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CAUTION: Any paper or filed copy of this document should be verified against the record version on an ATC on-line system.

1.0 SCOPE

- 1.1 This procedure is to ensure the facility ratings, used in the reliable planning and operation of the American Transmission Company (ATC) Electric System, are determined based on an established methodology.
- 1.2 This document describes ATC's ratings methodology and compliance with NERC reliability standards FAC-008 and FAC-009. The appendixes to this document assigns ratings responsibilities, outlines the facility ratings process and records associated with establishing, updating, issuing, and disseminating accurate and appropriate ampacity ratings for ATC electrical facilities
- 1.3 This document is applicable to all personnel engaged in planning, engineering, maintenance, construction and operation of ATC electrical facilities.

2.0 INTRODUCTION

Federal Energy Regulatory Commission (FERC) has granted the North American Electric Reliability Council (NERC) the legal authority to enforce reliability standards with all U.S. users, owners, and operators of the bulk power system, and has made compliance with those standards mandatory and enforceable. NERC reliability standards define the reliability requirements for planning and operating the Bulk Electric System (BES) in North America. The NERC Reliability Standards related to the ATC facilities ratings are:

- 2.1 FAC-008-1 requires ATC, as a Transmission Owner, to have an established methodology for determining Facility Ratings.
- 2.2 FAC-009-1 requires ATC to use that methodology to establish the ATC Facility Ratings, and provide the ratings related data to our Reliability Coordinator, and other affected entities.

3.0 REFERENCES

- 3.1 The following documents will be applied to all ATC facilities. If there is any apparent contradiction or ambiguity among these documents and this procedure, it shall be brought to the attention of Asset Planning & Engineering for resolution before application. Retroactive application of changes to the rating methodology will be evaluated and applied at ATCs discretion.
 - 3.1.1 ATC Criteria CR-0061; Overhead Transmission Line Ampacity Ratings
 - 3.1.2 ATC Criteria CR-0062; Underground Transmission Line Ampacity Ratings
 - 3.1.3 ATC Criteria CR-0063; Substation Equipment Ampacity Ratings
 - 3.1.4 National Electric Safety Code (NESC), C2
 - 3.1.5 NERC Reliability Standard FAC-008-1; Facility Ratings Methodology
 - 3.1.6 NERC Reliability Standard FAC-009-1; Establish and Communicate Facility Ratings
 - 3.1.7 NERC Glossary of Terms Used in Reliability Standards

4.0 DEFINITIONS

The bolded definitions are from the NERC Glossary of Terms.

- 4.1 **Ampacity:** The current carrying capacity of a circuit or one of its components. This value is measured in amperes and is a rating for each phase of a three-phase circuit. This value may also be listed using apparent power (Mega-Volt-Amperes or MVA) based on the nominal system phase-to-phase voltage:

$$\text{MVA} = \frac{\sqrt{3}(\text{kV})(\text{amps})}{1000}$$

- 4.2 **Bulk Electric System (BES):** As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kV or higher. Radial transmission facilities serving only load with one transmission source are generally not included in this definition.

- 4.3 **Component:** The rated parts or devices that make up the larger element rating.
- 4.4 **Contributing Company:** Any entity that has transferred their ownership of transmission facilities to ATC.
- 4.5 **Element:** Any electrical device with terminals that may be connected to other electrical devices such as a generator, transformer, circuit breaker, bus section, or transmission line. An element may be comprised of one or more components.
- 4.6 **Emergency Rating:** The rating as defined by the equipment owner that specifies the level of electrical loading or output, usually expressed in megawatts (MW) or Mvar or other appropriate units, that a system, facility, or element can support, produce, or withstand for a finite period. The rating assumes acceptable loss of equipment life or other physical or safety limitations for the equipment involved.
- 4.7 **Equipment Rating:** The maximum and minimum voltage, current, frequency, real and reactive power flows on individual equipment under steady state, short-circuit and transient conditions, as permitted or assigned by the equipment owner.
- 4.8 **Facility:** A set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.) ATC uses the term "section" to describe a facility.
- 4.9 **Facility Ratings:** The maximum voltage, current, frequency, or real and reactive power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility. ATC uses the term "section rating" to describe a facility rating.
- 4.10 **Limiting Element:** The element that is either 1) operating at its appropriate rating or 2) would be following the limiting contingency. The Limiting Element establishes a system limit.
- 4.11 **Normal Rating:** The rating as defined by the equipment owner that specifies the level of electrical loading, usually expressed in megawatts (MW) or other appropriate units that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life.
- 4.12 **Operating Voltage:** The voltage level by which an electrical system is designated and to which certain operating characteristics of the system are related; also, the effective (root-mean-square) potential difference between any two conductors or between a conductor and the ground. The actual voltage of the circuit may vary somewhat above or below this value.
- 4.13 **Pre-Valid Rating:** A Substation Equipment and Line Database (SELD) section-level status indicating:
1. All equipment/components that are physically installed have been included in the section record.
 2. All ratings-affecting element data, or components, have been verified by historical record, field review, or manufacturer consultation.
 3. All static ratings have been calculated per the applicable ATC ratings criteria documents; CR-0061, CR-0062 or CR-0063.
- A pre-valid rating status is required for all new construction facilities or modifications to existing facilities. The pre-valid status enables an opportunity for other groups to review and comment on the new or revised ratings before validation of the facility ratings.
- 4.14 **Rating:** The operational limits of a transmission system element under a set of specified conditions.
- 4.15 **Rating Criteria:** A document that outlines the ATC methodology for establishing normal and emergency ratings for elements of the transmission system. ATC has individual rating criteria document for overhead lines, underground lines and substation equipment.
- 4.16 **Reactive Power:** The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply the reactive losses on transmission facilities. Reactive power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar).
- 4.17 **Real Power:** The portion of electricity that supplies energy to the load.
- 4.18 **Section:** A set of electrical equipment that operates as a single Bulk Electric System Element. The general term used to define the level at which ratings are represented in SELD. Specific types include line, transformer and bus sections. Essentially, circuit junction points define section endpoints.

