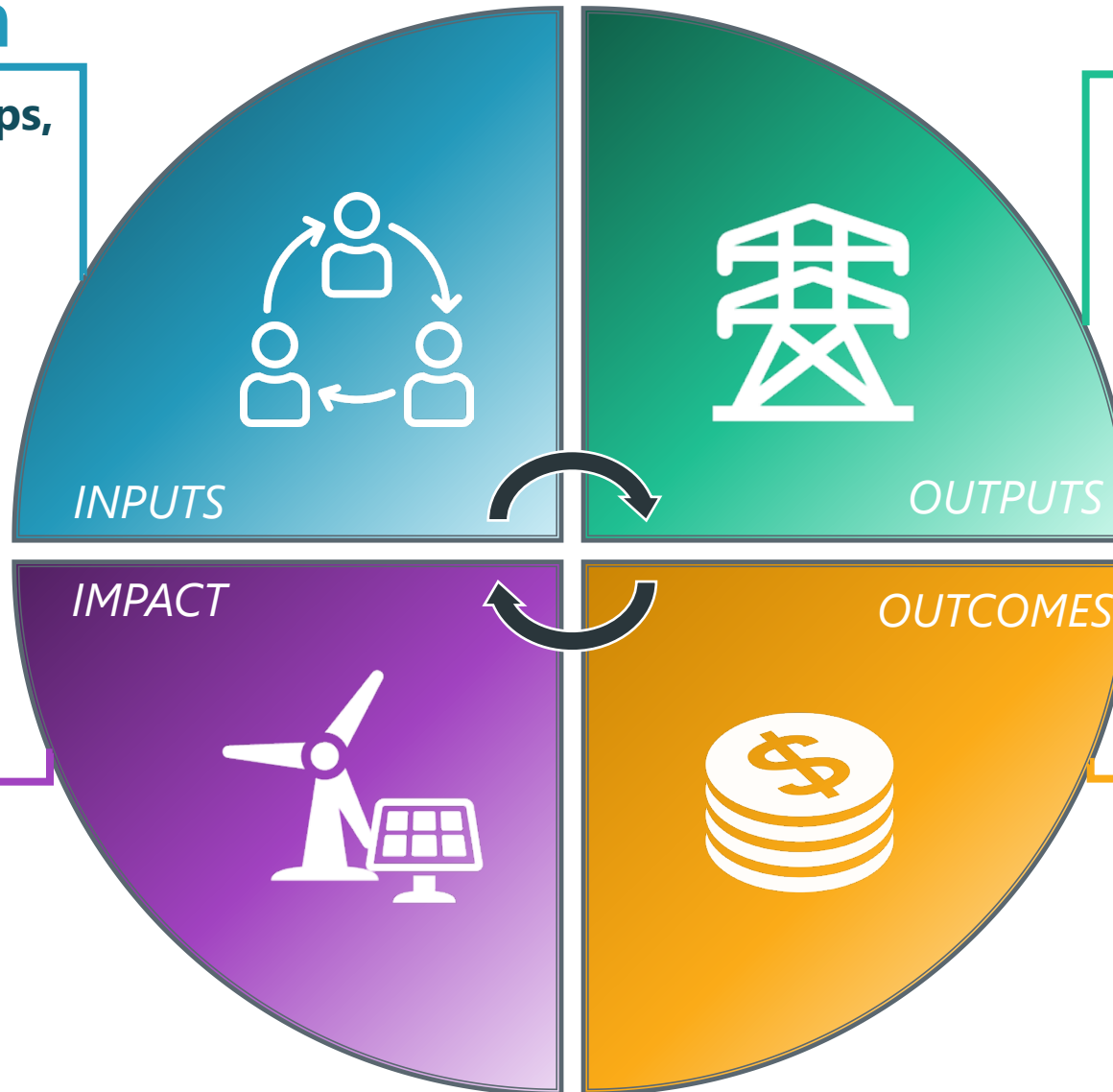
- 1,206 miles of new EHV for Future 1 & Future 2
- 896 miles of new EHV for Future 3 & Future 4
- Enables up to 93% CO₂ reduction
- 13 new transmission projects

