

**CONTRACT FOR
PROFESSIONAL SERVICES**

This contract, made by and between the City of Independence, Missouri (hereinafter called City) and, 1898 & Co, a Burns & McDonnell Engineering Company Inc., a Missouri Corporation (hereinafter called consultant).

WITNESSETH:

WHEREAS, City requires consulting services for the SPP Annual Engineering Data Request responses and, WHEREAS, consultant is prepared to provide said professional services and shall give consultation and advice to City during the performance of said services;
NOW THEREFORE, City and Consultant in consideration of the mutual covenants contained in this contract, agree as follows:

ARTICLE 1 – EFFECTIVE DATE

The effective date of this contract shall be July 6, 2023.

ARTICLE 2 – SERVICES TO BE PERFORMED BY CONSULTANT

Consultant shall perform the services set forth in the documents attached hereto and made a part of this contract, which include one or more of these documents: Request for Proposals, scope of work, statement of work, consultant’s proposal, and pricing. (See attached Consultants Proposal dated June 12, 2023).

ARTICLE 3 – PERIOD OF SERVICE

The services shall be completed by June 30, 2024.

ARTICLE 4 – COMPENSATION

For services performed, the City shall pay the consultant, an amount not to exceed \$80,000.00.

Regular (e.g. monthly) invoices shall be submitted by the consultant to the City for payment of services performed and expenses incurred during the preceding month. Invoices shall indicate the hours expended for each individual person, the total labor billing, and a summary of other expenses and charges with supporting documentation.

The City’s payment terms are Net 30. Payment will be made by the City within thirty (30) days of receipt of the complete invoice. The City’s preferred method of payment is via City credit card with no added fees. If credit is not acceptable, payment will be made by check.

The City is exempt from State of Missouri sales and use taxes on purchases made directly for the City. Consultant shall not include any sales or use taxes on transactions between the consultant and City.

ARTICLE 5 – PERMITS AND LICENSES

The consultant shall procure all necessary local construction permits and licenses and a City of Independence occupation license, unless exempt under state law. Consultant will abide by all applicable laws, regulations, and ordinances of all federal, state, and local governments in which work under this

contract is performed, and will require the same of all sub-consultants. The consultant must furnish and maintain certification of authority to conduct business in the State of Missouri.

ARTICLE 6 – OWNERSHIP OF DOCUMENTS AND INTELLECTUAL PROPERTY

Except as otherwise provided herein, documents, drawings, and specifications prepared by consultant as part of the services shall become the property of City, provided consultant has the unrestricted right to their use. Notwithstanding the foregoing, City accepts that any re-use of the documents or intellectual property shall be at City’s sole risk and liability.

ARTICLE 7 – CHANGES, DELETIONS, OR ADDITIONS TO CONTRACT

Either party may request changes within the general scope of this Contract. If a requested change causes an increase or decrease in the cost or time required to perform this contract, City and consultant will agree to an equitable adjustment of the contract price, period of service, or both, and will reflect such adjustment in a change order or formal modification.

ARTICLE 8 – STANDARD OF CARE

Consultant shall exercise the same degree of care, skill, and diligence in the performance of the services as is ordinarily possessed and exercised by a peer professional under similar circumstances.

ARTICLE 9– LIABILITY AND INDEMNIFICATION

Having considered the potential liabilities that may exist during the performance of this contract and the consultant’s fee, and in consideration of the mutual covenants contained in the contract, City and consultant agree to allocate and limit such liabilities in accordance with this article.

Consultant agrees, to the fullest extent permitted by law, to indemnify and hold harmless the City, its officers, directors, and employees against all damages, liabilities, or costs, including reasonable attorney fees and defense costs, to the extent caused by the consultant’s negligent performance of professional services under this contract and that of its sub-consultants or anyone for whom the consultant is legally liable. Consultant shall indemnify City against legal liability for damages arising out of claims by consultant’s employees.

Except in cases of gross negligence or willful misconduct and except to the extent such damages are otherwise covered by the insurance requirements set forth herein, in no event will either party be liable under this agreement to the other party or its affiliates for any special, indirect, consequential, including, without limitation, damages or losses in the nature of increase project costs, loss of revenue or profit, lost production, claims by customers of city, or governmental fines or penalties.

ARTICLE 10 – INSURANCE

Architect, Engineering, and Survey Services

The Consultant shall procure and maintain insurance against claims for injuries to persons or damages to property, which may arise from or in connection with the materials, equipment or supplies provided to the City. The insurer(s) must be licensed for business in the State of Missouri and maintain an A.M. Best rating of no less than A: VII; or an insurer approved by the City. Each policy requires a minimum cancellation notification of at least thirty (30) days’ advance written notice to the City.

(1) General Liability Insurance, with bodily injury and property damage limits of \$1,000,000 for each occurrence with a \$2,000,000 general aggregate and \$2,000,000 products and completed operations aggregate.

(2) Professional Liability or Errors and Omissions Insurance, with a limit of \$1,000,000 annual aggregate.

(3) Automobile Liability Insurance, with bodily injury limits of \$1,000,000 for each person and \$1,000,000 for each accident, and with property damage limits of \$1,000,000 for each accident.

The City is to be named as an additional insured as the City's interest may appear for the General Liability and the Automobile Liability Insurance. The Consultant's insurance shall be primary and any insurance or self-insurance maintained by the City shall be excess for the City and not contribute with the coverage maintained by the Consultant.

The City shall not obtain worker's compensation insurance on behalf of the Consultant or the employees of the Consultant. The Consultant shall comply with the worker's compensation law concerning its business and its employees.

WORKER'S COMPENSATION

The City shall not obtain worker's compensation insurance on behalf of the contractor or the employees of the contractor. The contractor shall comply with the worker's compensation law concerning its business and its employees.

ARTICLE 11 – SHIPPING, TITLE AND RISK OF LOSS

All sales and deliveries are F.O.B. City.

ARTICLE 12 – DELAY IN PERFORMANCE

Neither City nor consultant shall be considered in default of this contract for delays in performance caused by circumstances beyond the reasonable control of the nonperforming party. For purposes of this contract, such circumstances include, but are not limited to, abnormal weather conditions; floods; earthquakes; fire; epidemics; war, riots, and other civil disturbances; strikes, lockouts, work slowdowns, and other labor disturbances; sabotage; judicial restrains; and inability to procure permits, licenses, or authorizations from any local, state, or federal agency for any of the supplies, materials, accesses, or services required to be provided by either City or consultant under this contract. If such circumstances occur, the non-performing party shall, within a reasonable time of being prevented from performing, give written notice to the other party describing the circumstances preventing continued performance and the efforts being made to resume performance of this contract.

ARTICLE 13 – TERMINATION

City may terminate or suspend performance of this contract for City's convenience upon written notice to consultant. Consultant shall terminate or suspend performance of the services on a schedule acceptable to City. If termination or suspension is for City's convenience, City shall pay consultant for all the services performed till the date of the termination by the City or suspension expenses. If contract is restarted, an equitable adjustment shall be made to consultant's compensation.

This contract may be terminated by either party upon written notice in the event of substantial failure by the other party to perform in accordance with the terms of this contract. The nonperforming party shall have 15 calendar days from the date of the termination notice to cure or to submit a plan for cure

acceptable to the other party. In the event that funding for the contract is discontinued, City shall have the right to terminate this contract immediately upon written notice to consultant.

ARTICLE 14– WAIVER

A waiver by either City or consultant of any breach of this contract shall be in writing. Such a waiver shall not affect the waiving party’s rights with respect to any other or further breach.

ARTICLE 15 – SEVERABILITY

The invalidity, illegality, or unenforceability of any provision of this contract or the occurrence of any event rendering any portion or provision of this contract void shall in no way affect the validity or enforceability of any other portion or provision of this contract. Any void provision shall be deemed severed from this contract, and the balance of this contract shall be construed and enforced as if this contract did not contain the particular portion or provision held to be void. The parties further agree to amend this contract to replace any stricken provision with a valid provision that comes as close as possible to the intent of the stricken provision. The provisions of this article shall not prevent this entire contract from being void if a provision which is of the essence of this contract be determined void.

ARTICLE 16 – SUCCESSORS AND ASSIGNS

City and consultant each binds itself and its directors, officers, partners, successors, executors, administrators, assigns, and legal representatives to the other party to the contract and to the directors, officers, partners, successors, executors, administrators, assigns, and legal representatives of such other party in respect to all provisions of this contract.

ARTICLE 17 – ASSIGNMENT

Neither City nor consultant shall assign any rights or duties under this contract without the prior written consent of the other party. Unless otherwise stated in the written consent to an assignment, no assignment will release or discharge the assignor from any obligation under this contract.

ARTICLE 18– THIRD PARTY RIGHTS

Nothing in this contract shall be construed to give any rights or benefits to anyone other than City and consultant.

ARTICLE 19– INDEPENDENT CONSULTANTS

Each party shall perform its activities and duties hereunder only as an independent consultant. The parties and their personnel shall not be considered to be employees or agents of the other party. Nothing in this contract shall be interpreted as granting either party the right or authority to make commitments of any kind for the other. This contract shall not constitute, create, or in any way be interpreted as a joint venture, partnership or formal business organization of any kind.

ARTICLE 20– AUDIT

Consultant agrees that the City, or a duly authorized representative, shall, until the expiration of three (3) years after final payment under this contract have access to and the right to examine and copy any pertinent books, documents, papers, records, or electronic records of the consultant involving transactions related to this contract.

ARTICLE 21 – EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this contract or purchase order, the consultant agrees as follows:

The consultant will not discriminate against any employee or applicant for employment because of race, age, color, religion, sex, national origin or any other legally protected category. The consultant will take affirmative action to ensure that applicants are employed, and that employees are treated fairly during employment, without regard to their race, age, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The consultant agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

The consultant will, in all solicitations or advertisements for employees placed by or on behalf of the consultant, state that all qualified applicants will receive consideration for employment without regard to race, age, color, religion, sex, or national origin.

The consultant will send to each labor union or representative of workers with which consultant has a collective bargaining agreement or other contract or understanding, a notice to be provided by a contract compliance officer advising the said labor union or workers' representatives of the consultant's commitment under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The consultant will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

The consultant will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his or her books, records, and accounts by the Department and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

In the event of the consultant's noncompliance with the non-discrimination clauses of this contract or purchase order with any of the said rules, regulations, or orders, this contract or purchase order may be canceled, terminated, or suspended in whole or in part, and the organization may be declared ineligible for any further government contracts or purchase order or federally assisted contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, or by rules, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

The consultant will include the entire text of this Equal Employment Opportunity section and its subsections in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each sub-consultant or vendor. The consultant will take such action with respect to any sub-consultant or purchase order as the City may direct as a means of enforcing such provisions, including sanctions of noncompliance; provided, however, that in the event a consultant becomes involved in, or is threatened with litigation with a sub-consultant or vendor as a result of such direction by the City, the consultant may request the United States to enter into such litigation to protect the interest of the United States.

ARTICLE 22 – GOVERNING LAW

This contract shall be governed by the laws of the State of Missouri. The City and the consultant agree that the performance of this contract will be deemed to have occurred in the State of Missouri and that

consultant's performance under this contract will be deemed the transaction of business in Missouri. Jurisdiction and venue for any claim or cause of action arising under this contract shall be exclusively in the Sixteenth Judicial Circuit of Missouri and the consultant submits to personal jurisdiction of and waives any personal jurisdiction or inconvenient forum objection to, that court.

ARTICLE 23 – COMMUNICATIONS

Any communication required by this contract to the consultant shall be made in writing to the authorized representative named on the completed front page or response page of the solicitation. Any communication required by this contract with the City shall be to:

Mitch Krysa, P.E.
Power Engineering Manager
Independence Power & Light
17221 E 23rd Street South
Independence, MO 64051
mkrysa@indepmo.org
816-525-7468

Nothing contained in this article shall be construed to restrict the transmission of routine communications between representatives of consultant and City.

ARTICLE 24 – SEPARATE CONTRACTS

City and consultant each reserve the right to, from time to time, enter into other contracts for specific projects. If such contracts are separately approved in writing by the parties, the terms and conditions of those contracts shall prevail for the specific projects set forth therein.

ARTICLE 25 – ENTIRE CONTRACT

This contract represents the entire agreement between the City and consultant. All previous or contemporaneous agreements, representations, promises and conditions relating the consultant's services described herein are superseded. The RFP including the terms and conditions, the consultant's response and written proposal, and purchase order (where applicable) shall constitute the entire contract. If these General Terms & Conditions be in conflict with any attached Special Conditions, the Special Conditions will supersede the General Terms & Conditions. In case of a discrepancy, the purchase order shall take precedence over the RFP and the RFP shall take precedence over the consultant's response and written proposal.