- 4.19 Section Rating: A system operating limit that does not violate the applicable equipment rating of any equipment comprising the section or ATC Special Exception. A section rating shall equal the section's most limiting applicable equipment comprising that section. In the event a special exception is applied, the special exception will determine the limiting value.
- 4.20 SELD: ATC's Substation Equipment and Line Database (SELD) is the primary computer application for maintaining ratings data.
- 4.21 SELD Admin: The ATC MS Outlook address/queue to which all SELD-related correspondence will be directed, unless such correspondence is more specifically for a particular SELD Data Coordinator.
- 4.22 Short-term Emergency: An emergency current rating with duration less than 2 hours per occurrence.
- 4.23 Special Exception Rating: A SELD section rating not determined according to criteria documents CR-0061, CR-0062 and/or CR-0063, but rather by specific case evaluation; thereby resulting in ratings different from those specified in the criteria documents. Special Exception have a limited useful life (monitored via an expiration date) until permanent measures can be implemented.
- 4.24 Static Rating: A rating based on unchanging basis criteria, including weather conditions and any influence from actual load cycles.
- 4.25 Steady-State Condition: A theoretical condition with constant electrical current—electrical load.
- 4.26 **System:** A combination of generation, transmission, and distribution components.
- 4.27 **System Operating Limit (SOL):** The value (such as MW, Mvar, Amperes, Frequency or Volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria, including Facility Ratings (applicable pre- and post-contingency equipment or facility ratings).
- 4.28 **Thermal Rating:** The maximum amount of electrical current that a transmission line or electrical facility can conduct over a specified time period before it sustains permanent damage by overheating or before it sags to the point that it violates public safety requirements.
- 4.29 Transient Condition: A theoretical condition with a fluctuating electrical current—electrical load.
- 4.30 Transient Thermal Limit; A 15 or 30 minute rating expressed as a percentage of the section emergency rating used by Operations.
- 4.31 **Transmission Line:** A system of structures, wires, insulators and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69 kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances.
- 4.32 **Transmission Owner:** The entity that owns and maintains transmission facilities, herein being ATC.
- 4.33 **Transmission Planner:** The entity that develops a long-term (generally one year and beyond) plan for the reliability (adequacy) of the interconnected bulk electric transmission systems within its portion of the Planning Authority Area.
- 4.34 **Transmission Service Provider:** The entity that administers the transmission tariff and provides Transmission Service to Transmission Customers under applicable transmission service agreements.
- 4.35 Valid Rating: A SELD section-level status indication of ratings integrity. Changes to ratings related data, for both existing and new construction facilities, have been submitted to and approved by the pre-valid ratings review process.
- 4.36 Verified SELD Record: A SELD status indicating the completeness of ratings related for that component. An element or component will only be marked as verified if all data essential to establishing ratings has been verified by historical record, field review, or manufacturer consultation and included in the SELD record.

5.0 RATING METHODOLOGY

5.1 General Ratings Requirements

- 5.1.1 The ATC facility ratings shall be established in accordance with the ratings methodology as documented herein. Ratings are documented in the ATC Substation Equipment and Line Database (SELD) application.

- 5.1.2 ATC is transitioning facility ratings, based on a change from legacy weather parameters to study-based weather parameters. Either rating basis may be used during this transition period.
- 5.1.3 ATC has a culture of continuous improvement, where database processes and data quality will be improved as issues are identified and solutions developed. Discovery of additional or improved asset information and data input errors are anticipated discrepancies. When a SELD database discrepancy is identified, the information will be reviewed and communicated as a modification. Periodic review of databases will be performed to correct data quality issues that are expected to occur.
- 5.1.4 Facility ratings will be determined utilizing the most recent and current element/component records available at the time the rating is established. When more recent facility records become available the respective element/component rating will be updated if appropriate. This includes changes resulting from as built processes.
- 5.1.5 A NERC defined "Facility" in the ATC methodology is called a "Section". ATC's methodology includes line sections, transformer sections and bus sections.
- 5.1.6 NERC defined Elements in the ATC methodology consist of conductors, switches, transformers, breakers, circuit switchers, free-standing current transformers, series inductors (reactors and wave traps) and relays. In the ATC methodology, bushing-type current transformers are a component of either a breakers or transformer element. ATC Section ratings are determined from these elements and components.
- 5.1.7 The latest revisions of the ATC Rating Criteria documents will be applied to ATC facilities rated after the effective date of the criteria document. . Retroactive application of changes to the rating methodology will be evaluated and applied at ATCs discretion
- 5.1.8 The ATC rating methodology used to establish all of the ATC electric transmission facility ratings are described in this section and the following associated Rating Criteria:
- 5.1.8.1 ATC Criteria CR-0061; Overhead Transmission Line Ampacity Ratings
- 5.1.8.2 ATC Criteria CR-0062; Underground Transmission Line Ampacity Ratings
- 5.1.8.3 ATC Criteria CR-0063; Substation Equipment Ampacity Rating.
- 5.1.9 Various rating software and programs may be utilized to establish specific element/component ratings. These applications may not provide identical results, however the comparable results that are within metering accuracy are acceptable for rating purposes. Metering accuracy is considered to be 1 to 3 percent.
- 5.1.10 Special Exception ratings are used in specific cases, based on an evaluation for that specific facility condition.
- 5.1.11 The total number of emergency events (operating contingencies) that might occur during the equipment life is to be limited.
- 5.1.12 Under an emergency event, a certain amount of accelerated loss of life or conductor loss of strength is possible and permitted, as described in the ATC rating criteria document for the respective equipment.
- 5.2 Most-Limiting Equipment (FAC-008, R1.1)
- An ATC section (facility) rating shall equal that of the most limiting equipment(s)/component(s) that comprises that section (facility). The most limiting forward and reverse section rating is provided via the ATC SELD WEB application. ATC has jointly owned substation sites with the interconnecting companies with each of the individual equipment items within substation solely owned by only one of the companies.
- The types of facility ratings are of the following categories:
- 5.2.1 Transmission Line Sections consist of one or more segments of overhead line and/or underground cable. A line section is generally determined by the circuit junction points where power flow can split. A line section will include the line conductor and/or cable, inline switches and the substation equipment directly associated with the current flow for that line section.