Value

- More reliable grid
- Generation interconnection
- Decreased carbon emissions

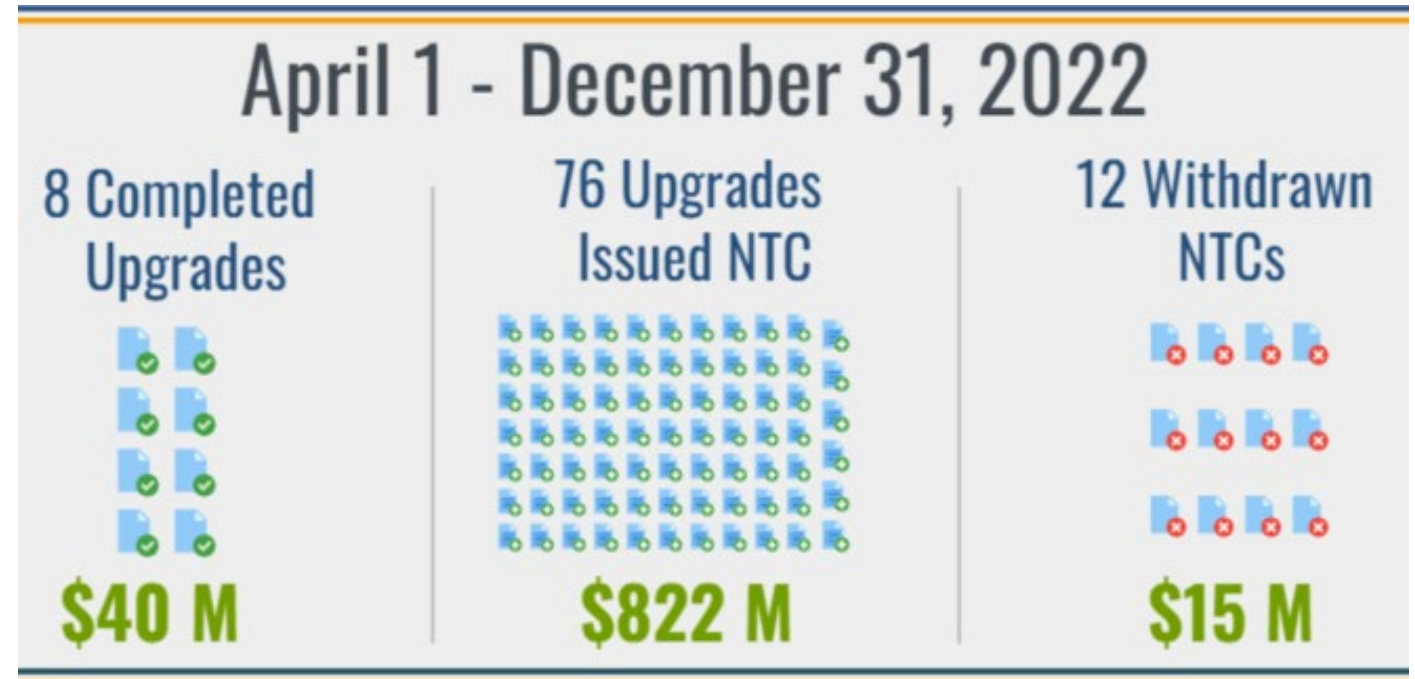
Benefits

- \$1.37B-\$1.55B E&C cost
- \$457M-\$1.17B lower APC
- \$269M-\$292M 1-year costs
- 1.57-4.35 B/C ratio range