ARTICLE 26 – SURVIVAL OF TERMS

The following provisions shall survive the expiration or termination of this contract for any reason: if any payment obligations exist, Article 4 – Compensation; Article 5 – Permits and Licenses; Article 9 – Liability and Indemnification; Article 14 – Waiver; Article 15 – Severability; Article 17 – Assignment; Article 19 – Independent Consultants; Article 22 – Governing Law; Article 25 – Entire Contract; and this Article 26 – Survival of Terms.

IN WITNESS WHEREOF, City and consultant, by and through their authorized officers, have made and executed this contract.

City

By _____

Date _____

Consultant

By Adri W. Mount

Title Associate Project Manager

Date June 27, 2023



June 12, 2023

Mr. Mitch Krysa
Engineering Manager
Independence Power & Light
17221 E 23rd St. S.
Independence, MO 64051

Re: Proposal for 2023-24 SPP Engineering Data Request Support

Dear Mr. Krysa:

1898 & Co.SM, a division of Burns & McDonnell Engineering Company, Inc. is pleased to submit this letter proposal to the City of Independence Power & Light (IPL) for planning and consulting services relating to Southwest Power Pool (SPP) data request and model build activities. 1898 & Co. is well qualified and prepared to assist IPL with performing the required work. 1898 & Co. has supported IPL in several previous planning study efforts and is familiar with the majority of data requested by SPP. The sections below outline the proposed scope, schedule, and cost for the services.

We are excited about this opportunity and look forward to putting our experience to work for you! The following Scope of Work describes the components of the proposal.

SCOPE OF SERVICES

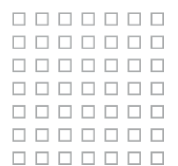
SPP requests specific data necessary to commence engineering studies and assessments. SPP also requires members to participate in multiple model build processes for compliance with MOD-032. 1898 & Co. will support IPL’s participation in these SPP efforts as outlined in the following sections.

Annual Data Requests

The annual data requests are scattered throughout the calendar year with set milestone dates. 1898 & Co. will assist IPL in developing and providing the data for many requests throughout the year. Based on previous

9400 Ward Parkway
Kansas City, MO
816-605-7800
1898andCo.com

1898 & Co.SM is a service mark of Burns & McDonnell Engineering Company, Inc.





Mr. Mitch Krysa
 Independence Power & Light
 June 12, 2023

conversations with IPL, 1898 & Co. will support the data preparations for the following requests during IPL's 2023 fiscal year, ending June 30, 2024:

Table 1: Data Request Items

Item	Anticipated Due Date
2023 TPL-001-5 Steady State Corrective Action Plans	7/14/2023
FAC-001 Transmission Owner Interconnection Requirements	7/31/2023
Quarterly Project Tracking Data Q4	8/7/2023
2023 Facilities Data	8/17/2023
2024 ITP/TPL Steady State TPL-001-5 P1, P2, P3, P4, P5, P6, P7 and Extreme Events	8/30/2023
2024 ITP 69 kV Contingencies For Assessments	9/1/2023
Transmission Operating Guides	9/17/2023
2023 Invalid Steady State Contingencies	9/25/2023
October NITSA Data Submittal	10/1/2023
2023 ITP/TPL BES Inclusion /Exclusion List	10/19/2023
2024 ITP/TPL TPL-001-5 Spare Equipment Strategy List	10/19/2023
2024 ITP/TPL Steady State and Stability PTPL-001-5 First Tier Contingencies	10/20/2023
2023 TPL-001-5 Stability Corrective Action Plans and System Adjustments	10/20/2023
NERC TPL-007-1 GIC Modeling Data Collection for GMD Assessment	11/1/2023
Quarterly Project Tracking Data Q1	11/6/2023
2024 ITP/TPL TPL-001-5 Short Circuit ANSI Fault Current Calculations Parameters	11/16/2023
PRC-006 UFLS	12/1/2023
PRC-010 UVLS	12/1/2023
2024 TPL-001-5 Stability P1, P2, P3, P4, P5, P6, P7 and Extreme Events	1/1/2024
MOD-030-3 Subsystem Files	1/13/2024
Quarterly Project Tracking Data Q2	2/13/2024
MDAG Dynamic Model Build	2/13/2024
2024 ITP/TPL-001-5 Short Circuit Needs	2/20/2024



Mr. Mitch Krysa
Independence Power & Light
June 12, 2023

Item	Anticipated Due Date
2024 MDAG Powerflow and Short Circuit Model Build	3/1/2024
2023 TPL-001-5 Short Circuit Corrective Action Plans	3/27/2024
Local Planning Criteria	4/1/2024
Quarterly Project Tracking Data Q3	5/8/2024
Resource Adequacy Data Submissions	5/15/2024
2024 TPL-001-5 Protection Scheme Contingencies	5/26/2024
NERC Compliance Contacts	6/1/2024
Zero Sequence Data	6/27/2024
2025 ITP Market Economic Model Generation and Load Review	2 weeks
Max Fault Exceptions	30 days
MOD-033-2	30 days
MW-Mile Owner Length Data	90 days

Each of the items referencing year 2024 are anticipated to occur in the same month as outlined in the 2023 SPP Data Request schedule. 1898 & Co. will stay abreast of any change in the 2024 dates once issued by SPP. Each item is described in full detail in the 2023 SPP Annual Engineering Data Request and Schedule document that is attached to this proposal.

SPP Model Build Process Support

1898 & Co. will support IPL’s participation in the SPP annual model build process. This will include supporting data preparations for data requests in addition to those listed above and reviewing posted models to ensure the accuracy of IPL’s portions of the models.

SPP ITP Process Support

1898 & Co. will support IPL’s participation in the SPP Integrated Transmission Planning Process (ITP). This will include supporting data preparations for data requests in addition to those listed above, review of posted ITP files to ensure the files used in the ITP process accurately reflect IPL’s system, review of posted ITP needs and portfolios for impacts to IPL’s system, and preparation of ITP Detailed Project Proposals (DPPs) for projects to address needs on IPL’s system (should any such needs be identified).



Mr. Mitch Krysa
Independence Power & Light
June 12, 2023

SPP General Support

1898 & Co. will support IPL in reporting SPP working group activity, responding to general SPP data requests in addition to those outlined in the above sections, and provide other support relating to SPP transmission planning efforts.

DELIVERABLES

For each of the data categories, 1898 & Co. will prepare the requested data in the proper format as instructed and provided by SPP. 1898 & Co. will also prepare an annual data record report that tabulates and tracks the details of the data that was submitted to SPP through the Annual Engineering Data Request process and other data requests.

SCHEDULE AND COMPENSATION

1898 & Co. anticipates preparing the required data within the allotted time before the milestone dates issued by SPP. 1898 & Co. proposes to support the data request items and other tasks defined herein for a not-to-exceed fee of \$80,000. 1898 & Co. shall seek pre-approval from IPL should the level of effort required for the Scope of Services exceed the estimated fee. All services provided under this proposal are expected to be performed on a “time and expenses” basis according to the attached “Schedule of Hourly Professional Billing Rates”.

1898 & Co. appreciates the opportunity to present its proposal for services and continue building upon the partnership of transmission planning services between 1898 & Co. and IPL. If you have any questions as you review our proposal, please feel free to contact Justin Helt at (816) 800-9442 | justin.helt@1898andco.com. We look forward to working with you!

Sincerely,

Adam W. Mummert
Associate Project Manager

Justin Helt
Project Manager



Mr. Mitch Krysa
Independence Power & Light
June 12, 2023

COVID-19 Notification

The uncertainty and potential disruptions to the labor force and supply chain caused by the global outbreak and spread of COVID-19 (“coronavirus”) may have an impact on this Project, the exact cost and duration of which we can neither predict nor control. Government orders and restrictions may also delay or prevent performance as anticipated. Therefore, this Proposal is conditioned upon an appropriate force majeure clause being included in the contract, which will grant the consultant a period of relief in performance and appropriate cost relief where circumstances arise that are beyond our control due to COVID-19 related events. In general, force majeure applies when an “act of God,” labor shortages, governmental order or regulation, or other extraordinary event prevents performance. The outbreak and spread of COVID-19 is just such an event, the impact of which nobody can predict at this time. To the extent applicable, the doctrines of “commercial impracticability” or “frustration of purpose” under the Uniform Commercial Code (“UCC”) may also excuse performance if delivery pursuant to our contract’s terms has been made “impracticable” by the occurrence of a contingency, the non-occurrence of which both parties assumed when the contract was made. At this time, it is impossible to foresee or to predict the full impact of COVID-19 around the world and, therefore, have not included a contingency specifically for COVID-19.

Schedule of Hourly Professional Service Billing Rates

Position Classification	Classification Level	Hourly Billing Rate
General Office *	5	\$80.00
Technician *	6	\$101.00
Assistant *	7	\$121.00
	8	\$166.00
	9	\$200.00
Staff *	10	\$230.00
	11	\$251.00
Senior	12	\$283.00
	13	\$310.00
Associate	14	\$317.00
	15	\$319.00
	16	\$321.00
	17	\$325.00

NOTES:

1. Position classifications listed above refer to the firm's internal classification system for employee compensation. For example, "Associate", "Senior", etc., refer to such positions as "Associate Engineer", "Senior Architect", etc.
2. For any nonexempt personnel in positions marked with an asterisk (*), overtime will be billed at 1.5 times the hourly labor billing rates shown.
3. For outside expenses incurred by Burns & McDonnell, such as authorized travel and subsistence, and for services rendered by others such as subcontractors, the client shall pay the cost to Burns & McDonnell plus 10%.
4. A charge will be applied at a rate of \$9.95 per labor hour for technology usage, software, hardware, printing & reprographics, shipping and telecommunications. Specialty items are not included in the technology charge.
5. Monthly invoices will be submitted for payment covering services and expenses during the preceding month. Invoices are due upon receipt. A late payment charge of 1.5% per month will be added to all amounts not paid within 30 days of the invoice date.
6. The services of contract/agency and/or any personnel of a Burns & McDonnell parent, subsidiary or affiliate shall be billed to Owner according to the rate sheet as if such personnel is a direct employee of Burns & McDonnell.

**SPP ANNUAL
ENGINEERING DATA
REQUEST SCHEDULE
2023**

02/01/2023

SPP Engineering

REVISION HISTORY

DATE	AUTHOR	CHANGE DESCRIPTION	COMMENTS
2/15/2016	SPP Engineering	Initial Draft	
2/15/2017	SPP Engineering	Added New Sections	October NITSA Data Submittal, Corrective Action Plans, NERC TPL-001 GIC Data Collection for modeling for GMD Assessment, PRC-006-2 UFLS, PRC-021-1 UVLS
2/12/2018	SPP Engineering	Added New Sections	MOD-030-3 Subsystem Files, Facilities Data, Quarterly Project Tracking Data, Resource Adequacy Requirement and EIA-411 Data Submissions, MDAG Dynamic Model Data, MDAG Powerflow and Short Circuit Model Data, Steady State Corrective Action Plans, Stability Corrective Action Plans, Short Circuit Corrective Action Plans,
2/1/2019	SPP Engineering	Added New Sections	MOD-033-1, Generation and Load Review
1/24/2020	SPP Engineering		Updated Section 1. Added Section 27.
1/29/2021	SPP Engineering		Added Short Circuit Needs Identification, Transmission Owner Interconnection Requirements, and NERC Compliance Contacts
02/01/2023	SPP Engineering	Added New Sections	Transmission Operating Guides, Zero Sequence Data

CONTENTS

Section 1: Engineering Data Request Schedule.....	5
GlobalScape.....	5
RMS.....	5
Section 2: 2023 Invalid Steady State Contingencies	6
Section 3: MOD-030-3 Subsystem Files.....	7
Section 4: MOD-033-2.....	8
Section 5: 2023 Facilities Data.....	11
Section 6: 2024 ITP Market Economic Model Generation and Load Review.....	12
Section 7: Quarterly Project Tracking Data	13
Section 8: 2024 ITP/TPL Steady State TPL-001-5 P1, P2, P3, P4, P5, P6, P7 and Extreme Events	15
Section 9: 2024 ITP/TPL Steady State and Stability TPL-001-5 First-Tier Contingencies.....	18
Section 10: Local Planning Criteria.....	19
Section 11: 2023 ITP/TPL BES Inclusion / Exclusion list.....	20
Section 12: 2024 ITP/TPL TPL-001-5 Spare Equipment Strategy List.....	21
Section 13: 2023 TPL-001-5 Protection Scheme Contingencies.....	22
Section 14: 2023 TPL-001-5 Stability P1, P2, P3, P4, P5, P6, P7 and Extreme Events.....	23
Section 15: 2024 ITP/TPL TPL-001-5 Short Circuit ANSI Fault Current Calculation Parameters	24
Section 16: MW-Mile Owner Length Data	25
Section 17: October NITSA Data Submittal.....	26
Section 18: Resource Adequacy Data Submissions	27
Section 19: MDAG Dynamic Model Build.....	29
Section 20: 2023 MDAG Powerflow and Short Circuit Model Build.....	32
Section 21: 2023 TPL-001-5 Steady State Corrective Action Plans.....	35
Section 22: 2023 TPL-001-5 Stability Corrective Action Plans and System Adjustments	36
Section 23: 2023 TPL-001-5 Short Circuit Corrective Action Plans.....	37
Section 24: 2023 ITP/TPL-001-5 Short Circuit Needs.....	38
Section 25: NERC TPL-007 GIC Modeling Data Collection for GMD Assessment.....	39
Section 26: PRC-006 UFLS	40
Section 27: PRC-010 UVLS.....	41
Section 28: Max Fault Exceptions	42
Section 29: FAC-001 Transmission Owner Interconnection Requirements.....	43
Section 30: NERC Compliance Contacts	44

Section 31: Transmission Operating Guides	45
Section 32: 2024 ITP 69kV Contingencies for assessments	46
Section 33: Zero Sequence Data	48
Appendix A: NERC TPL-001-5 Steady State Contingency Request.....	49
Appendix B: SPP Contingency Naming Convention	51
Appendix C: BES Quick Reference Guide	56
Appendix D: NERC TPL-001-5 Stability Contingency Request.....	59

SECTION 1: ENGINEERING DATA REQUEST SCHEDULE

Annually, SPP requests data necessary to commence engineering studies and assessments. SPP developed this document to minimize duplicate engineering data requests while providing transparency for data submittal milestones. The requested data will be disseminated, as needed, within the SPP Engineering department.