- 5.2.2 Transformer Sections consist of the transformer and all associated substation equipment directly associated with the current flow through that transformer.
- 5.2.3 Bus Sections consist of all substation equipment connected to a section of bus, with the section endpoints defined by the junction points where current/power can flow in multiple directions into other sections.
- 5.3 Rating Methods (FAC-008, R1.2)
- The method by which rating of major equipment comprising an ATC facility is determined according to the respective ATC Rating Criteria:
- 5.3.1 Overhead line facility, CR-0061; conductors and switches
- 5.3.2 Underground lines, CR-0062; conductors and associated cable systems
- 5.3.3 Substation equipment, CR-0063; power transformers, circuit breakers, switches, circuit switchers, current transformers, conductors (rigid and stranded, including jumpers), series inductors (reactors and wave traps), relay settings (forward and reverse) and relay non-directional thermal limit.
- 5.4 Rated Equipment (FAC-008, R1.2.1)
- 5.4.1 Equipment, owned by ATC and others, in the current carrying path shall be included in the section. Series inductors (reactors and wave traps) are included. ATC does not include shunt connected capacitors, reactors and potential devices, as ATC applies ratings they cannot be the most limiting device. ATC does not own series primary fuses, capacitors or power electronic devices that utilize shunt reactors and capacitance.
- 5.5 Provided Ratings (FAC-008, R1.2.2)
- The ATC ratings address both Normal and Emergency Ratings:
- 5.5.1 The ATC normal ratings are expressed in amperes and/or megavolt-ampere (MVA), that a system facility or element can support or withstand through repetitive daily demand cycles without loss of equipment life.
- 5.5.2 The ATC emergency ratings are expressed in amperes and/or megavolt-ampere (MVA), that a system facility or element can support, or withstand for multiple exposures of maximum 2-hour duration. The emergency rating assumes acceptable loss of equipment life or other physical/safety limitations for the equipment involved.
- 5.6 Manufacture Ratings (FAC-008, R1.3.1)
- ATC facility ratings consider or use equipment manufacturer ratings for certain types of equipment. Equipment manufacturer recommendations and/or ratings for the following situations, with specific detail in the respective facility Rating Criteria:
- 5.6.1 Overhead lines facility, CR-0061; conductor parameters.
- 5.6.2 Underground lines, CR-0062; certain cable section ratings as determined by the cable manufacturer.
- 5.6.3 Substation equipment, CR-0063; certain substation equipment shall be rated by the most limiting manufacturer component ratings within the larger equipment. Specific substation equipment/components that use/consider manufacturer ratings are:
- 5.6.3.1 Transformer stray flux heating, load and no-load tap changer rating capabilities, and bushings
- 5.6.3.2 Gas and oil circuit breaker bushings
- 5.6.3.3 Circuit switchers
- 5.6.3.4 Free-standing current transformers and bushing current transformer tap positions
- 5.6.3.5 Relay thermal limits
- 5.6.3.6 Gas Insulated Switchgear (GIS).
- 5.6.4 Equipment not specifically addressed in the respective rating criteria listed above, shall use the nameplate or manufacturers rating.

5.7 Industry Rating Practice and Standards (FAC-008, R1.3.2)

ATC facility ratings consider and use industry-rating practices, including but not limited to IEEE, ANSI, NEMA, AEIC, IEC, CIGRE and NESC. Industry rating practice recommendations apply to the following situations, with specific detail in the respective facility Rating Criteria:

5.7.1 Overhead lines, CR-0061;

5.7.1.1 Conductor operating temperature

5.7.2 Underground lines, CR-0062

5.7.2.1 Cable rating methodologies

5.7.2.2 Normal/emergency conductor operating temperatures

5.7.3 Specific substation equipment that associate industry rating practices, as covered in CR-0063, shall be used as follows:

5.7.3.1 Transformer loadings, loss of life, ancillary equipment and bushings,

5.7.3.2 Circuit breaker bushings, post emergency loading and allowable component temperatures,

5.7.3.3 Switch ratings,

5.7.3.4 Rigid bus and stranded conductor ratings.

5.7.3.5 Wave traps.

5.8 Ambient Conditions (FAC-008, R1.3.3)

5.8.1 Seasonal Periods in General: The application of appropriate facility rating calculations shall generally be according to the four (4) seasonal periods.

5.8.1.1 ATC System Operations uses four (4) seasonal rating periods: Spring, Summer, Fall, and Winter. The seasonal periods are those as identified in ATC Operating Procedure TOP-20-GN-000034.

5.8.1.2 In some cases where the seasonal ambient conditions are similar, seasons will be combined for ratings publication purposes.

5.8.2 Overhead line ratings are largely dependent on the ambient air temperature, wind speed and solar heat gain. These ambient conditions, along with the seasons are listed in the Overhead Rating Criteria, CR-0061.

5.8.3 Underground line ratings are largely dependent on the ambient temperature of the soils (or water) surrounding the cable installation. Ambient soil temperatures vary with season and depth of installation. Soil temperatures for the ATC area are listed in the Underground Rating Criteria, CR-0062.

5.8.4 Substation equipment ratings are largely dependent on the ambient air temperature, with substation conductors (rigid and stranded) also dependent on wind speed and solar heat gain. These ambient conditions, along with the seasons are listed in the Substation Equipment Rating Criteria, CR-0063.

