TENNESSEE VALLEY AUTHORITY

TRANSMISSION PLANNING

FACILITY CONNECTION REQUIREMENTS

END USER FACILITIES

Revision 3

September 2011

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Approved by: _____ Date: 9/30/2011

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Current Revision Description

Rev	Date	Description
0	April 19, 2004	Initial Issue
1	April 27,2007	Converted several previous references to appendices. Updated reference to NERC Reliability Standard FAC-001. Minor editorial changes.
2	March 30, 2010	Various revisions to include greater detail, replaced obsolete Appendix A (high-side backup protection sketch) with a form for requesting new delivery point information. Appendix E (Power quality guideline) was removed from the Appendix and is now a referenced document.
3	September 30, 2011	Reviewed for FAC 002-1 compliance effective October 1st, 2011 and revised section 3.2 “System Impact Study” to add new TPL Standards. Revised section 7 to add reference to new TPL Standards.

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1.0 INTRODUCTION

In accordance with the TVA Act and subsequent statutes and laws, TVA provides electrical power to its customers within the TVA region. Both wholesale and retail deliveries of power to customers within the TVA service area are provided at delivery points across TVA's transmission system. TVA provides delivery points to other utilities, where TVA transmission lines traverse their service areas, as well as negotiate the provision of delivery points from neighboring utilities for TVA customers when needed.

All types of load deliveries from the TVA transmission system have the same technical requirements; however, funding justification, cost responsibilities, and approval procedures differ. This document will address the technical and operational coordination of new delivery points to be supplied from the TVA transmission system regardless of whether the requestor is a TVA power distributor, existing or new industrial customer, another utility, or even TVA itself. Technical and operational requirements for delivery points for TVA customers that are to be supplied from neighboring utilities will be coordinated with the interconnecting utility in accordance with appropriate guidelines, policies, and any existing interconnection agreements that it may have with TVA. Requestors of new delivery points will be provided details regarding cost responsibilities and approval procedures, if needed.

2.0 SCOPE

This document covers the Facility Connection Requirements for new delivery points (End-user facilities) on the TVA transmission system in order to promote the safe operation, integrity, and reliability of the TVA transmission system as well as ensure compliance with NERC Reliability Standards, SERC Supplements, and TVA planning criteria.

3.0 PLANNING NEW DELIVERY POINTS

3.1 Notification

Requestors of new delivery points to be supplied from the TVA transmission system should notify TVA as early as possible to allow time for appropriate studies and facilitate coordination with area plans. Existing TVA power distributors and directly-served industrial customers should contact their Customer Service Manager or Industrial Marketing Representative. Other utilities requesting a TVA delivery point should contact TVA's Transmission System Services (423-697-4109) in accordance with TVA's Transmission Service Guidelines. New industrial customers should contact the local power distributor or TVA's Economic Development office. Formal request should be made either in writing to the appropriate contact person or be made in an official power supply meeting with TVA.

3.2 System Impact Study

TVA will perform a system impact study to assess the impact for any proposed new delivery point to be supplied from TVA's transmission system. The study may include, but is not limited to, loadflow, short circuit, dynamic stability, and Electro-magnetic Transients Program (EMTP) studies. System impact studies will determine if the proposed new load will cause a violation of TVA planning criteria under both normal and contingency conditions in accordance with NERC Reliability Standards TPL-001, TPL-002, and TPL-003 regarding (a) thermal overload of transmission facilities, (b) excessive voltage variations, and (c) transfer capabilities with other transmission systems. If a system impact study indicates an adverse impact on a transmission system interconnected to TVA's, then TVA will notify the neighboring system and coordinate its study results as needed.

If any violations of TVA's planning criteria are identified in the study, then any needed upgrades to the transmission system will be identified as part of the technical coordination phase of the New Delivery Point.