The sections below list and describe what engineering data is being requested for various studies and assessments and provides the milestone date for submittal to SPP. **These milestone dates for data submittal are our best current estimates and are subject to change.** Each section in this document describes a different data request with specific request dates and milestone dates. In some cases, especially for request dates beyond the initial annual data request date, a more detailed subsequent data request will be communicated to the entities for clarification purposes. As you submit the engineering data to SPP, please notify the contacts listed in the sections below.

GLOBALSCAPE

For those requests requiring [GlobalScape](#) access, stakeholders must provide SPP with a signed [confidentiality agreement](#). Instructions can be obtained by clicking on the link. Please submit these forms via [SPP's Request Management System \(RMS\)](#) through the "GlobalScape (DocuShare/State Estimator/RA) Access" Quick Pick. After the executed confidentiality agreement is received, an account will be created for the requester on [GlobalScape](#) and an email with instructions for logging on will be sent to the requester. For those that already have a [GlobalScape](#) account, no additional action is necessary.

RMS

[RMS](#) is the preferred method for receiving all inquiries and many of the requests below designate [RMS](#) as their preferred method for receiving data as well. To create a new [RMS](#) account:

- Click on Register Now
- Enter Login Name — This should be your company email address.
- Create a password — Your password must contain at least 8 characters, contain upper and lowercase letters and at least one number. You are required to change your RMS password every 90 days.
- Enter required information (name, address, etc.)
- Click Create My Account button

Upon creation of an account, you are able to immediately submit an inquiry or Request.

To submit an inquiry, select "Submit Request" in the left-hand menu on the Home page. The first drop-down item is "Quick Pick." Selecting the "Engineering Planning" Quick Pick ensures your request or inquiry gets to the appropriate SPP staff quickly.

For additional tips, an [RMS Job Aid](#) can be found on [spp.org](#).

SECTION 2: 2023 INVALID STEADY STATE CONTINGENCIES

MILESTONE: Invalid Steady State Contingencies

Request Date: 08/24/2023

Due by: 09/25/2023

SPP Contacts

[Maurisa Hughes](#)

[Josh Pilgrim](#)

Entity Scope:

[SPP Transmission Planners](#)

SPP will post the list of existing invalid contingencies and solicit stakeholder review of this list as well as the identification of additional invalid contingencies. These invalid contingencies will be excluded from Planning analyses, including the 2024 ITP. **For new invalid contingencies, a justification must be provided.**

The Invalid Contingency list can be found on [GlobalScape](#) at this path:

ITP (CEIL, RSD) → ITP → Non-Competitive → NDA → 2024 ITP → Invalid Contingencies

Please submit questions and updates to the invalid contingencies list via [RMS](#) through the “ITP Submittal > Data Submittal” Quick Pick.

SECTION 3: MOD-030-3 SUBSYSTEM FILES

MILESTONE: MOD-030-3 Subsystem Files

Request Date: 01/6/2023

Due by: 01/13/2023

SPP Contacts

Will Sayers

Planning Coordinator

Entity Scope:

SPP Transmission Operators

SPP First-Tier Balancing Authority

In order to simulate transfers between areas, participation points of MW decrease/increase should be specified in the subsystem file(s).

The subsystem file should contain the following:

- Provide units to participate in transfers including participation points. If absent from list, all units in area will participate.
- Provide a list of Independent Power Producers (IPPs) and wind farms that are in-service in the current study ITP model set to be included/excluded (2023 Fall, 2023 Summer, 2023 Winter, 2024 Spring)
- TOPs can specify generators to be excluded from use as participation points, such as generators that serve base load. The generation reduction should be based on economics, operating constraints or other criteria as specified by the Transmission Owner. The participation points used for import will be consistent for all transfer directions. Please use the format below to specify the generators being excluded from participation, circuit ID and reason for exclusion:

SYSTEM 'TEST-E-ALL'

AREA 900

SCALE ALL FOR EXPORT EXCEPT	Generator	Ckt	Reason for exclusion
BUS 999000 /	Name of Gen 34.500	1	wind.distribution
BUS 999001 /	Name of Gen 34.500	2	DVAR device

- Specify whether the subsystem file can be used on all four seasons. If not, provide separate subsystem files per season.

SPP Planning Criteria 6.4.2.3 default parameters will be used if the subsystem file is not reviewed and feedback provided to SPP staff in a timely manner.

SECTION 4: MOD-033-2

MILESTONE: MOD-033-2

Request Date: As Needed

Due by: 30 days after Request Date

SPP Contacts

Becca McCann

Eric Sullivan

Zach Sabey

Entity Scope:

SPP Transmission Operators

Per NERC Standard MOD-033-2, Planning Coordinators are required to establish consistent validation requirements to facilitate the collection of accurate data and building of planning models to analyze the reliability of the interconnected transmission system. As such, SPP, as the PC, must validate powerflow and dynamic model performance against actual system behavior/response in order to determine if there are unacceptable differences.

For the dynamics validation, the target of validation are the events that SPP determines are dynamic local events (which are disturbances on the power system that produce some measurable transient response, such as oscillations) or events which have significant impact on system performance.

The planning model validation requires a comparison of the performance of SPP's portion of the existing system in a planning dynamic model to actual system response during a dynamic event. **Once SPP has selected a system event for validation, event sequence data will be requested from the Transmission Operators. This data may be submitted to SPP in the form of logs, text files, or emails.**

SPP is requesting the following data initially from RC and TOP(s), but may request additional information at a later date:

- Bus voltage magnitude and angle
- Bus frequency
- Real power flow
- Reactive power flow
- Normal loading

The data provided should reflect a timeline of **5 minutes prior to the event through 10 minutes** after the event to adequately review the response of the BES elements on the SPP PC transmission system. Requested data can be provided via one or more of the following sources:

- EMS/State Estimator Data^[1]
 - Load (RC/TOP)
 - Generation Dispatch (RC/TOP)
 - Area Interchange (RC/TOP)
 - Transmission System Topology (RC/TOP)
 - Transmission/Generation Outages (RC/TOP)
 - Transmission/Generation Status (RC/TOP)
- EMS to Planning Model Mapping
 - Including summary of items translated and items that are not during mapping
 - Guidance on remaining components of the model for mapping to the planning model
 - Description of planning model used for mapping. This step should be coordinated with SPP Modeling contacts listed below.

The requested format for the data is summarized in the following table:

DATA	REQUIRED FOR	PROVIDED BY	REQUESTED FORMAT
EMS State Estimator Case	Steady State Validation	SPP EMS Modeling	PSSE .raw format
EMS to Planning Mapping	Mapping the topology, load, generation, interchange, and other model elements	SPP EMS Modeling, SPP Planning Modeling	Text, Microsoft Excel
Outage Information	Steady State Validation, Dynamic Model Validation,	SPP Outage Coordination Group (CROW)	Outages Mapped to PSSE models in EMS State Estimator Case
Synchrophasor Data*	Dynamic Model Validation	SPP Real-Time Engineering Support, TOP in SPP PC footprint	Per unit, Positive sequence data, Text, CSV, or Microsoft Excel
Dynamic DR/ DFR data*	Dynamic Model Validation	TOP in SPP PC footprint	Per unit, Positive sequence data

^[1] EMS/State Estimator Data can be provided as part of the EMS to Planning Model Mapped Case

Sequence of Event	Dynamic Model Validation, Steady State Validation	SPP RC, TOP in SPP	Log files, text, email.
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* This information should include the PMU location, PMU bus number, any pi data (SCADA measurement), and single line diagram.

If you are unable to provide this data related to the event being requested, you must provide a written response to SPP indicating such within 30 days of the date of this request.

Please submit questions and updates by contacting the [SPP MOD-033 Team](#).

SECTION 5: 2023 FACILITIES DATA

MILESTONE: Facilities Data

Request Date: 8/3/2023

Due by: 8/17/2023

SPP Contacts

Joshua Pilgrim
Reliability Planning

Entity Scope:

SPP Transmission Owners

The facilities data request provides planning engineers a detailed list of which reactive devices can be adjusted to maintain reliability during a contingency. This list helps reduce the number of invalid needs that make their way to the Needs Assessment. SPP transmission owners will be requested to provide updates to any facility data previously submitted, including new installations or removals of equipment. This information will include technical specifications for the following equipment types:

- Generators
- Transformers
- Switched shunts
- Conductors

SECTION 6: 2025 ITP MARKET ECONOMIC MODEL GENERATION AND LOAD REVIEW

MILESTONE: Market Economic Model Generation and Load Review

Pass 1 Trial 1

Request Date: TBD

Due by: 2 weeks after request date

Pass 2

Request Date: TBD

Due by: 2 weeks after request date

SPP Contacts

[David Duhart](#)

[Estevan Padilla](#)

Entity Scope:

[SPP Generator Owners](#)

[SPP Resource Planners](#)

[SPP Load Responsible Entities](#)

[SPP Load Serving Entities](#)

SPP staff requests review of the economic parameters for generation and load model data to be utilized in the Integrated Transmission Planning (ITP) market economic models. An Excel workbook will be provided and will contain data to be reviewed and data to be surveyed.

Data to be reviewed is provided to SPP Stakeholders for review and does not require updates. Data to be surveyed is data that should be reviewed and updated as necessary and is provided by SPP Stakeholders to SPP.

SECTION 7: QUARTERLY PROJECT TRACKING DATA

MILESTONE: Quarterly Project Tracking

Q1 2023 Request Date: 10/26/2022

Due by: 11/8/2022

Q2 2023 Request Date: 2/1/2023

Due by: 2/13/2023

Q3 2023 Request Date: 4/27/2023

Due by: 5/8/2023

Q4 2023 Request Date: 7/27/2023

Due by: 8/7/2023

Q1 2024 Request Date: 11/1/2023

Due by: 11/6/2023

SPP Contacts

[Tammy Bright](#)

[Adam Bell](#)

Entity Scope:

[SPP Transmission Owners](#)

SPP's Project Tracking program actively monitors the progress of approved SPP Transmission Expansion Plan (STEP), SPP Aggregate Study and TO planned projects. Each quarter, SPP staff polls transmission owners to determine the progress made on each approved project. This data is then compiled into a quarterly report for the Markets and Operations Policy Committee (MOPC), Regional State Committee (RSC), and SPP Board of Directors.

On a quarterly basis, the initial Project Tracking portfolio will be sent via email with a due date for requested updates. Staff will then request cost variance justifications for Applicable Projects with estimates outside their respective bandwidth thresholds. SPP Staff will notify TOs and the PCWG of cost estimates outside the precision bandwidth of +/- 20%.

Please make all updates in [TRAC](#). If you make any changes to the in-service dates of projects, please make these changes in Model on Demand (MOD), as well.

Southwest Power Pool, Inc.

Please refer to the [Project Tracking & NTCs page](#) of spp.org and the 2023 Quarterly Project Tracking Schedule located under 'Related Documents' for a more information.

SECTION 8: 2024 ITP/TPL STEADY STATE TPL-001-5 P1, P2, P3, P4, P5, P6, P7 AND EXTREME EVENTS

MILESTONE: Steady State TPL-001-5 P1, P2, P3, P4, P5, P6, P7 and Extreme Events

Request Date: 08/02/2023

Due by: 8/30/2023

SPP Contacts

Melanie Hill

Joshua Pilgrim

Planning Coordinator

Reliability Planning

Entity Scope:

SPP Transmission Planners

Integrated Transmission Planning (ITP) and Transmission Planning (TPL) assessments require specific data sets for contingent elements. Additionally, the TPL studies utilize contingencies specified by Table 1 of the NERC TPL-001-5 standard. Steady State TPL-001-5 Table 1 P1, P2, P3, P4, P5, P6, P7 and Extreme Events are required to commence various system planning studies. Contingencies must include circuit IDs where applicable.