5.9 Operating Limitations (FAC-008, R1.3.4)

5.9.1 Rating of all facilities shall consider operating limitations of the respective elements:

5.9.2 The operating limitations for specific types of facility and operating conditions, are detailed in the respective facility Rating Criteria as indicated:

5.9.2.1 Overhead lines equipment, CR-0061; Conductor thermal limits and clearance limits for steady-state and transient condition

5.9.2.2 Underground cable, CR-0062; Cable ratings for steady-state and transient condition

5.9.2.3 Substation equipment ratings, CR-0063; Transformer capability, circuit breakers, switches, circuit switchers, current transformers, rigid and stranded conductor and wave traps for steady-state and transient condition.

5.10 Assumptions (FAC-008, R1.3.5)

5.10.1 Facility equipment is considered in good operating condition.

- 5.10.2 Overhead line assumptions are as follows, CR-0061:
 - 5.10.2.1 Ambient conditions
 - 5.10.2.2 Conductor maximum temperature limits.
- 5.10.3 Underground line assumptions are as follows, CR-0062:
 - 5.10.3.1 Ambient conditions
 - 5.10.3.2 Cable accessories are not limiting elements.
 - 5.10.3.3 A 100% load factors during emergency loading.
 - 5.10.3.4 Wisconsin Electric Power Company rating methodology assumptions; Appendix A – Assumptions and Table 1 Notes.
 - 5.10.3.5 Madison pipe system rating parameters; Appendix B, system analysis.
- 5.10.4 Substation equipment assumptions are as follows, CR-0063:
 - 5.10.4.1 Ambient conditions
 - 5.10.4.2 Transformer straight-line per-loading (i.e. 100% load factor).
 - 5.10.4.3 Switches, unknown age and upgrades (i.e. assume most limiting rating designation).

6.0 METHODOLOGY EXAMINATION AND REVIEW

The Reliability Coordinator and Planning Authority for ATC is MISO (Midwest Independent System Operator), with the Transmission Operator and Transmission Planner being ATC.

- 6.1 Rating methodology inspection and technical review (FAC-008, R2)
 - 6.1.1 ATC's Ratings Methodology is available for MISO to inspect or review. ATC will provide MISO electronic copies within 15 calendar days of receipt of a request.
 - 6.1.2 ATC Transmission Operators and Planners have immediate access to the ATC rating methodology via PowerLine under the "Guides, Procedures, and Criteria" section of the Manage Assets homepage include T-line OH, T-line UG and/or Substation web pages.
- 6.2 Comments on rating methodology (FAC-008, R3)
 - 6.2.1 MISO written comments related to a review of the ATC Facility Ratings Methodology will be responded to in writing within 45 calendar days of receipt of the review comments. The ATC Written response shall indicate whether any change(s) will be made to the Ratings Methodology and/or explain why a change will not be made to the Ratings Methodology.
 - 6.2.2 ATC has a culture of continuous improvement, that encourages ATC Transmission Operators and Planners to provide comments on the rating methodology as issues are identified and considered for incorporation into the respective rating criteria.

7.0 ESTABLISHING AND COMMUNICATION OF RATINGS

- 7.1 Establishing facility rating (FAC-009, R1)
 - 7.1.1 The ATC electric transmission facility ratings are established in accordance with one or more of the following of Rating Criteria:
 - 7.1.1.1 ATC Criteria CR-0061; Overhead Transmission Line Ampacity Ratings
 - 7.1.1.2 ATC Criteria CR-0062; Underground Transmission Line Ampacity Ratings
 - 7.1.1.3 ATC Criteria CR-0063; Substation Equipment Ampacity Rating.
- 7.2 Communication of the ATC transmission facility ratings (FAC-009, R2)
 - 7.2.1 Upon ATC internal approval of new or modified facility ratings, the respective ratings are disseminated to MISO (Midwest Independent System Operator), the regional Reliability Coordinator and Planning Authority.
 - 7.2.2 Upon ATC internal approval of new or modified facility ratings, the respective ratings are posted on the ATC SELD application and incorporated into the following ATC group activities:

- 7.2.2.1 Update Transmission System Planning models (e.g. PSS/E), used in various power flow and stability studies.
- 7.2.2.2 Update the EMS (Energy Management System) applications, and other internal ATC Transmission Operations models, for use in operating the transmission system.

8.0 REVISION INFORMATION

- 8.1 ATC's Asset Planning and Engineering will be responsible for all revisions to this procedure.
- 8.2 This Procedure will be reviewed in accordance with requirements in GD-0480, Document Control. The review is performed to ensure the Procedure remains current and meets any new or revised NERC Standard listed in Section 2.

Version	Author	Date	Section	Description
01	S. Newton	3/27/2007	All	Reformatted and replaces former Operating Procedure 01-03.
02	R. Kluge	10/22/2007	Various	Updates to clarify ratings process and include NERC Reliability Std. references.
03	R. Knapwurst	9/10/2008	2, 5, 7 & Various	Revised various definitions, minor responsibility changes, requirement addition and various other minor format changes.
04	R. Knapwurst	8/10/2009	All	Updated various document/group titles, added/revised references & definitions, revised Figure 1 Flowchart and various other minor changes. Annual review as required by NERC Standards.
05	R. Knapwurst	5/24/2010	All	Add NERC definitions, add methodology sections, reformatted document and other various minor changes/corrections.
06	R. Knapwurst	8/17/2010	5.1, 5.2, 6, 7.2	Clarified rating requirements, most-limiting equipment and methodology inspection/review section.
07	R. Knapwurst	4/30/2012	3, 4, 5, 6, 7 & Appedices A, B & C	Revised references, moved steady-state and transient condition, removed dynamic loading definitions; revised special exception conditions, ratings methods, rated equipment and operation limitations; added ambient assumption and prior versions, revised ratings examination section, added communication section, removed impedances references, updated responsibilities and process, and other various minor changes/clarifications.