3.3 Information Required

Customers are required to furnish information during the planning phase of a new delivery point regarding the nature of the load to be supplied as well as certain design parameters of the proposed connected facilities. Information required will include, but is not limited to:

1. Substation name
2. Contact person (name, address, telephone, email)
3. Proposed location of station
4. Preferred schedule of new delivery point
5. Preferred supply voltage
6. One-line diagram of proposed station
7. Transformer data
8. Transmission line configuration, impedance, and thermal ratings.
9. Peak load anticipated (initial and 10-year projection)
10. Power factor
11. Future/ultimate plans
12. Special requirements (e.g., motor starting)

13. Characteristics of harmonic- or flicker-producing loads (arc furnaces, fluctuating load, etc)

14. Preferred connection configuration

15. On-site generation plans

A form for conveying the required information is found in Appendix A. Additional information will be required during the technical scoping phase of the proposed New Delivery Point facilities.

3.4 Delivery Point Location

TVA must agree with the actual physical location of the new delivery point. The site of the proposed delivery point should be coordinated with TVA. A joint site visit by TVA and the Customer is recommended to review site specific issues. Customers are advised not to make actual purchase of property until the site is reviewed by TVA for suitability.

3.5 Delivery Point Configuration

New loads may be connected to TVA's transmission system in a variety of configurations. TVA Interconnection Facilities will be generally based on the location, size, and type of load. Customers at new delivery points may participate in enhanced facilities for improved reliability at their cost.

A typical new delivery point to the TVA transmission system can involve the tapping of a transmission line. The configuration of tapped stations will be determined on a case-by-case basis. TVA typically provides two manually-operated sectionalizing switches at tapped stations, however, enhanced switching devices, such as motor operated switches, Line-Rupters, circuit switchers, or circuit breakers may be provided at the Customer's cost if desired. Alternately, TVA may provide enhanced switching facilities under certain conditions. Enhanced switching configurations may include remote or automatic control of the switching devices.

A transmission line may be looped through the station, such that the transmission line's power flow travels across the Through Bus facilities in the station. Under this configuration, the Through Bus will need to be appropriately sized to handle system power flows. Any switching devices (circuit breakers, interrupters, switches, etc) included in the Through Bus facilities must be operated and dispatched by TVA. Also, TVA will require unrestricted use of the Through Bus, if owned by the Customer, for system flows.

Other new delivery points may involve connection to existing substations or involve new switching stations and will be coordinated with the Customer as needed.

4.0 TECHNICAL COORDINATION

TVA and Customer will coordinate the various technical issues related to the New Delivery Point as follows.

4.1 Scoping Workshop

For all new delivery point projects, TVA will conduct a Scoping Workshop to initiate the design and construction phases of the project. Coordination, review, and approval of the technical scope of the new delivery point facilities is performed and documented in the workshop activities. A project schedule is also determined. TVA will provide the Customer with a Specification Diagram and Communication Specification Diagram depicting the power and telecommunications facilities agreed upon in the workshop. The Scoping Workshop will not be conducted until after the Customer completes property purchase. A Scoping Checklist will be followed in a scoping workshop.

4.2 System Protection and Other Controls

The proposed New Delivery Point shall not adversely affect TVA's ability to protect its transmission system as well as not unduly impact the reliability of other area customers. The following relay and protective issues shall be coordinated as needed.

1. Review of the relay settings for a new delivery point by TVA will be required to ensure compatibility of TVA and Customer protection schemes.

2. Customer shall provide TVA a copy of the manufacturer's test report (including zero sequence data) for any power transformer it plans to install in its facilities. TVA and Customer shall coordinate proposed transformation impedance, and winding configuration to ensure no adverse impact to TVA's protective scheme for the transmission system. Customer's use of an autotransformer must be approved by TVA. When 161-kV grounded-wye connected transformers are to be installed, TVA shall determine need and size of neutral reactors.