Please refer to the [NERC TPL-001-5 Contingency Steady State Request](#) and the [Contingency Naming Convention](#) sections below for specifics of contingency creation. Note that the requests for kV level and special cons have been added to the naming convention instructions.

Please also include:

- Rationale for contingencies integrated as comments or holistic explanation statements in an additional document.
- The P3 and P6 events are optional as SPP will pair the applicable P1 events to simulate P3 and P6 events. If any member plans to submit additional P3 and/or P6 events, member submitted contingencies should be submitted as two (2) individual P1 events, with the generator outage occurring first. The contingencies should be named in a manner to indicate their pairing (i.e. contingency P11:__:__:_____ -1 and P11:__:__:_____ -2"
- P5 events due to Single Point of Failure of BES protection system per TPL-001-5 Table 1, footnote 13
- To provide better clarity for ITP vs TPL applicability in contingency naming and classification, please **populate a "Field 7" with the designations of "HV" or "EHV"** following the lowest kV applicable for any element contained in the contingency definition. SPP staff will use the EHV and HV designation to identify events in Table 1 of the NERC Standard TPL-001 that do not allow for non-consequential load loss (NCLL) or the interruption of firm transmission service (IFTS). In

determining the EHV and HV designation, please ensure consistency with the following Table 1 items of the NERC Standard TPL-001 considering how events are simulated in PSSE and ability to apply Footnote 1 and 5 based on the PSSE contingency definition of event to remove only those elements “that Protection Systems and other controls are expected to automatically disconnect for each event”.

- Ex.

```
CONTINGENCY 'PXX:230:AREA:NAME::DESC:HV: '
TRIP BRANCH FROM BUS 666666 TO BUS 666667 CKT 1 (230kV line)
TRIP BRANCH FROM BUS 777777 TO BUS 777778 CKT 1 (345kV line)
END

CONTINGENCY 'PXX:345:AREA:NAME::DESC:EHV: '
TRIP BRANCH FROM BUS 888888 TO BUS 888889 CKT 1 (345kV line)
TRIP BRANCH FROM BUS 999999 TO BUS 999990 CKT 1 (345kV line)
END
```

- To assist in **probabilistic planning** efforts and the requirements for **MOPC AI 302** (*TWG and ESWG to develop approaches that address winter peaking and cold-weather driven reliability issues for incorporation in SPP’s normal planning processes*), SPP is also requesting the submission of **additional contingencies driven by extreme and cold weather initiated events specifically resulting in dispatch changes**. The goal of these additional contingencies is to provide additional system operating points post contingency without full model builds to accommodate altered dispatch situations across the footprint. Contingency events of this nature would include but not be limited to generation scaling, transfer/system swing alterations, etc.

- Requirements:

- Inclusion of “RBP” acronym for “Risk-Based Planning” in the contingency name, Field 8
- Inclusion of justification and rationale for the generator related outage/re-dispatch of the system commented in the con file
- Inclusion of comments for any seasonal or model specificity

- Ex.

```
COM Only Applicable to Case Years: 5+, 10+, Summer/LightLoad only
COM Breaker Fault at Plant XX, followed by system re-dispatch

CONTINGENCY 'P23:345:AREA:PlantXX::Breaker Fault Plant XX:EHV:RBP'
REMOVE UNIT S1 FROM BUS 111111 MW
REMOVE UNIT S1 FROM BUS 222222 MW
SET BUS 333333 GENERATION TO 40 MW
SET BUS 444444 GENERATION TO 0 MW
SET BUS 555555 GENERATION TO 40 MW
TRIP BRANCH FROM BUS 666666 TO BUS 666667 CKT 1
TRIP BRANCH FROM BUS 777777 TO BUS 777778 CKT 1
END
```

Below are some additional reminders for syntax requirements of contingencies submitted based on SPP’s automation which validates and processes contingencies and inconsistencies. SPP will change the contingency names and definitions to match standard inputs following these inclusion or exclusion guidelines when not followed.

INCLUDE:

- All eight fields, leaving blanks as placeholders
 - o Ex. P12:138:TO::Description → P12:138:TO::Description::
- Apostrophes around the P event name if spaces are in any of the fields
 - o Ex. Contingency P12:138:TO::Description of something:: → Contingency 'P12:138:TO::Description of something::' or Contingency P12:138:TO::Description_of_something::
- Contingencies separated by P type, not model applicability, in .con files
 - o Ex. TO_P1.con, TO_P2.con, etc.

EXCLUDE:

- Any additional comments in the same line as data for P names or definitions (usually with '/' preceding)
 - o Ex. P12:138:TO::Description:: / Extra comment here → P12:138:TO::Description::
- Any "end of file" cons
- Any auto single contingency commands which are standardly taken in ITP/TPL ACCCs
- Contents other than "EHV" or "HV" in field 7, or, Contents other than "RBP" (Risk Based Planning) or "LLT" (Long Lead Time) in field 8
 - o Ex. P12:138:TO::Description:Comment:CommentAgain → Ex. P12:138:TO::Description_Comment_CommentAgain::
- Field 7 and 8 descriptors not in the correct field
 - o Ex. P12:138:TO::Description:EHV:: → P12:138:TO::Description:EHV:

SECTION 9: 2024 ITP/TPL STEADY STATE AND STABILITY TPL-001-5 FIRST-TIER CONTINGENCIES

MILESTONE: Steady State and Stability TPL-001-5 First-Tier Contingencies

Request Date: 09/15/2023

Due by: 10/20/2023

SPP Contacts

Melanie Hill

Neil Robertson

Reliability Planning

Scott Jordan

Nathan Bean

Planning Coordinator

Entity Scope:

SPP PC First-Tier Planning Coordinators, SPP PC First-Tier Transmission Planners

SPP TP First-Tier Planning Coordinators, SPP TP First-Tier Transmission Planners

Per the NERC TPL-001-5 standard R3.4.1 and R4.4.1, SPP PC is required to coordinate with adjacent Planning Coordinators (PCs) and Transmission Planners (TPs) (First-Tier entities) to ensure that contingencies on adjacent Systems which may impact the SPP System are included in the contingency file used in SPP transmission planning studies. Steady State and Stability TPL-001-5 First-Tier contingencies are required to commence various system planning studies. Contingencies must include circuit IDs where applicable.

Steady State contingencies

3.4.1. The Planning Coordinator and Transmission Planner shall coordinate with adjacent Planning Coordinators and Transmission Planners to ensure that Contingencies on adjacent Systems which may impact their Systems are included in the Contingency list.

Stability contingencies

4.4.1. Each Planning Coordinator and Transmission Planner shall coordinate with adjacent Planning Coordinators and Transmission Planners to ensure that Contingencies on adjacent Systems which may impact their Systems are included in the Contingency list.

Please refer to the [NERC TPL-001-5 Contingency Steady State Request](#) section and the [Contingency Naming Convention](#) section for specifics of contingency creation.

SECTION 10: LOCAL PLANNING CRITERIA

MILESTONE: Company-Specific Planning Criteria

Request Date: 02/14/2023

Due by: 04/01/2023

SPP Contact(s)

Joshua Pilgrim

Reliability Planning

Entity scope:

SPP Transmission Owners

The Integrated Transmission Plan (ITP) studies include local planning criteria to monitor facilities at a more stringent voltage criteria as well as implement local planning requirements. Attachment O, Section II.5 of the [SPP Tariff](#) requires that SPP Transmission Owners provide their local planning criteria to the Transmission Provider at least once a year, by April 1, in order for Zonal Reliability Upgrades to be assessed and included in the SPP Transmission Expansion Plan.

If an SPP Transmission Owner has an established waiver to allow local planning criteria that is less stringent than SPP Criteria, this waiver should be provided to SPP Engineering for consideration in the engineering planning studies.

NOTE: This data will be used for the 2024 ITP needs assessment. If there are any changes to your criteria between April 1 and September 1, please communicate them to the SPP Contact(s) above.

SECTION 11: 2023 ITP/TPL BES INCLUSION / EXCLUSION LIST

MILESTONE: BES Inclusion/Exclusion list

Request Date: 09/14/2023

Due by: 10/19/2023

SPP Contact

Melanie Hill
Planning Coordinator

Entity Scope:

SPP Transmission Planners

Entities have the option to include facilities that would normally not be included as a Bulk Electric System facility (Inclusions) or to exclude facilities that would normally not be excluded as a Bulk Electric System facility (Exclusions) in system planning studies.

Inclusions:

- I1:** Transformers – 2 winding need to have both windings over 100kV, 3 winding at least two windings need to be over 100kV.
- I2:** Generators – 20MW single, 75MW aggregate through the high side of the step-up transformer.
- I3:** Blackstart resources.
- I4:** Wind and solar, other renewables – 75MW aggregate or more connected at 100kV or higher.
- I5:** SVCs, Cap banks, Reactors – connected at 100kV either directly or through step-up transformers.

Exclusions:

- E1:** Radials with the listed criteria.
- E2:** Behind the meter generation.
- E3:** Local networks.
- E4:** SVCs or Cap banks used for local voltage support, not on the BES.

The NERC BES reference document can be found [here](#).

The SPP BES Quick Reference Guide can be found [here](#).

SECTION 12: 2024 ITP/TPL TPL-001-5 SPARE EQUIPMENT STRATEGY LIST

MILESTONE: TPL-001-5 Spare Equipment Strategy List

Request Date: 09/14/2023

Due by: 10/19/2023

SPP Contact

Melanie Hill
Planning Coordinator

Entity Scope:

SPP Transmission Planners

The NERC TPL-001-5 R2.1.5 standard states: *“When an entity’s spare equipment strategy could result in the unavailability of major Transmission equipment that has a lead time of one year or more (such as a transformer), the impact of this possible unavailability on System performance shall be studied. The studies shall be performed for the P0, P1, and P2 categories identified in Table 1 with the conditions that the System is expected to experience during the possible unavailability of the long lead time equipment.”*

Suggested format for data submittal:

Three Winding Transformers							
From Bus Number	From Bus Name	To Bus Number	To Bus Name	Last Bus Number	Last Bus Name	Id	Name

Two Winding Transformers				
From Bus Number	From Bus Name	To Bus Number	To Bus Name	Equipment

SECTION 13: 2023 TPL-001-5 PROTECTION SCHEME CONTINGENCIES

MILESTONE: TPL-001-5 Base and Sensitivity Models Protection Scheme Contingencies

Request Date: 05/16/2023

Due by: 05/26/2023

SPP Contact

Melanie Hill
Planning Coordinator

Entity Scope:

SPP Transmission Planners

Steady State Contingencies

3.3.1 Simulate the removal of all elements that the Protection System and other automatic controls are expected to disconnect for each Contingency without operator intervention. The analyses shall include the impact of subsequent:

3.3.1.1. Tripping of generators where simulations show generator bus voltages or high side of the generation step up (GSU) voltages are less than known or assumed minimum generator steady state or ride through voltage limitations. Include in the assessment any assumptions made.

3.3.1.2. Tripping of Transmission elements where relay loadability limits are exceeded.

Stability contingencies

4.3.1. Simulate the removal of all elements that the Protection System and other automatic controls are expected to disconnect for each Contingency without operator intervention. The analyses shall include the impact of subsequent:

4.3.1.1. Successful high speed (less than one second) reclosing and unsuccessful high speed reclosing into a Fault where high speed reclosing is utilized.

4.3.1.2. Tripping of generators where simulations show generator bus voltages or high side of the GSU voltages are less than known or assumed generator low voltage ride through capability. Include in the assessment any assumptions made.

4.3.1.3. Tripping of Transmission lines and transformers where transient swings cause Protection System operation based on generic or actual relay models.

Contingencies must include circuit IDs where applicable.

Please refer to the [NERC TPL-001-5 Contingency Steady State Request](#) section and the [Contingency Naming Convention](#) section for specifics of contingency creation.

SECTION 14: 2023 TPL-001-5 STABILITY P1, P2, P3, P4, P5, P6, P7 AND EXTREME EVENTS

MILESTONE: Stability TPL-001-5 P1, P2, P3, P4, P5, P6, P7 and Extreme Events

Request Date: 02/01/2023

Due by: 0/01/2023

SPP Contacts

[Scott Jordan](#)

[Nathan Bean](#)

[Reliability Assurance](#)

Entity Scope:

[SPP Transmission Planners](#)

An Excel workbook (Stability Contingency Form.xlsx) will be provided in a subsequent data request by the data request date.

Contingencies must include circuit IDs where applicable.