Appendix A – Roles and Responsibilities to Support SELD

All of the groups listed in this section shall contribute to updates, communication, and monitoring of proper ratings in SELD (Substation Equipment and Line Data)

Specific group responsibilities are outlined in the following sections:

1. Asset Planning and Engineering; The Asset Planning and Engineering group is responsible for:
 - a. Maintaining ATC Criteria documents governing the calculation of static ratings for ATC facilities as defined in:
 - i. ATC Criteria CR-0061; Overhead Transmission Line Ampacity Ratings
 - ii. ATC Criteria CR-0062; Underground Transmission Line Ampacity Ratings
 - iii. ATC Criteria CR-0063; Substation Equipment Ampacity Ratings
 - b. Authorizing or facilitating authorization of a Special Exception rating or modification of an existing Special Exception.
 - c. Communicating thermal reviewed line updated ratings-related information via the line Transmission Line Section Data Update Form.
 - d. Addressing inquiries regarding deviations from the ratings standards – with Special Exception ratings.
 - e. Provide special rating requests including 15/30-minute transient thermal limits, alternate emergency durations, variable ambient conditions, and unique operating conditions.
 - f. Ensure that system rated capacities are utilized in accordance with ATC operating procedures.
2. Asset Applications and GIS; The Asset Applications and GIS group is responsible for:
 - a. Reviewing existing facilities' characteristic rating-related data for completeness and accuracy.
 - b. Establishing individual components' static ratings in accordance with applicable ATC Criteria.
 - c. Updating SELD and SALL (Substation and Location List) for pending and final configuration and ratings changes associated with new or modified construction facilities.
 - d. Integrating related component capabilities into the section ratings of transmission line sections, transformer sections, and bus sections.
 - e. Maintaining SELD as ATC's primary ratings related data resource by facilitating consistency with end-user applications.
 - f. Disseminating ratings updates internal to ATC via the MS Outlook "SELD Ratings Updates" distribution list.
 - g. Resolving ratings conflicts or questions that arise from data published in SELD, including those posed by the Midwest Independent Service Operator (MISO).
 - h. Administering Special Exception ratings, including monitoring resolution to a rating based on ATC's standard criteria.
3. System Planning; The System Planning group is responsible for:
 - a. Post files to be used to update System Planning models (e.g. PSS/E) used in various power flow and stability analyses with ratings changes disseminated by Asset Applications and GIS.
 - b. Providing Project Engineering and System Protection with desired normal and emergency ratings values for proposed additional facilities and new projects.
 - c. Disseminating ratings updates to the Midwest Independent System Operator (MISO) via the MISO "Rating Submittal" web tool¹ and when appropriate via the MISO "Supplemental File" data template, which is used for large amounts or complex changes to the system.
 - d. Creates the Rating Change Request Form, an informational document that communicates supplemental data internal to ATC. The form documents what was sent to MISO and is used if a very substantial system changes has occurred and diagrams are needed to understand the new system topology, associated ratings.

¹ System Planning will issue to MISO via ModelUpdates@midwestiso.org.

- e. Working with Asset Applications and GIS to resolve any System Planning model ratings recognized as different from those maintained in SELD.
4. System Operations; The System Operations group is responsible for:
- a. Providing Asset Applications and GIS with final approval for moving any rating to “valid” status, via an email reply report from the Transmission Reliability Administrator(s) to the original SELD Recently Pre-Valid Ratings Report;
 - b. Updating the SCADA, advanced EMS applications, and other internal Operations models based on valid ratings disseminated by Asset Applications and GIS, but only upon receipt of MS Outlook “SELD Ratings Updates” form.
 - c. Communicating section ratings information to adjacent utilities, RFC, MISO, NERC, MRO and other entities as necessary for real-time operations;
 - d. Working with Asset Applications and GIS to resolve any EMS ratings recognized as inconsistent with those maintained in SELD;
 - e. Ensuring that system rated capacities are utilized in accordance with ATC operating procedures.
5. System Protection; The System Protection group is responsible for:
- a. Providing the following information as soon as it is available – required for SELD entry before projects are placed in-service - for applicable construction projects:
 - iv. Relay settings translated into associated ampacity/MVA ratings,
 - v. Relay thermal limits,
 - vi. Metering limitations,
 - vii. Current transformer (CT) connected ratios
 - b. Assisting Asset Applications and GIS in review and validation of ratings for existing relay settings, relay thermal limits, CT connected ratios.
6. EMS (Energy Management System) Group; The EMS Group is responsible for:
- a. Providing the following information as soon as it is available, for applicable construction projects – required for SELD entry before projects are placed in-service:
 - i. Metering limitations,
 - ii. Remote Terminal Units’ (RTUs) scaling limits translated into ampacity ratings associated with the subject primary voltage
 - b. Assisting Asset Applications and GIS in review and validation of ratings for existing metering, CT connected ratios, and RTUs.
7. Asset Maintenance; The Asset Maintenance group is responsible for:
- a. Notifying Asset Applications and GIS (via the MS Outlook “SELD Admin” queue) and System Operations of any maintenance-initiated facilities changes that affect ratings, including those changes associated with emergency restoration.
 - b. Coordinating with Project Management on implementing expedited maintenance or construction of facilities to resolve ratings identified as unexpectedly problematic as the end-result of a review of existing facilities ratings.
8. Project Management; The Project Management group is responsible for:
- a. Submitting a Project In-Service Notification form to the MS Outlook “SELD Admin” for new or modified facilities are placed into service.
 - b. Implementing construction of facilities to resolve ratings identified as unexpectedly problematic as the end-result of a review of existing facilities ratings.
9. Project Engineering; The Project Engineering group is responsible for:
- a. Design the equipment and facilities to the desired ratings from Planning and communicating any disparity between what can be done and the desired ratings via the Design Summary Document (DSD) review process.

- b. Design the equipment and facilities to resolve ratings identified as unexpectedly problematic as the end-result of a review of existing facilities ratings.
- c. Communicating reviewed ratings-related information via updates to ATC CADD Standard drawings and/or forms; the substation Equipment Connection Diagram (ECD), the line Phasing Diagram and Transmission Line Section Data Update Form. This shall be done at construction issue and at the as-built issue where the ratings are changed from the construction issue.