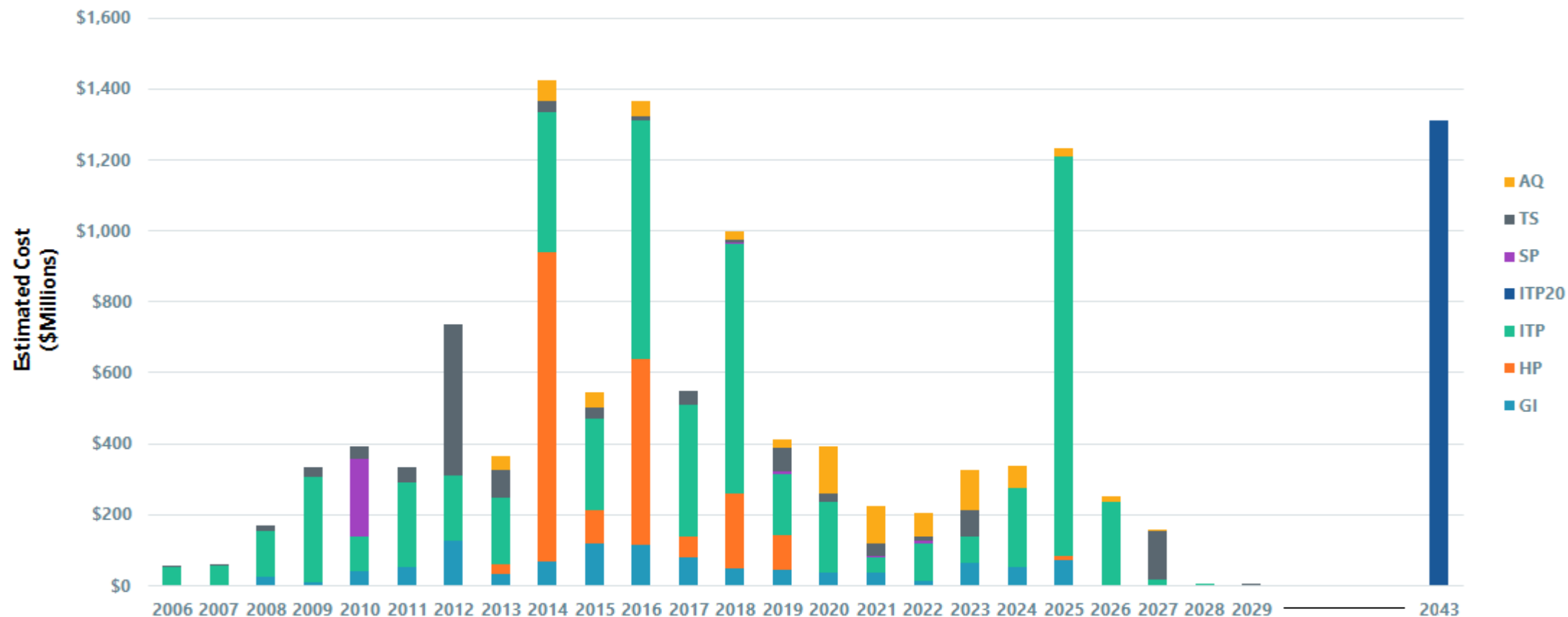


2023 NTC SUMMARY

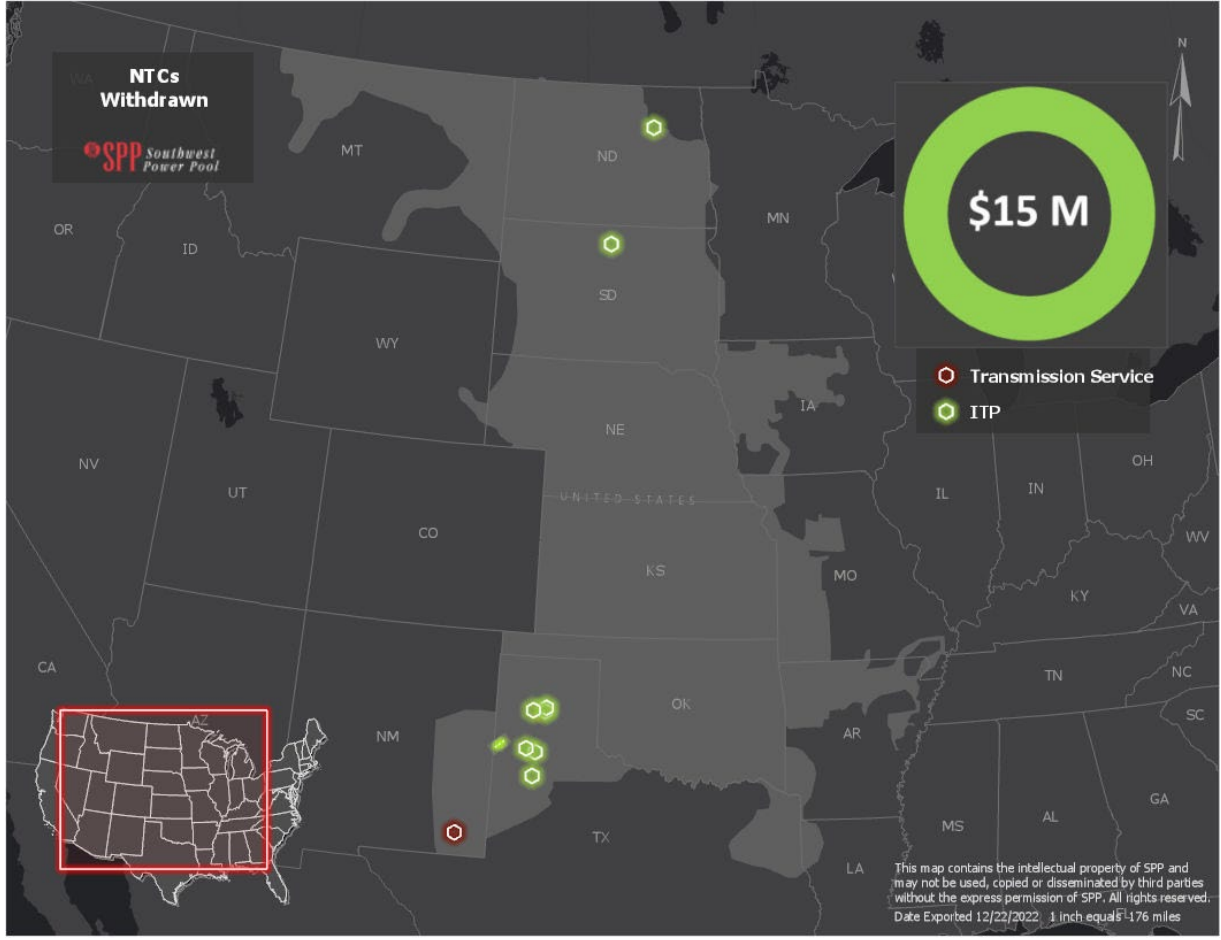
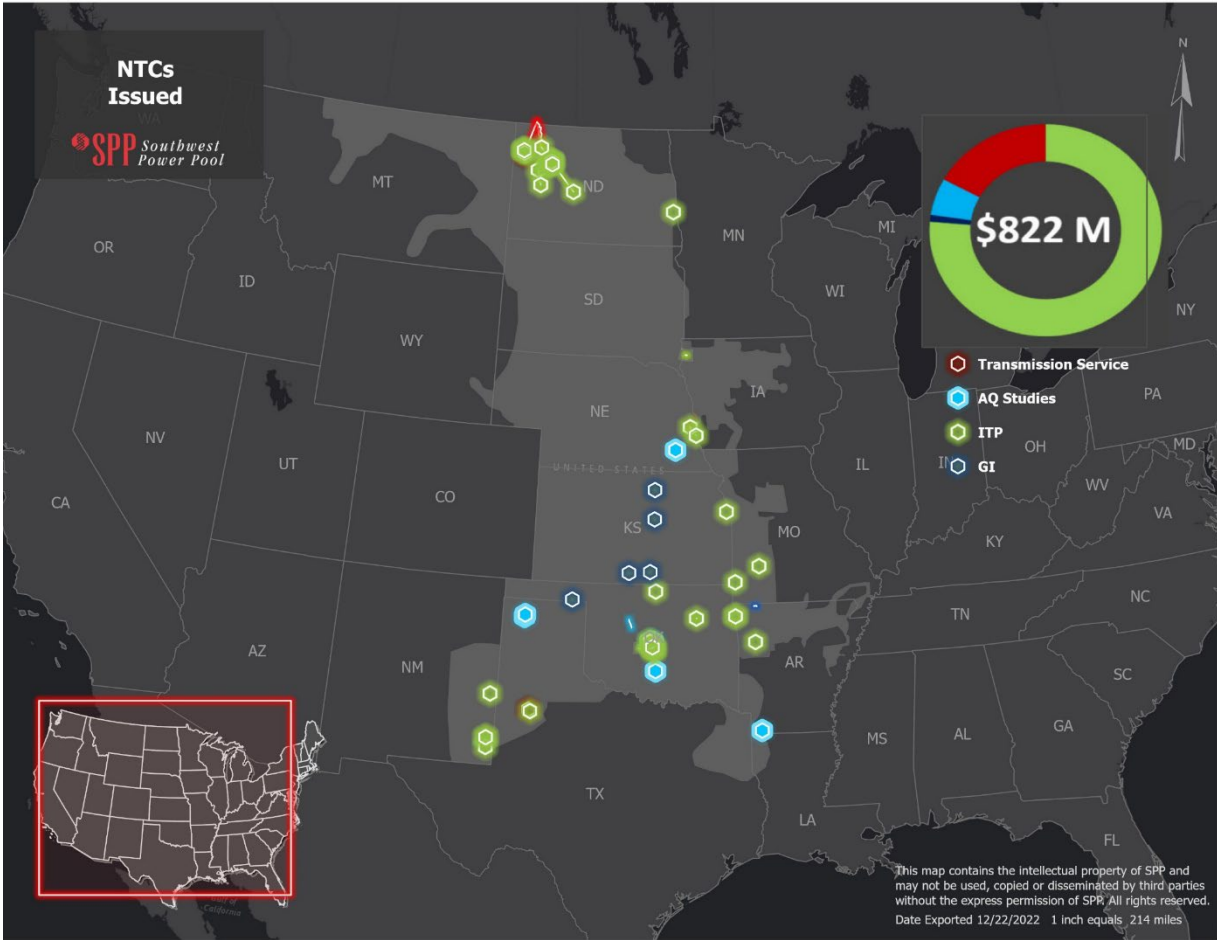
- NTCs issued & withdrawn
- Completed upgrades & upgrades by status
- Upgrades by Process
- Investment by in-service year