SECTION 15: 2024 ITP/TPL TPL-001-5 SHORT CIRCUIT ANSI FAULT CURRENT CALCULATION PARAMETERS

MILESTONE: TPL-001-5 Short Circuit ANSI Fault Current Calculation Parameters

Request Date: 10/16/2023

Due by: 11/16/2023

SPP Contact

Nathan Bean
Reliability Assurance

Entity Scope:

SPP Transmission Planners

Transmission Planners (TPs) that require ANSI Fault Current calculation will provide to the Planning Coordinator (PC) the following ANSI Fault Current Calculation parameters to be used for each bus within the TP area:

- Divisors
 - For branches in positive sequence
 - For machines in positive sequence
 - For branches in zero sequence
 - For machines in zero sequence
- Fault multiplying factors
 - DC decrement only or AC and DC decrement
- Max operating voltage, in PU
- Contact parting times, in seconds

SECTION 16: MW-MILE OWNER LENGTH DATA

MILESTONE: MW-Mile Owner Length Data

Request Date: First of the month following finalization of ITP Model

Due by: 90 days after initial request

SPP Contacts

Fredrick Kolp

Entity Scope:

SPP Transmission Owners

SPP utilizes MW-Mile analysis to determine proper allocation for the Billing and Revenue Distribution Process. Accurate Transmission Owner data and correct line length for each transmission branch in the SPP footprint are essential for this allocation process. Transmission line owner length format will be provided in a subsequent data request by the data request date.

If the submitting entity has verified that the branch data in the 2023 ITP Model can be used to accurately represent the MW-Mile owner data, an email attestation may be submitted in lieu of the additional data requested.

SECTION 17: OCTOBER NITSA DATA SUBMITTAL

MILESTONE: NITSA DATA SUBMITTAL

Request Date: 09/04/2023

Due by: 10/01/2023

SPP Contacts

[Bryce Bowie](#)

Entity Scope:

[SPP Transmission Customers](#)

System Planning & Protection

The Network Customer shall provide the Transmission Provider and Host Transmission Owner the following information:

A ten (10) year projection by summer and winter peak for the following:

- a. Demands with the corresponding power factors and annual energy requirements on an aggregate basis for each delivery point. If there is more than one delivery point, the Network Customer shall provide the summer and winter peak demands and energy requirements at each delivery point for the normal operating configuration;
- b. Planned generating capabilities and committed transactions with third parties for which resources are expected to be used by the Network Customer to supply the peak demand and energy requirements provided in (a);
- c. Estimated maximum demand in kilowatts that the Network Customer plans to acquire from the generation resources owned by the Network Customer, and generation resources purchased from others; and
- d. A projection for each of the next ten (10) years of transmission facility additions to be owned and/or constructed by the Network Customer for which facilities are expected to affect the planning and operation of the transmission system within the Host Transmission Owner's Zone.

Please refer to the [Open Access Transmission Tariff Attachment G Section 4.1a – 4.1d](#). The template can be found [here](#).

SECTION 18: RESOURCE ADEQUACY DATA SUBMISSIONS

MILESTONE: Attachment AA and NERC Standard MOD-031-2 data submissions

Due by: May 15

Submission Occurrence: Annual

SPP Contact(s)

Alex Crawford

Bradley Payne

Resource Adequacy

Entity scope:

Market Participants

Generator Owners

Load Responsible Entities

Data submitted for Resource Adequacy is used to validate the requirements outlined in Attachment AA of the SPP Open Access Transmission Tariff (OATT) and NERC Standard MOD-031-2. The data is submitted through the Engineering Data Submission Tool (EDST) and contains, but is not limited to, resource specific information (including Deliverability Study results), purchases and sales information, and demand information for the previous year, current year, and future 10 years. GlobalScape is also used to submit documents for verifying requirements in Attachment AA that cannot be submitted through EDST. Any questions about Resource Adequacy or gaining access to EDST or GlobalScape for Resource Adequacy should be directed to the SPP contacts listed in this section.

Attachment AA can be located on the SPP Website using the following path;

<https://www.spp.org> → Engineering → Resource Adequacy → Attachment AA Tariff.pdf

NERC Standard MOD-031-2 can be located using the following link;

<https://www.nerc.com> → Reliability Standards → United States → MOD-031-2 - Demand and Energy Data

The EDST can be located using the following link:

<https://edstool.spp.org/EDST/>

The Data Instruction Manual and User Guide for the EDST can be located on the SPP Website using the following paths:

<https://www.spp.org> → Engineering → Resource Adequacy → ResourceAdequacyWorkbookInstructionManual.docx

<https://www.spp.org> → Engineering → Resource Adequacy → EDST Materials → EDST User Guide V6.docx

Globalscape can be located using the following link:

<https://sppdocushare.spp.org/EFTClient/Account/Login.htm>

SECTION 19: MDAG DYNAMIC MODEL BUILD

MILESTONE: MDAG Dynamic Model Data

Request Date: 01/16/2023

Due by: 02/13/2023

SPP Contact(s)

Zach Sabey

Theo Brown

Entity scope:

This data request typically goes out to all entities applicable to NERC standard **MOD-032** and/or entities defined in the SPP Open Access Transmission Tariff which are required to provide modeling data in accordance with the SPP MDAG Model Development Procedure Manual.

- **Data Submitter entities as defined in the Scope of Applicability section of the SPP MDAG Model Development Procedure Manual.**

All Powerflow and Short Circuit Data submitted to SPP Modeling shall conform to the requirements guidelines set forth in the [SPP MDAG Model development Procedure Manual](#) posted on the *MDAG Reference Documents* link under the Model Development Advisory Group (MDAG) page on [SPP website](#). A detailed schedule comprising a set of models to be built is created by the MDAG on an annual basis based on the corresponding MDAG powerflow model build series. Once finalized by the Model Development Advisory Group (MDAG), the 2023 Series MDAG model build schedule will be posted to the SPP website at the following link: [2023 Series MDAG Dynamics Model Build Schedule](#). The model build typically starts mid-January and completes around the December timeframe of the same year.

Requested Data:

- 1) All dynamic and power flow data submitted to SPP Modeling Staff should conform to the guidelines set forth in the [SPP MDAG Model Development Procedure Manual](#) posted on the MDAG Documents Link under the MDAG area on SPP.ORG.
- 2) MDAG recognizes the NERC acceptable model list in accordance with the language contained in the MDAG manual section 4.
- 3) Please supply any dynamic data changes for machine models listed in the posted DOCU output files (from the final 2022 series MDAG dynamic models). The dynamic DOCU files contain machine data based on last year's models can be found on [GlobalScope: Modeling \(CEII, RSD\)→MDAG Series →Dynamics→2023 Series →A. Initial Member Data Update](#). The updates should be supplied in member feedback subfolder.
- 4) The dyre file update submissions should include:

- Outdated generator, exciter, governor, and power system stabilizer models commented out with the “/old/” tag at the beginning of the line of the model data

```

/OLD/ 999999 'LCFB1' '1' 1 1 0.01 1.0 0.01 0.1 0.5 0.005 0.05 / \ 01/01/1996 12/31/2300
/OLD/ 999999 'GENROU' '1' 7.9 0.04 0.54 0.085 5.489 0.0 1.8 1.72 0.21 0.405 0.155 0.115
/OLD/ 0.0731 0.3945 / GENROU UPDATE \ 01/01/1996 12/31/2300
/OLD/ 999999 'GAST' '1' 0.05 0.4 0.1 3.0 1.0 2.0 1.0 -0.05 0.0 / \ 01/01/1996 12/31/2300
/OLD/ 999999 'EXAC2' '1' 0.01 1.0 1.0 1000.0 0.01 8.6 -8.6 1.0 13.9 -13.9 0.66 4.0 0.0 0.05
/OLD/ 1.0 0.1 0.8 1.0 10.79 4.73 0.02 3.55 0.01 / \ 01/01/1996 12/31/2300

999999 'USRMDL' '1' 'GENTPJU1' 1 1 0 16 6 1 7.9 0.04 0.54 0.085 5.489 0.0 1.8 1.547 0.21 0.405 0.155
0.155 0.115 0.0600 0.4000 0 / UPDATE \
999999 'AC7B' '1' 0 27.241 27.241 0 0.45 60.3 -54.1 90.8 82.6 60.3 -54.1 0 99 0 0.7 0 1 1
2.1 1 1.2 99 0 4.5 0.001 6 0.01 / \
999999 'PSS2B' '1' 1 0 3 0 5 1 2.0 2.0 0.0 2.0 2.0 0.4555 1.0 0.5 0.1 10.0 0.2
0.03 0.15 0.02 1 1 2 -2 2 -2 0.1 -0.01 / \
999999 'GGOV1' '1' 1 0 0.05 2.5 0.05 -0.05 6 1.4 0 0.05 1 0.15 0.5 1.55 0.13 0.5 0 0
3 2 0.67 1 0 0.1 -0.1 0 0.01 10 0.1 0 0.00025 4 5 99 -99 / \ 01/01/1996 12/31/2300
  
```

- Parameter changes
 - Renamed or renumbered units
- 5) In addition to updating existing dynamic information, please provide dynamic data for new generators and dynamic devices introduced in the 2023 MDAG power flow models that are subject to NERC standards for inclusion in dynamic models.
 - 6) Machines that are over 20 MVA will need to have a detailed model associated with them.
 - 7) Review of renewable energy resource machine power flow updates:
 - Power flow data updates in PSS/E version 35.3.2 format to accurately model facilitates at the generator kV bus which is typically below 1 kV are required. SPP power flow DocuCheck reports are provided to associated data submitters on [GlobalScope: Modeling \(CEII, RSD\)→MDAG Series →Dynamics→2023 Series→A. Initial Member Data Update→Powerflow_DocuCheck.xlsx](#). Data submitters should provide detail and updates to accurately model the renewable energy resources at their appropriate generator kV level. The appropriate wind flag, power factor, and voltage schedule set point should be modeled based on PSS/E documentation and dynamic model manufacturer’s recommendations.
 - 8) Governor Response Type for Frequency Response:
 - Provide and update governor response type for frequency response as part of MMWG data collection requirements
 - 9) CMLD data:
 - The SPP Dynamic Load Task Force (DLTF) has developed and benchmarked Industrial load representations for the CMLD_2 dyre file representing 3-phase motor and electronic loads. The CMLD_2 load model is being added in order to comply with a TPL-001-5 Requirement 2.4.1 that the dynamic simulations take into account the expected dynamic behavior of Loads that could impact the study area, considering the behavior of induction motor Loads. The MDAG approved an addition to the MDAG Manual stating non-scalable loads greater than or equal to 10 MW are required to have a dynamic load model representation. CLOD and CMLD_1 models are considered obsolete and should be replaced with CMLD_2 models.

The CMLD workbook is located at [GlobalScape: Modeling \(CEII, RSD\)](#)→MDAG Series
→Dynamics→2023 Series→A. Initial Member Data Update→ CMLD2_Workbooks.zip

SECTION 20: 2023 MDAG POWERFLOW AND SHORT CIRCUIT MODEL BUILD

MILESTONE: MDAG Powerflow and Short Circuit Model Data

Request Date: 07/2022

Due by: 03/2023

SPP Contact(s)

Becca McCann

Eric Sullivan

Lottie Jones

Entity scope:

This data request typically goes out to all entities applicable to NERC standard [MOD-032](#) and/or entities defined in the SPP Open Access Transmission Tariff which are required to provide modeling data in accordance with the SPP MDAG Model Development Procedure Manual.

- **Data Submitter entities as defined in the Scope of Applicability section of the SPP MDAG Model Development Procedure Manual.**

All Powerflow and Short Circuit Data submitted to SPP Modeling shall conform to the requirements guidelines set forth in the [SPP Model development Procedure Manual](#) posted on the *MDAG Reference Documents* link under the Model Development Advisory Group (MDAG) page on [SPP website](#). A detailed schedule comprising a set of models to be built, is created by the MDAG on an annual basis prior to the commencement of the model build. Once finalized by the Model Development Advisory Group (MDAG), the 2023 Series MDAG model build schedule will be posted to the SPP website at the following link: [2023 Series MDAG Powerflow and Short Circuit Model Build Schedule](#). The model build typically starts mid-July and completes around the March timeframe of the following year.

The model build normally entails several passes/iterations where Data Submitters have a chance to submit data, review the models developed by SPP staff, and provide corrections congruent with the approved schedule. Depending on the type of modeling data, SPP utilizes the following avenues to collect updates:

- [Model On Demand \(MOD\)](#).
 - This is a database with a web-based interface through which Data Submitters can upload the following information (**steady state and short circuit**):
 - Future planned projects (generation resources, transmission)
 - As-built information of transmission and generation projects
 - Load and Generation profiles up to 10 years out

- Device Control profiles such as transformer taps, switchable shunt voltage bands, etc.
 - Short Circuit information (mutual, positive, negative & zero sequence data)
 - ETC
- All Data Submitters are expected to do MOD training in order to submit projects and profile data directly through the MOD web interface.
- **NOTE:** The MOD hyperlink may not be active when the new model build starts so make sure to contact SPP staff for an updated link.