Appendix B – SELD Rating Process

1. The ATC facility ratings are documented in the ATC Substation Equipment and Line Database (SELD) application. The SELD update process is shown in a flowchart representation in Figure 1, SELD Update Process.
2. Ratings Review of Existing Facilities;

Asset Applications and GIS will review and validate appropriate ratings for all facilities transferred from contributing companies. Until this review and validation is complete, ATC's System Planning and System Operations groups will continue to use summary ratings data provided by the contributing companies for any facilities not marked as having valid ratings. Where SELD valid ratings are unavailable, Asset Applications and GIS will provide MISO with Operations Energy Management System (EMS) ratings to answer special requests.

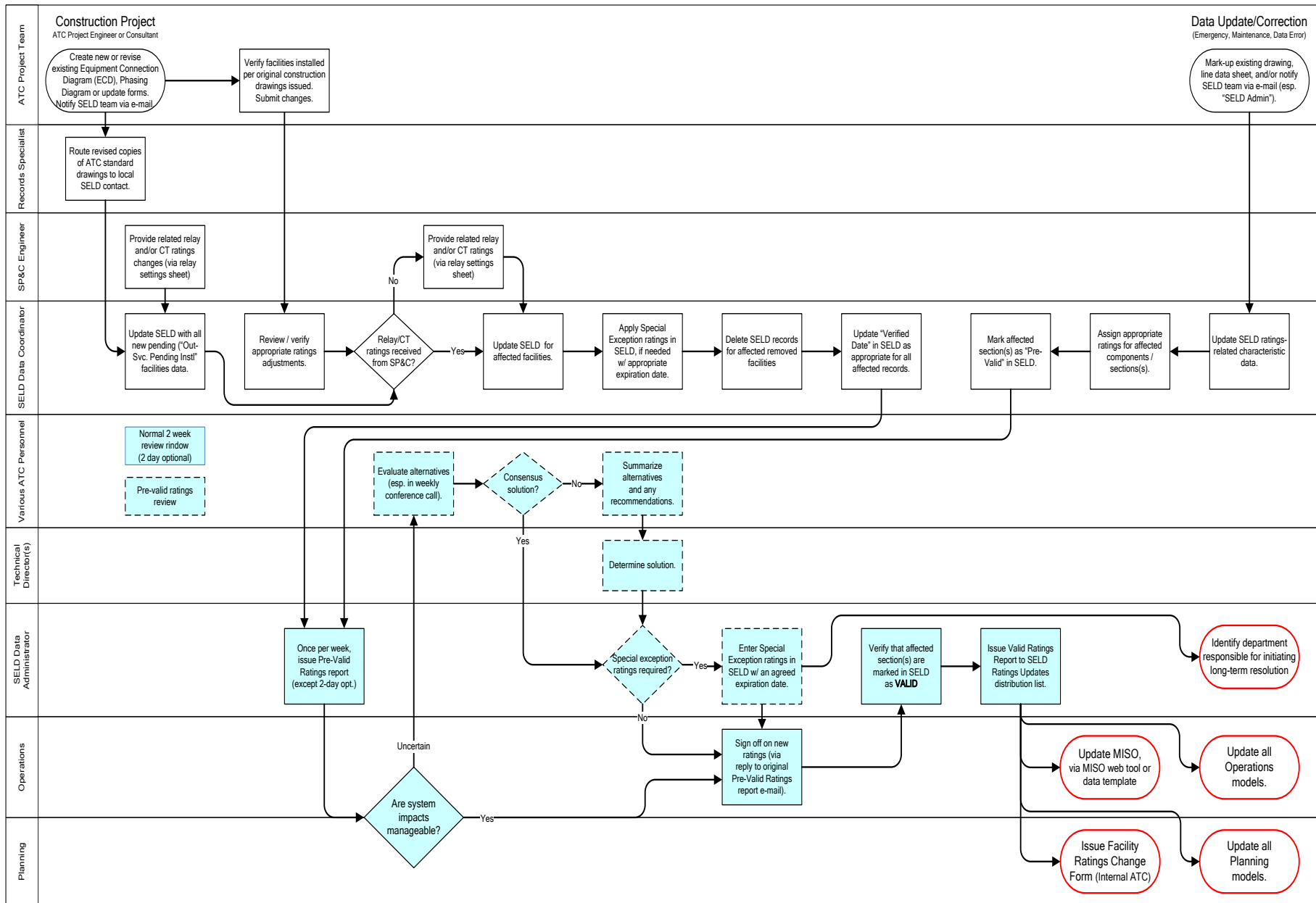
 - a. Component Characteristic Data Verification;

Asset Applications and GIS SELD Data Coordinators will document in SELD the characteristics of components that affect facility ratings after a comprehensive review, drawing on various resources, including engineering records, project records, and consultation with equipment manufacturers. SELD Data Coordinators will conduct field reviews when necessary to achieve certainty otherwise unavailable from ATC records. SELD Data Coordinators will determine ratings per ATC Criteria CR-0061, CR-0062, and CR-0063.
 - b. Pre-Valid Ratings Review:
 - i. On a weekly basis, Asset Applications and GIS will notify the System Planning and System Operations groups (via the "SELD Pre-Validation" email distribution list) of pre-valid ratings and provide a 2-week period for end-user review and comment. The SELD Administrator will only mark a section as pre-valid if it meets the following conditions.
 - All components that are physically installed have been included in the section record
 - All ratings data has been verified by historical record, field review, or manufacturer consultation
 - All static ratings have been calculated per the applicable ATC ratings Criteria; CR-0061, CR-0062, or CR-0063.
 - ii. Within the 2-week review period, participants shall discuss any unmanageable system impacts within the immediate system configuration. If there will be unreasonable constraints that require mitigation, a Special Exception Rating may be assigned while the mitigation measures are implemented.
 - iii. A 2-day pre-valid review period can be used on a case-by-case basis when a facility rating is important for operational reasons. In this situation, it is especially important for operation and planning personnel discuss the impact on the transmission system.
 - iv. All pre-valid ratings require sign-off by System Operations, as communicated by the Transmission Reliability Administrator, and System Planning via a reply email to the original weekly Recently Pre-Valid Ratings report. When approved, Asset Applications and GIS will mark pre-valid ratings to valid. If no issues are raised for any particular section's ratings, the pre-valid ratings will be considered "valid".
 - v. When participants cannot identify a consensus solution, the SELD Administrator will submit the subject facilities proposed ratings to the Directors of Asset Management, System Planning, and System Operations for final determination.
 - c. Special Exception Ratings