INVESTMENT BY IN-SERVICE YEAR



NTCS ISSUED AND WITHDRAWN



2022 PROJECT BENEFITS

TS 608 MW New Transmission Service

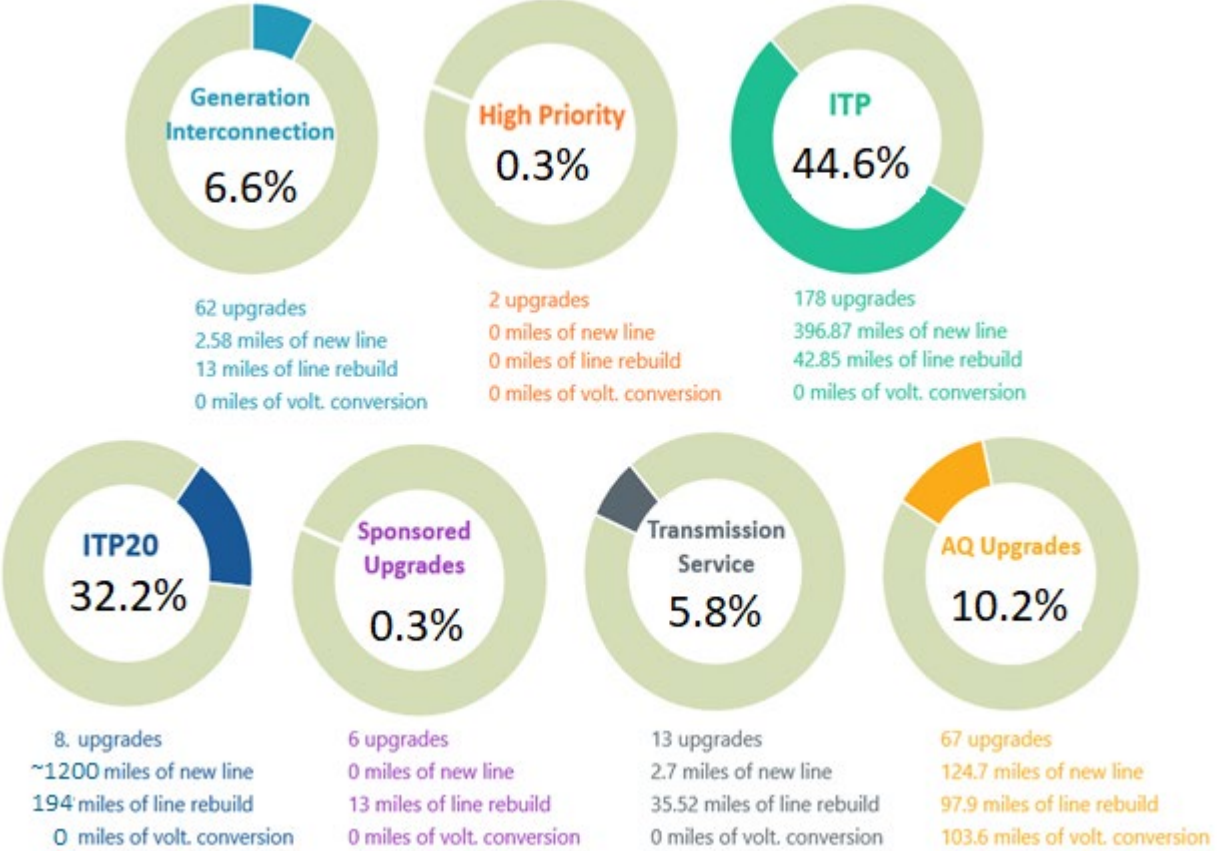
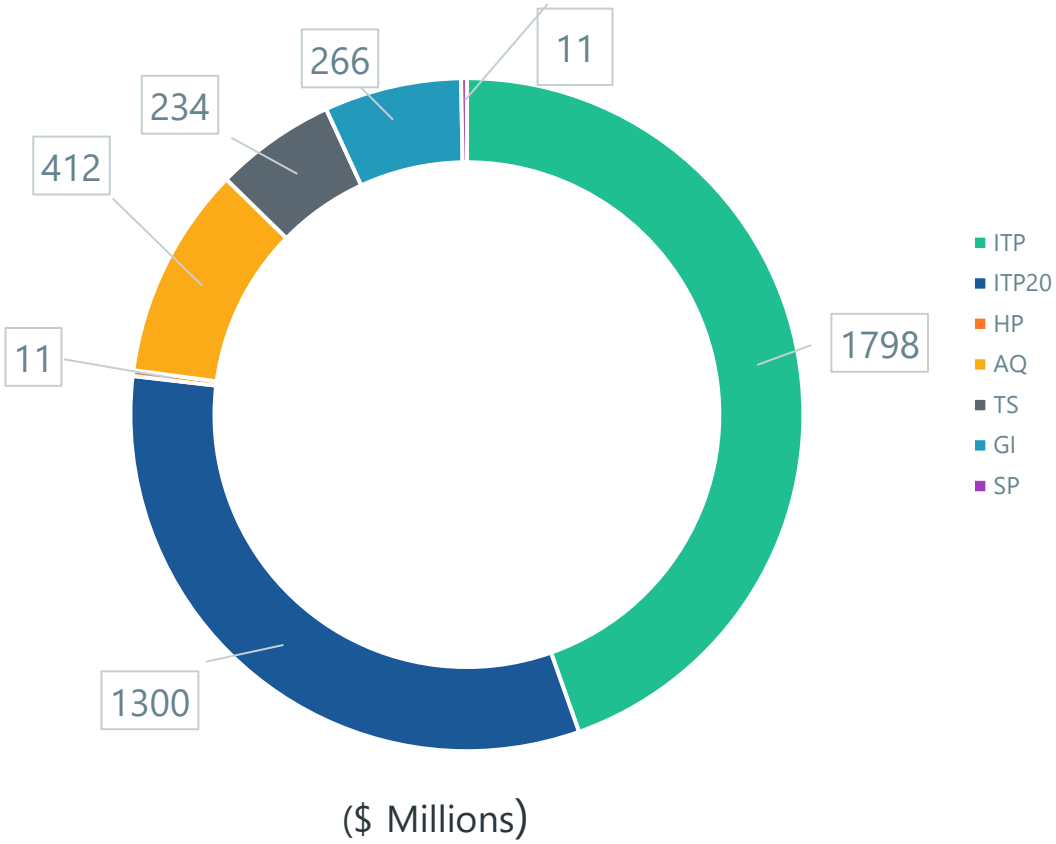
TS 650 MW Firm Transmission Service Exports