- **GlobalScape**
 - Secure file-share site used by SPP to store confidential data
 - SPP uses this site to share model data with Data Submitters and vice versa
 - Model information is stored on GlobalScape such as PSSE models, supplemental model data, SPP modeling contact list, EDST training material, MOD training material.

- **Engineering Data Submission Tool (EDST)**
 - This tool replaced the old Data Submittal Workbook and is used primarily to coordinate and store transactions, PC-PC tie lines, and other data not readily found in the PSSE models (Refer to the SPP Model Development Procedure Manual for more details on EDST).
 - Data Submitters who are unsure of whether they need to submit information through EDST should contact SPP staff
 - EDST material can be found on both the SPP website
 - [EDST 2.0 Material](#)
 - EDST Training
 - Please contact SPP Modeling to schedule training on the tool at the following email:
 - SPPEngineeringModeling@spp.org

The models will be built using Siemens PTI PSS/E software (PSSE V35) and the data below is normally requested congruent with the format specified in the MDAG manual.

- Data Coordination Workbook: MOD-032-1 applicable entities are required to fill out this workbook to let SPP know if they'll be submitting data for themselves or on behalf of other entities as well.
 - The *MOD-032 Data Submitter Designee Letter of Notice* (can be found in the appendix section of the model development manual) is also required in addition to the *Data Coordination Workbook*.
- Powerflow and Short Circuit Data in accordance with Attachment 1 of NERC standard MOD-032-1 and the SPP Model Development Procedure manual.

Furthermore, status calls are held during the data submission period of each pass to solicit feedback and discuss any issues or questions about the model build. Detailed data request emails will be sent out to all Data Submitters throughout the model building process to signify the beginning of each pass.

If you are an applicable Data Submitter and need to be added to the modeling contacts distribution list, please contact the SPP staff listed in this section. Furthermore, Data Submitters unacquainted

with the SPP modeling process are encouraged to sign up for the MDAG Exploder list on the SPP website to stay abreast of anything modeling related in SPP's Planning department.

The MDAG Procedure Manual can be found on the SPP Website at this path:

<https://www.spp.org> → Engineering → Modeling → Reference Documents → SPP Model Development Procedure Manual 2021 V5.0 (OR LATESET VERSION)

OR

<https://www.spp.org> → Organizational Groups → Model Development Advisory Group → MDAG Reference Documents → SPP Model Development Procedure Manual 2021 V5.0 (OR LATESET VERSION)

SECTION 21: 2023 TPL-001-5 STEADY STATE CORRECTIVE ACTION PLANS

MILESTONE: TPL-001-5 R2.7 Corrective Action Plan

Request Date: 05/16/2023

Due by: 07/14/2023

SPP Contacts

[Melanie Hill](#)

[Will Sayers](#)

[Samantha Dix](#)

[Planning Coordinator](#)

Entity Scope:

[SPP Transmission Planners](#)

See the TPL-001-5 Scope document for details about the format in which CAPs will need to be submitted.

SECTION 22: 2023 TPL-001-5 STABILITY CORRECTIVE ACTION PLANS AND SYSTEM ADJUSTMENTS

MILESTONE: TPL-001 R2.7 Corrective Action Plans and System Adjustments

Request Date: 9/15/2023

Due by: 10/20/2023

SPP Contacts

Scott Jordan

Nathan Bean

Reliability Assurance

Entity Scope:

SPP Transmission Planners

See the TPL-001-5 Scope document for details about the format in which CAPs and system adjustments will need to be submitted.

SECTION 23: 2023 TPL-001-5 SHORT CIRCUIT CORRECTIVE ACTION PLANS

MILESTONE: TPL-001-5 R2.7 Corrective Action Plan

Request Date: 02/24/2023

Due by: 03/27/2023

SPP Contacts

Nathan Bean

Reliability Assurance

Entity Scope:

SPP Transmission Planners

See the TPL-001-5 Scope document for details about the format in which CAPs will need to be submitted.

SECTION 24: 2023 ITP/TPL-001-5 SHORT CIRCUIT NEEDS

MILESTONE: Short Circuit Needs Identification

Request Date: 1/20/2023

Due by: 2/20/2023

SPP Contacts

Nathan Bean
Reliability Assurance

Background:

As outlined in the TPL-001-5 Scope, stakeholders are to provide the applicable analysis type (ANSI or ASCC), fault type (3 phase or Single line-to-ground), fault current exceeded, and the value being exceeded (duty rating) for each Short Circuit analysis results provided. Note: Please identify all breakers where the equipment rating is exceeded. Models are preliminary Short Circuit analysis results will be posted on GlobalScape. This information is needed in order for SPP to post the identified facilities as ITP Needs.

SECTION 25: NERC TPL-007 GIC MODELING DATA COLLECTION FOR GMD ASSESSMENT

MILESTONE: GIC Data Collection in Support of TPL-007-4

Request Date: September 2023

Due by: November 2023

SPP Contacts

Scott Jordan, Technical Questions

Eric Sullivan, **Zach Sabey**, GIC Data Template

Background:

A GMD model-based set of steady-state models that incorporate GIC-related effects. The GMD Model Set is developed in two stages. First, the GIC System model containing GIC-related system information (such as substation grounding values, latitude/longitude, etc.) is used to determine the magnitude of GIC currents. Second, GIC currents are integrated into System models, translating GIC effects to the AC power system representations. The resultant set of System models, containing the GIC-related impacts, is referred to as the GMD Model Set. The Requirements R2 of the NERC TPL-007-3 standard (standard) became effective July 1, 2019. SPP, the Planning Coordinator (PC), with guidance from the SPP TPL Task Force, requests Table 1 contingencies from the Transmission Planners (TPs) for the annual TPL assessment.

Entity Scope:

SPP Transmission Owners and Generation Owners

SPP, as Planning Coordinator (PC), requests that Transmission Owners and Generation Owners within the SPP PC area provide to SPP, as a Planning Coordinator:

- Data and information in support of the SPP GMD Model Set, or
- An explanation of the technical basis for an exception within 90 days of receipt of written notification from SPP

A “GIC Data Collection Template” will be sent out by SPP in a data request to facilitate the gathering of the necessary GIC data.

SECTION 26: PRC-006 UFLS

MILESTONE: Updated Information for Under Frequency Load Shed Database for PRC-006 R8

Request Date: 10/02/2023

Due by: 12/1/2023

SPP Contact(s)

Nathan Bean

Scott Jordan

Reliability Assurance

Entity Scope:

SPP Transmission Owners, Distribution Providers, and Generator Owners

R8. Each UFLS entity shall provide data to its Planning Coordinator(s) according to the format and schedule specified by the Planning Coordinator(s) to support maintenance of each Planning Coordinator's UFLS database.

All TO/DP/GO Entities that fall within the SPP PC footprint are required to complete and upload a "UFLS Attestation Form" form via [GlobalScape](#). This form indicates if the Entity owns/operates:

- Armed UFLS relays
- Armed Automatic Load Restoration (ALR) relays
- Generator protective relays (set within the no-trip zone, PRC-006, Attachment 1), and/or
- Automatic equipment used to control over-voltage as a result of Under-frequency load shedding in the SPP PC footprint.

- 1. Updated Model Database:** The UFLS Model Database (DB) contains the current powerflow model bus, load, machine, branch, and transformer data. The SPP PC UFLS Entities will mark all their entity loads in the UFLS Model DB.
- 2. Updated Inventory Database:** Entities who own and operate *UFLS relays, Automatic Load Restoration, and/or generator protective relays (set within the no-trip zone, PRC-006, Attachment 1), Automatic equipment used to control over-voltage as a result of Under-frequency load shedding* in the SPP PC footprint equipment shall complete their "Inventory Database." Instructions for completing and posting the Inventory Database will be in the Reporting Instructions.

Previous data in support of PRC-006 will be provided by the PC at the time of the formal request.

SECTION 27: PRC-010 UVLS

MILESTONE: Updated Under-Voltage Load Shed Information for PRC-010

Request Date: 10/2/2023

Due by: 12/1/2023

SPP Contact(s)

Nathan Bean

Scott Jordan

Reliability Assurance

Entity Scope:

SPP Transmission Planners and Under-Voltage Load Shed Entities (Distribution Providers and Transmission Owners)

R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system:

R1.1. Size and location of customer load, or percent of connected load, to be interrupted.

R1.2. Corresponding voltage set points and overall scheme clearing times.

R1.3. Time delay from initiation to trip signal.

R1.4. Breaker operating times.

R1.5. Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.

Previous data in support of PRC-010 will be provided upon request to the PC.

SECTION 28: MAX FAULT EXCEPTIONS

MILESTONE: Max Fault Exceptions

Request Date: Summer 2023

Due by: 30 days after request date

SPP Contact(s)

[Eric Sullivan](#)

[Zach Sabey](#)

[Nathan Bean](#)

Entity Scope:

[Data Submitters*](#)

In the Max Fault Short Circuit models, all available transmission and generation facilities are put in service to provide the maximum fault current possible in the transmission system. In certain scenarios Data Submitters request that particular facilities remain out of service for indicated reasons, e.g. a Normally Open transmission line. These facilities that Data Submitters request to not be put in service in the Max Fault Short Circuit model should be submitted to SPP as part of the Max Fault Exceptions file, so that these facilities will not be put in service during the Max Fault Short Circuit model build.

Any facilities that should be included in the Max Fault Exceptions file should be submitted to SPP per the applicable MDAG / ITP Short Circuit Model build schedule. This request for these exceptions will be included in the model data request during the MDAG / ITP Short Circuit Model build.

SECTION 29: FAC-001 TRANSMISSION OWNER INTERCONNECTION REQUIREMENTS

MILESTONE: Transmission Owner Interconnection Requirements

Request Date: July 2023

Due by: 30 days from Request Date

Submission Occurrence: Annual

SPP Contact(s)

Tammy Bright

Entity Scope:

SPP Transmission Owners

Background:

FAC-001-3 requires Transmission Owners to make interconnection requirements available so that entities seeking to interconnect will have the necessary information. SPP gathers this information from all TOs in order to document in one place on OASIS to provide a central point of information for all SPP stakeholders.

SECTION 30: NERC COMPLIANCE CONTACTS

MILESTONE: NERC Compliance Contacts

Request Date: May 2023

Due by: 30 days after Request Date

SPP Contact(s)

Ellen Cook

Entity Scope:

Generator Owners

Generator Operators

Transmission Owners

Transmission Operators

Transmission Planners

Background:

In order to ensure proper delivery of NERC compliance-related items, SPP will be sending a formal request for appropriate contacts from registered GOs, GOPs, TOs, TOPs, and TPs. These contacts will be used for future SPP NERC compliance coordination.

SECTION 31: TRANSMISSION OPERATING GUIDES

MILESTONE: Transmission Operating Guides

Request Date: 9/3/2023

Due by: 9/17/2023

SPP Contacts

Joshua Pilgrim
Reliability Planning

Entity Scope:

SPP Transmission Owners

Transmission owners and operators shall provide a list of the operating guides that are applicable to the transmission planning process, as well as withdraw any operating guides that are no longer valid for usage. These operating guides can be used as potential mitigations for violations observed in the ITP study.

These operating guides should consist of a .pdf file as well as any applicable idvts for applying the post-contingency actions listed in the operating guide. More details can be found in Section 5 of the ITP manual.

SECTION 32: 2024 ITP 69KV CONTINGENCIES FOR ASSESSMENTS

MILESTONE: 69kV Contingencies for Assessments

Request Date: 9/2023

Due by: 9/2023

SPP Contacts

[Reliability Planning](#)

Entity Scope:

[All interested stakeholders](#)

SPP Staff is requesting stakeholders to submit 69 kV contingencies, monitored elements, or mon/con pairs for staff consideration to be included in the 2024 ITP Constraint Assessment and Market Powerflow Needs Assessment. This request is in concurrence with the ITP Manual section 2.2.3.2 and section 4.2.2. All submittals must be accompanied by justification to be included in the 2024 ITP Constraint Assessment and Market Powerflow Needs Assessment. Permanent and temporary 69kV flowgates as identified in SPP Operations will be included as flowgates in the 2024 ITP Assessments. The request form will also be posted to [GlobalScape](#).

P0, P1, P2.1		
	Monitored Element	Contingent Element
Reference Case Year 2 Peak	100 kV+ with select 69 kV facilities	100 kV+ with select 69 kV facilities
Reference Case Year 2 Off-Peak		
Reference Case Year 5 Peak		
Reference Case Year 5 Off-Peak		
Reference Case Year 10 Peak	100 kV+	100 kV+
Reference Case Year 10 Off-Peak		
F _x Year 5 Peak		
F _x Year 5 Off-Peak		
F _x Year 10 Peak		
F _x Year 10 Off-Peak		

Table 6: NERC Standard TPL-001 Planning Events as Monitored and Contingent Elements
ITP Manual v2.8 – Section 4.2.2 Market Powerflow Model (page 30)

Please provide all applicable modeling data in the provided Excel template in order to facilitate staff implementation of constraints and AC contingency analysis. SPP Staff is available to answer any questions regarding this data request.