Asset Applications and GIS, and Asset Planning and Engineering will administer Special Exception ratings in SELD. Assignment of Special Exception ratings may be appropriate under either of two scenarios:

 - i. Where some component data is unverified and/or unavailable to validate ratings, an interim rating consistent with ATC's criteria is assigned until research or other hard data is obtained specific to this component(s), or
 - ii. Where all component data has been verified, and the participants in the pre-valid ratings review process can justify and agree or when Directors authorize operating with mitigated risk, a Special Exception Rating is assigned.

Figure 1 – SELD Update Process



- d. The affected groups or pre-valid ratings review participants – Asset Applications and GIS, Asset Planning & Engineering, System Planning, System Protection, System Operations, Real Estate, Customer Relations, Portfolio - Projects and Asset Maintenance (as applicable) - must agree on an action plan to resolve the Special Exception to a permanent solution that accommodates assignment of ATC standard ratings. Any of the participants may assume responsibility for initiating and/or coordinating the work toward permanent resolution, dependent on the circumstances of the particular issue. Asset Applications and GIS will assign an expiration date to all Special Exception ratings and monitor resolution to ultimate assignment of standard ratings for the subject facilities.

- e. Special Ratings Review Request

- i. Internal to ATC

ATC-internal special requests to review ratings not yet valid in SELD will be submitted via email to the MS Outlook “SELD Admin”. Urgent special requests will be directed by phone to the Asset Planning and Engineering, or the SELD Administrator. Asset Planning & Engineering will assign or consult with equipment experts as necessary.

The SELD Administrator will reply to the originator of the special ratings review request, specifying a plan of action and estimated lead-time for ratings review completion. The SELD Administrator may assign the special request to a SELD Data Coordinator responsible for the respective region.

Asset Planning & Engineering will answer special ratings review requests by communicating back to the original requestor and to the SELD Administrator or Data Coordinator.

- ii. MISO:

Asset Applications and GIS will designate primary and backup contacts for responding to MISO requests for ratings related data clarification. An email request will be required as specific documentation of the request, even if initially the inquiry is made via the phone.

The Asset Applications and GIS MISO designee, with appropriate technical support from Asset Planning & Engineering, will reply to the originator of the special ratings related review request, specifying a plan of action and estimated lead-time for ratings related review completion. The Asset Applications and GIS MISO designee may assign the special request to a SELD Data Coordinator. If MISO requires an expedited answer that cannot necessarily be answered with a SELD valid rating in the desired timeframe, Asset Applications and GIS will provide MISO with the present System Operations EMS rating, as confirmed with System Operations.

Asset Applications and GIS will answer special ratings related review requests by not only communicating back to the original requestor, but also by communicating to System Operations and System Planning and marking the subject section(s) as “pre-valid” (if applicable) in SELD.

- 3. Ratings for New Facilities or Modified Existing Facilities

- a. The goal of the ratings update process related to project work is the assignment of pending updated ratings in ATC models before physical equipment is placed into service. Once an in-service notification is received the pending or pre-valid ratings become Valid and used in ATC and MISO models. To accomplish this goal, the Asset Applications and GIS will:
 - i. Enter ratings related data associated with projects into SELD at the time Project Engineering issues prints, including Equipment Connection Diagrams and Phasing Diagrams, for construction;
 - ii. Assign a pending service status to these project-affected components in SELD until final in-service notification is received;
 - iii. Service status for affected components after in-service notification is received
- b. Mark affected sections as pre-valid. Project Management, Project Engineering, Asset Maintenance, EMS and/or System Protection are contributors to the ratings related process for:
 - i. New facilities added to the system,
 - ii. Existing facilities removed from the system, and
 - iii. Existing facilities modified or replaced as part of a maintenance activity.

- c. Project Engineering will communicate ratings related information primarily via updates to ATC CADD Standard drawings; the substation Equipment Connection Diagram (ECD) and/or the line Phasing Diagram (PD). If the scope of a project does not require the creation of or revision to one of these standard drawings (i.e. relay change out, or other facilities that are not normally represented on an ECD or PD), communication of ratings related updates via an email to the "SELD Admin" will suffice.

After a SELD Data Coordinator has updated all project affected components statuses in SELD, he/she will mark the section(s) pre-valid, and include as pre-valid rating(s) on the weekly SELD "Out-of Service, Pending Install" Pre-Valid Ratings Report. If the project information does not get updated in SELD prior to in-service, it will be issued on a SELD Pre-Valid Ratings Report. Ratings affected by projects will be submitted to this process to enable System Planning to ensure intended ratings have indeed been satisfied by the completed project and that Operations has the associated ratings when the project goes in-service.

Should ratings be required for consideration before they are available from Asset Applications and GIS and/or SELD, System Planning will be responsible for providing expected ratings associated with newly planned projects.

- i. Equipment Connection Diagram; Reference ATC Guide ECS-GD-0130, Equipment Connection Diagram Requirements.

Project Engineering (consultant) will prepare The Equipment Connection Diagram (ECD) (a 26-series drawing) as part of the Asset Records substation CADD Standards drawing set. It is a one-line drawing that represents all ratings-related components (except for relays, meters, and RTUs) and characteristic data by a standard format on a single drawing, thereby making any future ratings records research simplified and directly correlated to the SELD model for substation equipment ratings.

The Asset Records Project Specialist assigned to the respective Portfolio will route construction issue and as-built ECDs to Asset Applications and GIS as related to standard ATC drawing requirements and routing,

- ii. Phasing Diagram: Reference Guide GD-0105, Phasing Diagram and Form ECS-FM-0490, Phasing Diagram Line Data.