AQ 844.1 MW New AQ Load

GI 818 MW New Generation

ITP 17 New Projects & 11.18 miles rebuilt lines

UPGRADES BY PROCESS



AGENDA

MRO Regional Risk Assessment (RRA) *Mark Tiemeier, Principal Technical Advisor, MRO*

Action

Information

Report

Mark Tiemeier will lead this discussion during the meeting.

Classification: **Public**



MIDWEST
RELIABILITY
ORGANIZATION

MRO 2024 Regional Risk Assessment

Mark Tiemeier

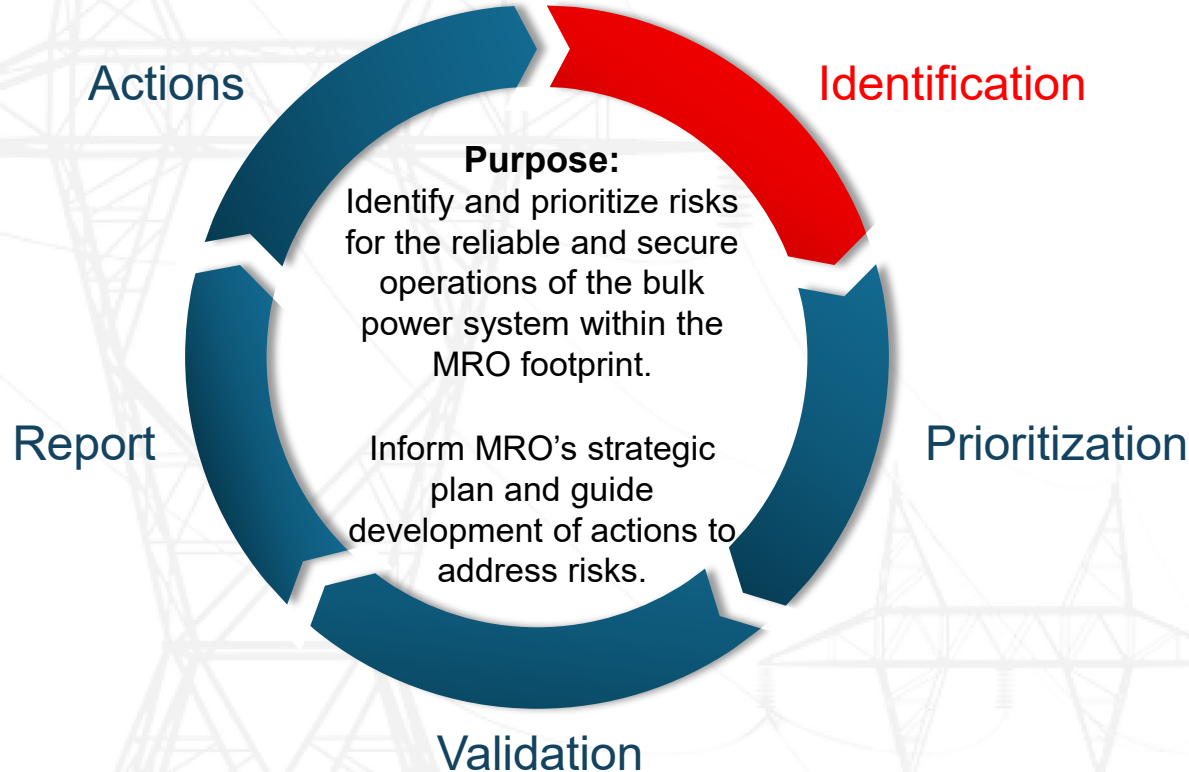
Principal Technical Advisor

CLARITY

ASSURANCE

RESULTS

Regional Risk Assessment Process

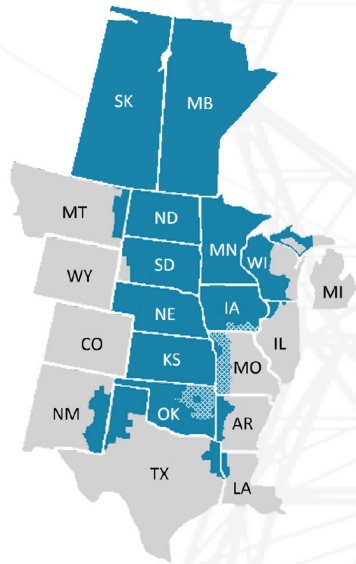




MRO 2023 Regional Risk Assessment

Top risks to the reliable and secure operation of the North American bulk power system in MRO's regional footprint.

Territory



About Us

As part of the [ERO Enterprise](#), MRO is committed to a shared mission to identify, prioritize and assure effective and efficient mitigation of risks to the reliability and security of the North American bulk power system in its regional footprint.

Read more at www.MRO.net.

MRO Reliability Risk Matrix: Risk Rankings

Consequence / Impact (C)		Likelihood (L)				
		L1	L2	L3	L4	L5
		Very Unlikely	Unlikely	Possible	Likely	Almost Certain
C5	Severe					
C4	Major				4,5,6,16	
C3	Moderate		2	9,12,13	1	
C2	Minor			3,7,8,10,14,17	15	
C1	Negligible			11		

Top risks are reflected in orange above and described below. A full list of risks assessed can be found in the final report.

Assessment Overview

- Extreme weather, consumer demand, and changes in technology and generation resources continue to present a rapidly increasing number of challenges to grid planners and operators. Physical and cyber security risks also continue to evolve at an unprecedented pace.
- MRO's annual *Regional Risk Assessment* considers continent-wide risks to reliability and security of the North American bulk power system and determines which are more likely to occur and would have a higher impact in MRO's region.
- This report is focused on risk identification, prioritization and mitigation and highlights for industry the priorities needed to collaboratively address these challenges. It also serves to inform key decision makers of challenges the industry faces and the policies and regulations that will help define a variety of proposed solutions.