SECTION 33: ZERO SEQUENCE DATA

MILESTONE: Final Reliability Assessment

Request Date: 5/6/2023

Due by: 6/27/2023

SPP Contacts

[Eric Sullivan](#)

Entity Scope:

[SPP Transmission Operators](#)

Zero sequence data is required to evaluate the effectiveness of an ITP solution and to determine if any new short circuit violations arise as the result of the solutions implementation. Each ITP, SPP identifies top solutions and requests study cost estimates for them. Zero sequence data will be requested at the same time as study cost estimates, but in a separate request. As applicable, SPP will request zero sequence data from the transmission owner of the facilities included these solutions, if it has not already been provided as part of the original solution submission.

Please submit questions and updates via [RMS](#) through the "ITP Submittal > Data Submittal" Quick Pick.

APPENDIX A: NERC TPL-001-5 STEADY STATE CONTINGENCY REQUEST

The initial requirements of the NERC TPL-001-5 standard (standard) becomes effective January 1, 2023. SPP, the Planning Coordinator (PC), with guidance from the SPP TPL Task Force, requests Table 1 contingencies from the Transmission Planners (TPs) for the annual TPL assessment.

The PC requests that the TPs provide one contingency file per Table 1 ‘P’ event (P1, P2, P4, P5, and P7) and one contingency file for all Table 1 steady state extreme events. The table below defines the naming convention of each file that the TPs will provide. Contingency file name example: XXXX is the PSS/E control area, e.g., NPPD_P1.con. Contingencies must include circuit IDs where applicable.

File name	Voltage level	Description
Not applicable	N/A	P0: No contingency
XXXX_P1.con	All	P1.1: Single Contingency (Generator)
	All ¹	P1.2: Single Contingency (Transmission Circuit)
	100 kV+	P1.3: Single Contingency (Transformer ²)
	100 kV+	P1.4: Single Contingency (Shunt)
	All	P1.5: Single Contingency (Single Pole of a DC line)
XXXX_P2.con	100 kV+	P2.1: Single Contingency (No fault line section)
	100 kV+	P2.2: Single Contingency (Bus section)
	100 kV+	P2.3: Single Contingency (Internal Breaker Fault [non-Bus-tie breaker])
	100 kV+	P2.4: Single Contingency (Internal Breaker Fault [Bus-tie breaker])
XXXX_P4.con	100 kV+	P4.1: Multiple Contingency ³ (Fault ⁴ on Generator, Stuck Breaker)
	100 kV+	P4.2: Multiple Contingency ³ (Fault ⁴ on Transmission Circuit, Stuck Breaker)
	100 kV+	P4.3: Multiple Contingency ³ (Fault ⁴ on Transformer ² , Stuck Breaker)
	100 kV+	P4.4: Multiple Contingency ³ (Fault ⁴ on Shunt, Stuck Breaker)
	100 kV+	P4.5: Multiple Contingency ³ (Fault ⁴ on Bus Section, Stuck Breaker)
	100 kV+	P4.6: Multiple Contingency ³ (Fault on Bus-tie Breaker Bus, Stuck Bus-tie Breaker)
XXXX_P5.con	100 kV+	P5.1: Multiple Contingency ³ (Fault on Generator, Primary relay failure on Generator)
	100 kV+	P5.2: Multiple Contingency ³ (Fault on Transmission Circuit, Primary relay failure on Transmission Circuit)
	100 kV+	P5.3: Multiple Contingency ³ (Fault on Transformer ² , Primary relay failure on Transformer)
	100 kV+	P5.4: Multiple Contingency ³ (Fault on Shunt, Primary relay failure on Shunt)
	100 kV+	P5.5: Multiple Contingency ³ (Fault on Bus Section, Primary relay failure on Bus Section)
XXXX_P7.con	100 kV+	P7.1: Multiple Contingency (Any two adjacent circuits on common structure)

¹ This voltage level has been updated from the previous TPL study P1.2 events

² Low side voltage

³ All elements in this contingency must be at or above the associated Voltage level

⁴ Non-Bus-tie Breaker

File name	Voltage level	Description
	All	P7.2: Multiple Contingency (Loss of a bipolar DC line)
XXXX_EExxx.con	All	EExxx 1-3b: See TPL-001-5 Standard page 25 for the event types needed

Software Generated Contingencies

When developing the contingency files, keep in mind that the PC will be automatically analyzing many contingencies through automatic N-1 & N-2 simulations. The auto-contingency feature allows all single contingencies (N-1) and combination of single contingencies (N-2) to be taken. It is important to note the contingency name of the auto-contingency analysis will not follow the recommended contingency naming convention. **To avoid duplicate results, a Transmission Planner may exclude a contingency in the applicable contingency file if the contingency will be analyzed during the auto-contingency analysis⁵.** The contingencies that will be captured during the auto-contingency analysis are listed below.

N-1 contingencies⁶:

1. Generator
2. Shunt device
3. Single Pole of a DC line
4. Transmission branch⁷

N-2 contingencies will be generated in the POM software using the following conditions:

1. All Generators – All Generators
2. All Generators – Transmission branch⁶ in same Area
3. All Generators – Shunt device in same Zone
4. Transmission branch⁶ – Transmission branch⁶ in same Zone
5. Transmission branch⁶ – Shunt device in same Zone
6. Shunt device – Shunt device in same Zone

Contingency Naming

The PC requests that the TPs follow the [SPP Contingency Naming Convention document](#) when naming each contingency that will be submitted to the PC per this request.

Invalid Contingencies

The PC requests that the TPs provide a current list of invalid contingencies formatted as specified in the SPP Contingency Naming Convention document.

⁵ Transmission Planner submitted contingency names will be retained.

⁶ P1.2 is considered a breaker to breaker contingency and therefore not included in the automatic contingency simulation unless breakers are at each end of the transmission line segment.

⁷ Transmission branch = Transformer or Transmission line segment.

APPENDIX B: SPP CONTINGENCY NAMING CONVENTION

Naming Structure

At a minimum, the required and optional fields of the contingency names should follow this structure:

1. Contingency name lengths are limited to 128 characters⁸.
2. Use colon ":" as a field delimiter (to separate fields).
3. Use back-to-back colons "::" for empty fields (null fields).

Required Field Descriptions

Fields one through three are considered static fields, meaning that the field types should be consistent for all contingencies.

Field 1: TPL-001-5 Table 1 Planning Event

For Planning Events P1, P2, P4, P5, P7, provide the Category and Event type with no delimiter. For example, a Category P1 paired with Event 1 should be listed as P11. Other examples include: P12, P13, P14, P15, P21, P23, etc.

For Extreme Event contingencies provide the event type "EExxx." For example, the loss of all transmission lines on a common right-of-way should be listed as EE2B. Other examples include: EE1, EE2A, EE2C, EE2D, EE2E, EE3A1, EE3A2, etc.

Field 2: Nominal Voltage

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, provide the Nominal Voltage per the guidelines below.

- Numerical voltages should be given as a three-digit integer in kV, with a leading zero for sub-BES voltages, e.g., 069, 161.
- For contingencies that involve generators and GSUs, the generator high-side voltage is the nominal voltage⁹.
- For contingencies that involve non-GSU transformers, both low-side and high voltages with a dash "-" between the voltages, in that order, are the nominal voltage.

⁸ PSS/E 33 limitation; Contingency names may be truncated in PSS/E standard reports. However, PSS/E will import and export the full 128-character name. MUST runs will limit the Contingency naming to 42 characters.

⁹ TPL-001-5 Table 1, footnote 5

- For contingencies that involve any two adjacent circuits on a common structure and are different voltage levels, both low-side and high voltages with a dash “-” between the voltages, in that order, are the nominal voltage.

Field 3: Transmission Owner

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, provide the Transmission Owner abbreviation per the guidelines below.

- Provide the TO abbreviation as listed in the planning model.
- For jointly owned facilities, provide each TO abbreviation separated by a dash “-” with the Contingency Owner listed first.

Optional Field Descriptions

Fields four through six are considered dynamic fields and can be used to help improve communications between two entities sharing contingency information.

Field 4: Operational Facility Names

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, Field 4 may be used to link the contingency with familiar historical or Operations naming conventions.

- Line Name
- EMS Station Name
- Event Name
- Existing Shorthand Contingency Name
- Etc.

Field 5: Nameplate Values

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, Field 5 may be used to list P_{MAX} of generators, Q_{MAX} of shunt device.

Field 6: Event Description

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, Field 6 may be used to list the applicable descriptions of the event.

- For contingencies that involve a generator, provide Unit PSSE Bus Name and Unit ID.
- For contingencies that involve a transmission line, provide the From and To PSSE Bus Names and Circuit ID.
- For contingencies that involve a transformer, provide the PSSE Transformer name and Circuit ID.
- For contingencies that involve a shunt device, provide the PSSE Bus Name.
- For contingencies that involve a DC line, provide the From and To PSSE Bus Name.
- When opening a line section without a fault, provide the Opened End and Closed End PSSE Bus Names.
- For a loss of two adjacent circuits on a common structure, provide Lower kV Line Name, and Higher kV Line Name.

Field 7: Voltage Level Designation

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, Field 7 may be used to list the kV level applicability for the event following footnotes 1 and 5 of NERC TPL-001-5. These must either be “EHV” or “HV” level descriptions in order to properly categorize ITP and TPL applicability.

Field 8: Special Contingency Flag

For Planning Events P1, P2, P4, P5, P7 and Extreme Events, Field 8 may be used designate special contingencies for additional analysis which can be included or excluded from study analysis when applicable. Currently, there are only two flags that may be used as options:

- “RBP” for Risk Based Planning regarding cold weather driven or risk-based contingencies and any system adjustments following
- “LLT” for Long Lead Time

EXAMPLES:

“P11:345:AEPW: *Optional Descriptor(s)*” (*Generator Contingency*)

(Contingency Type: P1.1, Point of Interconnection voltage kV: 345, Transmission Owner: AEPW, Optional Descriptor(s))

“P12:345:GRDA: *Optional Descriptor(s)*” (*Transmission Circuit Contingency*)

(Contingency Type: P1.2, kV: 345, Transmission Owner: GRDA, Optional Descriptor(s))

“P13:069-138:SPRM: *Optional Descriptor(s)*” (*Transformer Contingency*)

(Contingency Type: P1.3, Secondary kV: 69, “-”, Primary kV: 138, Transmission Owner: SPRM, Optional Descriptor(s))

“P14:345:WAPA: *Optional Descriptor(s)*” (*Shunt Device Contingency*)

(Contingency Type: P1.4, highside connected kV: 345, Transmission Owner: WAPA, Optional Descriptor(s))

“P15:350:WERE: *Optional Descriptor(s)*” (*Single Pole of a DC Line Contingency*)

(Contingency Type: P1.5, kV:350, Transmission Owner: WERE, Optional Descriptor(s))

“P21:345:SPS: *Optional Descriptor(s)*” (*Opening of a line section w/o fault*)

(Contingency Type: P2.1, kV: 345, Transmission Owner: SPS, Optional Descriptor(s))

“P22:115:NPPD: *Optional Descriptor(s)*” (*Bus Section Fault Contingency*)

(Contingency Type: P2.2, kV: 115, Transmission Owner: NPPD, Optional Descriptor(s))

“P23:115:LES: *Optional Descriptor(s)*” (*Internal non-Bus-tie Breaker Fault Contingency*)

(Contingency Type: P2.3, kV: 115, Transmission Owner: LES, Optional Descriptor(s))

“P24:161:EMDE: *Optional Descriptor(s)*” (*Internal Bus-tie Breaker Fault Contingency*)

(Contingency Type: P2.4, kV: 161, Transmission Owner: EMDE, Optional Descriptor(s))

“P41:138:OMPA: *Optional Descriptor(s)*” (Stuck non-Bus-tie breaker attempting to clear a generator Fault)

(Contingency Type: P4.1, Point of Interconnection voltage kV: 138, Transmission Owner: OMPA, Optional Descriptor(s))

“P42:138:MIDW: *Optional Descriptor(s)*” (Stuck non-Bus-tie breaker attempting to clear a Transmission Circuit Fault)

(Contingency Type: P4.2, kV: 138, Transmission Owner: MIDW, Optional Descriptor(s))

“P43:161-345:SUNC: *Optional Descriptor(s)*” (Stuck non-Bus-tie breaker attempting to clear a Transformer Fault)

(Contingency Type: P4.3, Secondary kV: 161, “-”, Primary kV: 345, Transmission Owner: ITCM, Optional Descriptor(s))

“P44:345:KCPL: *Optional Descriptor(s)*” (Stuck non-Bus-tie breaker attempting to clear a Shunt Device Fault)