Project Engineering (consultant) will prepare the Phasing Diagram (a 02-series drawing) as part of the Asset Records transmission line CADD Standards drawing set. This drawing distinguishes each of the separate line segments and their associated characteristic data by a standard format (including a line data table) on a single drawing, thereby making any future ratings records research simplified and directly correlated to the SELD model for line section ratings.

The Asset Records Project Specialist assigned to the respective Portfolio will route construction issue and as-built Phasing Diagrams to Asset Applications and GIS as related to standard ATC drawing requirements and routing.

- iii. In-Service Notification:

Project Management will copy the "SELD Admin" on all completed Project In-Service Notification forms. Upon receipt of this form, a SELD Data Coordinator will update affected facilities' pending service statuses to final service statuses as appropriate.

If all of the above ratings information has been transmitted to SELD the proper ratings will be ready to be implemented at time of energizing, when the new rating is urgent.

- iv. As-built Drawing Updates:

Project Management will update the ratings as appropriate based on the rating of the element as documented in the field as-built conditions.

4. Updates of Revised or Newly Valid Ratings,

Asset Applications and GIS will communicate all final ratings related changes via the weekly SELD Recently Modified Valid Ratings report routed to the MS Outlook "SELD Ratings Updates" distribution list.

- a. ATC Internal:

Upon receipt of the SELD Recently Modified Valid Ratings report, System Planning will disseminate all ratings related updates via the ATC Facility Ratings Change Request Form (see Figure 2 for an example) and ATC MS Outlook's "ATC Model Updates" (an internal distribution list of model owners).

Figure 2: Sample Facility Ratings Change Request Form

FACILITY RATINGS CHANGE REQUEST FORM															
LINE/XFMR															
FROM BUS#	FROM BUS NAME	TO BUS#	TO BUS NAME	KV	Line # or Transformer #	Circuit #	R	X	B	SUMMER NORM (MVA)	SUMMER EMER (MVA)	WINTER NORM (MVA)	WINTER EMER (MVA)	EFFECTIVE DATE	
1	39410	Paris	39249	Albers	138	3124	1				211	279	272	322	03/02/05
2	39196	Ohmstead	39254	Ledgeview Tap	138	X-51	1				293	293	301	344	03/02/05
3	39090	Russell	39092	Viking	138	X-32	1				188	256	242	287	03/02/05
4	39092	Viking	39213	Tripp Road	138	X-32	1				188	256	242	292	03/02/05
5	39213	Tripp Road	39141	Town Line Road	138	X-32	1				188	256	242	292	03/02/05
6	39891	Munising - 138	38752	Munising - 69	Xfmr	T1									03/02/05
The transformer # for the Munising 138/69 kV Transformer has changed from T6 to T1. Please update your records accordingly.															
All emergency ratings are for a two hour time limit unless they are equal to the normal limit.															

Date Sent to MISO: 3/3/2005

b. MISO:

Upon receipt of the SELD Recently Modified Valid Ratings report, System Planning will disseminate all ratings related updates to the Midwest Independent System Operator (MISO) via the MISO "Rating and Impedance Submittal" web tool² and when appropriate via the MISO "Supplemental File" data template, which is used for large amounts or complex changes to the system.

c. Interconnected Utilities:

- i. Asset Applications and GIS will maintain in SELD the ratings associated with the non-ATC portion of an interconnection transmission line as a single representative component record. This non-ATC component record's field will be updated with details indicating more specific details regarding the interconnected transmission utility's limiting component(s), if available. If the interconnected transmission utility does not maintain or provide spring/fall ratings, ratings equal to their summer ratings will be entered for spring/fall.
- ii. Asset Applications and GIS will coordinate all rating changes in ATC interconnection transmission line facility ratings with the tie utility. The non-ATC component ratings are likely rated by a different rating methodology, and for that reason may not be validated within the ATC SELD application.
- iii. Asset Applications and GIS will maintain ratings data in SELD for all ATC-owned facilities up to the point of facilities ownership demarcation, for generators and distribution interconnections; they will not maintain ratings for interconnected generators and distribution utilities' facilities.

² System Planning will issue to MISO via ModelUpdates@midwestiso.org.

Appendix C – Required Records

ATC will maintain ratings-related records and standards per ATC Procedure 2003-RM-2, Records Management Program–Vital Records Protection and ATC Design Guide ER-0410, Instructions for Maintaining Substation Equipment Files.

1. ProjectWise:

- a. The Equipment Connectivity Drawing (ECD) and the Phasing Diagram serve as the primary record resource for SELD ratings-related data.
- b. Project Engineering will create or update the existing Equipment Connection Diagrams (ECD) (as part of the standard drawing sets for all ATC-occupied substations), as required.
- c. For substations for which the contributing utility still owns the drawing sets, ATC's Equipment Connection Diagram will exist as the only ATC-owned drawing.
- d. Project Engineering will create or update an ATC-owned Phasing Diagram for any line of which ATC is at least a partial owner.
- e. Asset Applications and GIS will maintain the ECD and Phasing Diagrams in ProjectWise.

2. Asset Records will maintain the ECD and Phasing Diagrams in ProjectWise, Contributing Company Files;

Equipment and facility ratings related data have been received from each contributing company, municipality, or cooperative using file systems or software specific to those companies to store the information. Until valid ratings are achieved for all ATC facilities, System Planning will temporarily be responsible for the accuracy and completeness of the records in the various file systems or software received from the contributing companies.

3. Ratings Change Summary Sheets:

- a. Asset Applications and GIS will maintain Ratings Change Summary Sheets that document additional details of each ratings change communicated via the SELD ratings validation process. Specifically, these sheets will document the ratings before and after the actual change.
- b. System Planning will maintain a copy of all "Rating and Impedance Submittal" and "Supplemental File" data that are sent to MISO at: U:\Knowledge Share\Plng-Ops-Eng\MISO Rating Updates.