- READ MRO'S [2023 REGIONAL RISK ASSESSMENT](#)

Key Findings: Top Reliability and Security Risks in MRO's Territory

Model Assumptions	Planning Reserves	Energy Reliability	Generation Unavailability	Transmission Line Ratings	Insider Threats	Malware/Ransomware	Supply Chain Compromise
RISK 1. Assumptions used in bulk power models to plan and operate the grid have not accounted for the rapid increase in inverter-based and distributed energy resources, challenging industry's ability to accurately assess current and future system characteristics.	RISK 4. Traditional methods to calculate Planning Reserve Margin are inadequate to properly plan for the generation capacity needed to meet increasingly uncertain system operations, especially during extreme weather events.	RISK 5. Increased uncertainty from changing energy supply and customer demand challenge the grid's ability to meet load for all hours of the year. There is no comprehensive planning that assesses assurance of available energy and fuel sources over all time periods to maintain grid reliability.	RISK 6. Generation availability assumed during cold weather, particularly in the southern U.S., has been shown to be unrealistically high due to a lack of generation winterization and natural gas curtailments.	RISK 12. Use of constant overhead transmission line ratings year-round (non-seasonal) limits available transmission capacity and leads to inefficient real-time decisions when system conditions deviate from assumptions that drive rating calculations, such as cooler temperatures or during emergency operations.	RISK 9. Employees or contractors using their knowledge and authorized access of critical systems to do harm to the bulk power system is a continued, substantial threat to organizations and the reliability of the grid.	RISK 13. Phishing attacks can introduce malware or ransomware to corporate IT systems, which can impact critical systems necessary for reliable bulk power system operations through direct or in-direct connections those systems have to IT networks.	RISK 16. A cyber security event carried out through the vendor supply chain can broadly impact bulk power system reliability, especially where the vendor is a market leader providing systems used for system operation.