(Contingency Type: P4.4, highside connected kV: 345, Transmission Owner: KCPL, Optional Descriptor(s))

“P45:115:KACY: *Optional Descriptor(s)*” (Stuck non-Bus-tie breaker attempting to clear a Bus Section Fault)

(Contingency Type: P4.5, kV: 115, Transmission Owner: KACY, Optional Descriptor(s))

“P46:138:EMDE: *Optional Descriptor(s)*” (Stuck Bus-tie breaker attempting to clear an associated Bus Fault)

(Contingency Type: P4.6, kV: 138, Transmission Owner: EMDE, Optional Descriptor(s))

“P51:138:SPS: *Optional Descriptor(s)*” (Failure of a non-redundant relay protecting a generator)

(Contingency Type: P5.1, Point of Interconnection voltage kV: 138, Transmission Owner: SPS, Optional Descriptor(s))

“P52:138:AEPW: *Optional Descriptor(s)*” (Failure of a non-redundant relay protecting a Transmission Circuit)

(Contingency Type: P5.2, kV: 138, Transmission Owner: AEPW, Optional Descriptor(s))

“P53:161-345:OPPD: *Optional Descriptor(s)*” (Failure of a non-redundant relay protecting a Transformer)

(Contingency Type: P5.3, Secondary kV: 161, Primary kV: 345, Transmission Owner: OPPD, Optional Descriptor(s))

“P54:345:WAPA: *Optional Descriptor(s)*” (Failure of a non-redundant relay protecting a Shunt Device)

(Contingency Type: P5.4, highside connected kV: 345, Transmission Owner: WAPA, Optional Descriptor(s))

“P55:138:LES: *Optional Descriptor(s)*” (Failure of a non-redundant relay protecting a Bus Section)

(Contingency Type: P5.5, kV: 138, Transmission Owner: LES, Optional Descriptor(s))

“P71:115-230:OKGE-WFEC: *Optional Descriptor(s)*” (Loss of 2 adjacent circuits on a common structure)

(Contingency Type: P7.1, Lower kV: 115,“-”, Higher kV: 230, Transmission Owner: OKGE and WFEC, Optional Descriptor(s))

“P72:350:NPPD: *Optional Descriptor(s)*” (Loss of a bipolar DC Line)

(Contingency Type: P7.2, kV: 350, Transmission Owner: NPPD, Optional Descriptor(s))

“EE2A:161:SWPA: *Optional Descriptor(s)*” (Steady State Extreme Event)

(Contingency Type: Extreme Event, kV: 161, Transmission Owner: SWPA, Optional Descriptor(s))

APPENDIX C: BES QUICK REFERENCE GUIDE

Definition:

Bulk Electric System (BES): Unless modified by the lists shown below, all Transmission Elements operated at 100 kV or higher and Real Power and Reactive Power resources connected at 100 kV or higher. This does not include facilities used in the local distribution of electric energy.

Inclusions:

I1 – Transformers with the primary terminal and at least one secondary terminal operated at 100 kV or higher unless excluded by application of Exclusion E1 or E3.

I2 – Generating resource(s) including the generator terminals through the high-side of the step-up transformer(s) connected at a voltage of 100 kV or above with:

- a) Gross individual nameplate rating greater than 20 MVA; or
- b) Gross plant/facility aggregate nameplate rating greater than 75 MVA.

I3 – Blackstart Resources identified in the Transmission Operator’s restoration plan.

I4 – Dispersed power producing resources that aggregate to a total capacity greater than 75 MVA (gross nameplate rating), and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above. Thus, the facilities designated as BES are:

- a) The individual resources, and
- b) The system designed primarily for delivering capacity from the point where those resources aggregate to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.

I5 – Static or dynamic devices (excluding generators) dedicated to supplying or absorbing Reactive Power that are connected at 100 kV or higher, or through a dedicated transformer with a high-side voltage of 100 kV or higher, or through a transformer that is designated in Inclusion I1 unless excluded by application of Exclusion E4.

Exclusions:

E1 – Radial systems: A group of contiguous transmission Elements that emanates from a single point of connection of 100 kV or higher and:

- a) Only serves Load, or
- b) Only includes generation resources, not identified in Inclusions I2, I3, or I4, with an aggregate capacity less than or equal to 75 MVA (gross nameplate rating), or
- c) Where the radial system serves Load and includes generation resources, not identified in Inclusions I2, I3 or I4, with an aggregate capacity of non-retail generation less than or equal to 75 MVA (gross nameplate rating).

Note 1 – A normally open switching device between radial systems, as depicted on prints or one-line diagrams, for example, does not affect this exclusion.

Note 2 – The presence of a contiguous loop, operated at a voltage level of 50 kV or less, between configurations being considered as radial systems, does not affect this exclusion.

E2 – A generating unit or multiple generating units on the customer’s side of the retail meter that serve all or part of the retail Load with electric energy if: (i) the net capacity provided to the BES does not exceed 75 MVA, and (ii) standby, back-up, and maintenance power services are provided to the generating unit or multiple generating units or to the retail Load by a Balancing Authority, or provided pursuant to a binding obligation with a Generator Owner or Generator Operator, or under terms approved by the applicable regulatory authority.

E3 – Local networks (LN): A group of contiguous transmission Elements operated at less than 300 kV that distribute power to Load rather than transfer bulk power across the interconnected system. LNs emanate from multiple points of connection at 100 kV or higher to improve the level of service to retail customers and not to accommodate bulk power transfer across the interconnected system. The LN is characterized by all of the following:

- a) Limits on connected generation: The LN and its underlying Elements do not include generation resources identified in Inclusions I2, I3, or I4 and do not have an aggregate capacity of non-retail generation greater than 75 MVA (gross nameplate rating);
- b) Real Power flows only into the LN and the LN does not transfer energy originating outside the LN for delivery through the LN; and
- c) Not part of a Flowgate or transfer path: The LN does not contain any part of a permanent Flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection, or a comparable monitored Facility in the ERCOT or Quebec Interconnections, and is not a monitored Facility included in an Interconnection Reliability Operating Limit (IROL).

E4 – Reactive Power devices installed for the sole benefit of a retail customer(s).

Note – Elements may be included or excluded on a case-by-case basis through the Rules of Procedure exception process.

Quick reference:

Inclusions:

- I1:** Transformers – 2 winding need to have both windings over 100kV, 3 winding at least two windings need to be over 100kV.
- I2:** Generators – 20MW single, 75MW aggregate through the high side of the step-up transformer.
- I3:** Blackstart resources.
- I4:** Wind and solar, other renewables – 75MW aggregate or more connected at 100kV or higher.
- I5:** SVCs, Cap banks, Reactors – connected at 100kV either directly or through step-up transformers.

Exclusions:

- E1:** Radials with the listed criteria.
- E2:** Behind the meter generation.
- E3:** Local networks.
- E4:** SVCs or Cap banks used for local voltage support, not on the BES.

The better document for this is the NERC guidance document “[Bulk Electric System Definition Reference Document](#).”

Key to diagram color coding:

- **Blue** indicates that an Element is included in the BES
- **Green** indicates that an Element is not included in the BES
- **Orange** indicates ‘points of connection’
- **Black** indicates Elements that are not evaluated for the specific inclusion depicted in the individual diagrams being shown

APPENDIX D: NERC TPL-001-5 STABILITY CONTINGENCY REQUEST

The initial requirements of the NERC TPL-001-5 standard (standard becomes effective January 1, 2023). SPP, the Planning Coordinator (PC), with guidance from the SPP TPL Task Force, requests Table 1 contingencies from the Transmission Planners (TPs) for the annual TPL assessment.

The PC requests on annual basis that the TPs provide a contingency spreadsheet per Table 1 for all 'P' events (P1, P2, P4, P5, and P7) and Table 1 steady state Extreme Events. The table below defines the naming convention for of each contingency that the TPs can provide in the spreadsheet. The spreadsheet tab labeled "form" is the location that the TP will insert the time domain description of the fault definition (sequence of events) or actions taken on the topology contained in the power flow model. SPP Staff will provide the necessary support to TPs in order to compile the fault definitions within the spreadsheet by request. The spreadsheet tab labeled "Submitter" is the location that the TP will insert their name, contact information, and the case or cases the contingency is to be applied. The number of contingencies requested will vary by year and will be contained in the formal request sent out via e-mail. The list below summarizes the type of contingency data the PC expects to receive during the annual contingency request:

- Events Expected to Produce More Severe Impacts (includes events coordinated with adjacent systems)
 - Rationale for Event Selections
- Relay models
 - PSS/E Dynamic Relay Models for DYRE file, and/or
 - Description of time domain relay actions that replicate the expected removal of elements
- Description of successful and unsuccessful high speed (less than one (1) second) reclosing
- Description of generator low voltage ride through characteristics if not already contained in DYRE file
- Remedial Action Schemes
- Generic or actual relay models for tripping of transmission lines and transformers where transient swings cause protection system operations
- Specific generator scaling that will be required to balance generation/load when generation is removed as a "prior outage" for a contingency.

Category	Initial Condition	Category	Event	Fault Type
P0 No Contingency	Normal System			
P1 Single Contingency	Normal System	P1_1	Generator	3 ϕ
		P1_2	Transmission Circuit	3 ϕ
		P1_3	Transformer	3 ϕ
		P1_4	Shunt Device	3 ϕ
		P1_5	Single pole of DC line	SLG
P2 Single Contingency	Normal System	P2_1	Opening a line section w/o a Fault	N/A
		P2_2	Bus section fault	SLG
		P2_3	Internal Breaker Fault (non-Bus-tie Breaker)	SLG
		P2_4	Internal Breaker Fault (Bus-tie Breaker)	SLG
P3 Multiple Contingencies	Loss of Generator followed by System Adjustment	P3_1	Generator	3 ϕ
		P3_2	Transmission Circuit	3 ϕ
		P3_3	Transformer	3 ϕ
		P3_4	Shunt Device	3 ϕ
		P3_5	Single pole of DC line	SLG
P4 Multiple Contingencies (Fault plus stuck breaker)	Normal System	P4_1	Generator	SLG
		P4_2	Transmission Circuit	SLG
		P4_3	Transformer	SLG
		P4_4	Shunt Device	SLG
		P4_5	Bus section fault	SLG
		P4_6	Loss of multiple elements caused by a stuck breaker	SLG
P5 Multiple Contingencies (Fault plus relay failed to operate)	Normal System	P5_1	Generator	SLG
		P5_2	Transmission Circuit	SLG
		P5_3	Transformer	SLG
		P5_4	Shunt Device	SLG
		P5_5	Bus section fault	SLG
P6 Multiple Contingencies (Two overlapping singles)	Loss of a Transmission Circuit followed by a System adjustment	P6_1		
		P6_1_1	Transmission Circuit	3 ϕ
		P6_1_2	Transformer	3 ϕ
		P6_1_3	Shunt Device	3 ϕ
		P6_1_4	Single pole of DC line	SLG
	Loss of a Transformer followed by a System adjustment	P6_2		
		P6_2_1	Transmission Circuit	3 ϕ
		P6_2_2	Transformer	3 ϕ
		P6_2_3	Shunt Device	3 ϕ
		P6_2_4	Single pole of DC line	SLG
		P6_3		

Category	Initial Condition	Category	Event	Fault Type	
	Loss of a Shunt Device followed by a System adjustment	P6_3_1	Transmission Circuit	3 ø	
		P6_3_2	Transformer	3 ø	
		P6_3_3	Shunt Device	3 ø	
		P6_3_4	Single pole of DC line	SLG	
	Loss of a Single Pole of DC line followed by a System adjustment	P6_4			
		P6_4_1	Transmission Circuit	3 ø	
		P6_4_2	Transformer	3 ø	
		P6_4_3	Shunt Device	3 ø	
	P6_4_4	Single pole of DC line	SLG		
P7 Multiple Contingencies (Common Structure)	Normal System	P7_1	Any two adjacent circuits on common structure	SLG	
		P7.2	Loss of bipolar DC line	SLG	
Extreme Events (EE) A. Simulate the removal of all elements that Protection Systems and automatic controls are expected to disconnect. B. Simulate Normal Clearing unless otherwise specified		Extreme_1			
	Local or wide area events affecting the Transmission System	Extreme_2			
	3 ø fault on generator with stuck breaker or a relay failure resulting in Delayed Fault Clearing	Extreme_2_a			
	3 ø fault on Transmission Circuit with stuck breaker or a relay failure resulting in Delayed Fault Clearing	Extreme_2_b			
	3 ø fault on generator with stuck breaker or a relay failure resulting in Delayed Fault Clearing	Extreme_2_c			

Category	Initial Condition	Category	Event	Fault Type
	3 ϕ fault on bus section with stuck breaker or a relay failure resulting in Delayed Fault Clearing	Extreme_2_d		
	3 ϕ internal breaker fault	Extreme_2_e		
	Other events based on operating experience	Extreme_2_f		