CLARITY

ASSURANCE

RESULTS

2024 RRA Risk Ranking Meetings

- **Risk Information Sessions**

- *Tuesday, 10/17 2-4:30pm (Ops/Planning risks)*
- *Wednesday, 10/18 2-4:30pm (Security risks)*
- Open to all council members

- **Risk Ranking Workshop**

- *Monday, 10/23 8:30am-3:30pm*
- Only council risk ranking volunteers



MRO 2024 RRA Draft Risk Identification

● Insufficient Bulk Power System Modeling

- Models used to operate and plan the bulk power system do not sufficiently represent growing levels of inverter-based resources and distributed energy resources to accurately assess the impact of system reliability from these resources

● Inadequate Energy Availability

- Combines *Conservative Practices to Calculate PRM and Energy Reliability Planning* risks from 2023
- Lack of dispatchable resources and variable resources to meet load obligations resulting in load shed



MRO 2024 RRA Draft Risk Identification

- **Generation Unavailability During Extreme Cold Weather**
 - Widespread cold weather, especially in the Southern MRO footprint, leading to significant generator outages
- **Use of Inaccurate Transmission Line Ratings**
 - System operators using inaccurate line ratings (incorrect equipment parameters or not appropriate for weather conditions) leading to decisions that hurt bulk power system reliability
 - Broader coverage than 2023 which focused only on lack of use of seasonal/emergency ratings



MRO 2024 RRA Draft Risk Identification

● Changing Sources of Reactive Power

- Retirement of large, centralized power plants being replaced by smaller, more distributed plants changes the location and capability to produce reactive power and the system needs for reactive power. If replacement sources of reactive power are not properly planned for, the bulk power system could have a deficiency affecting operational reliability.

● Inadequate IBR Ride-Through Capability

- Electrical fault causes a significant number of IBRs in an area to come offline and no longer be available to generate into the system



MRO 2024 RRA Draft Risk Identification

- **Material and Equipment Availability**
 - Challenges in the supply chain coupled with widespread damage from a severe weather event challenge the transmission grid leading to controlled load shed
- **Misoperations Due to Human Errors**
 - Protection misoperation of transmission facilities due to human error leading to a significant outage within an area



MRO 2024 RRA Draft Risk Identification

- **Tight Supply of Expert Labor**
 - Insufficient number of trained staff to maintain reliable operation of the bulk power system and adapt to the rapidly evolving changes in the system



Mark Tiemeier, P.E.
**Principal Technical
Advisor**

mark.tiemeier@mro.net

651-855-1759



Questions

AGENDA

NERC Standards Review Forum (NSRF) Update *Gayle Nansel, Reliability Advisory Council Vice Chair*

Action

Information

Report

Vice Chair Nansel will provide an update during the meeting.

Classification: **Public**

AGENDA

Protective Relay Subgroup (PRS) Update *Jake Bernhagen, Manager of Reliability Performance, MRO*

Action

Information

Report

Jake Bernhagen will provide an update during the meeting.

Classification: **Public**

MEETING AGENDA – Reliability Advisory Council (RAC) – August 10, 2023

AGENDA

2023 Meeting Dates

Gayle Nansel, Reliability Advisory Council Vice Chair

Action

Information

Report

Vice Chair Nansel will provide an overview during the meeting.

	Q1 2023	Q2 2023	Q3 2023	Q4 2023
RAC	3/1	5/18	8/10	11/9
SAC	2/22	5/24	8/8	10/12
CMEPAC	2/21	5/31	8/9	10/19
PRS	3/14	6/27	9/6	12/6
OGOC	4/12	6/14	9/13	12/13
BOD	4/13	6/15	9/14	12/14

MRO CONFERENCE DATES 2023

Q1	RAM Conference: March 21-22, 2023 networking reception and conference (hybrid)
Q2	Reliability Conference: May 16-17, 2023 networking reception and conference (hybrid)
Q3	CMEP Conference: July 25-26, 2023 networking reception and conference (hybrid)
Q4	Security Conference: September 26-27, 2023 networking reception, training and conference (hybrid); Oklahoma City, OK

Classification: Public

AGENDA

RAC Member Roundtable

Gayle Nansel, Reliability Advisory Council Vice Chair

Action

Discussion

Report

Vice Chair Nansel will lead this discussion during the meeting.

Classification: **Public**

AGENDA

Other Business and Adjourn

Gayle Nansel, Reliability Advisory Council Vice Chair

Action

Discussion

Report

Vice Chair Nansel will lead this discussion during the meeting.

Classification: **Public**