3. Standard protection requirements for Customer's Facilities include backup protection for the high-side tripping. This should be in the form of two fault-interrupting devices in series for each transformer connection. Typically two circuit switchers are used, but a circuit breaker and circuit switcher combination or two circuit breakers (for high fault levels) could be used. For multiple transformer bank installations, a common interrupting device could be used for the backup protection if desired. Exceptions to this requirement may be granted for special situations. The secondary protection afforded by a redundant interrupting device prevents other area customers from adverse impact should primary tripping fail during fault conditions.

4. TVA will review the plans for new delivery point facilities to ensure that appropriate backup protection is provided as well as compatibility with TVA's protective schemes in effect for the specific location. Although TVA will point out any discrepancy in protection that is noticed, TVA's review should not be construed as an endorsement for adequacy for the Customer's own needs. It should be noted that TVA does not provide backup protection from remote line terminals for Customer transformer banks.

5. Requestors of new delivery points are referred to "Typical Terms and Conditions for New Delivery Points" (Appendix D).

6. Underfrequency Load Shed Program - In accordance with NERC Standards and SERC's regional supplement, TVA expects customers of its transmission system to participate in TVA's underfrequency (UF) load-shed program as described in PSO-SPP-9.5 Underfrequency Load Shedding. TVA will provide a pre-wired panel with an underfrequency relay and associated equipment and Customer shall install. Customer-owned relays shall not be used as part of TVA's UF load shed program due to difficulties in program oversight and maintenance activities.

7. At new delivery points where TVA has line circuit breakers or other automatic devices and the Customer has stepdown transformation, an exchange of secondary circuits and trips circuits between TVA and Customer may be required.

8. If generation sources are installed either at the Customer's facilities or within the Customer's distribution system, then such generation facilities must be in accordance with "Dispersed Power Production Guidelines for TVA and Distributors of TVA Power" (Appendix B) and "Distributed Generation Protection" (Appendix C).

9. On TVA transmission lines that are protected with high-speed pilot protection, it is possible especially with large wye-connected grounded or autotransformers, that the remote pilot tripping elements protecting the transmission line will "see" faults on or near the distributor's subtransmission and/or distribution buses, which would result in erroneous relay operation of TVA transmission lines. In these cases, TVA may need to install a wave trap, coupling capacitor voltage transformer (CCVT), carrier transmitter, and blocking relay in the Customer's Facility.

4.3 Drawing Requirements

Customer shall provide a one-line diagram and general arrangement plan for the Facility. A relay plan may also be needed if sufficient relay information is not included in the one-line diagram. The drawings provided should depict equipment data, breaker and switch configuration, and protective relay zones. The transformation planned needs to be appropriately described by including capability ratings, winding configuration, voltage levels and available tap ranges.

4.4 Equipment Ratings

Customer should determine equipment ratings such as load carrying capacity and insulation ratings for its Facility in accordance with Good Utility Practice. TVA does not dictate the ratings of Customer-owned equipment except as they directly affect the performance of the TVA transmission system. Through Bus facilities must be of appropriate capability to handle anticipated transmission line flows and/or be of equivalent capacity as the connected transmission line.

4.5 System Grounding

The proper use of grounding at electrical stations will ensure personnel safety as well as limit damage to equipment during normal and fault conditions. Safety is of upmost importance to TVA and adequate grounding is required at any facility that is connected to TVA's transmission system. Accordingly, Customer's Facility must have a grounding system that solidly grounds all metallic structures and equipment in accordance with the ANSI/IEEE 80, IEEE Guide for Safety in AC Substation Grounding as well as the National Electrical Safety Code.

The interface between TVA and Customer at the point of interconnection will require the coordination of grounding connections such as transmission line and substation overhead shield wires, ground grids, fencing, cable shields, etc. If the Facility is physically near another station, TVA recommends that the two ground grids be connected with conductors of adequate capacity to handle fault currents and sufficiently control voltage rise on the ground grids. TVA must approve any connection to a TVA ground grid.

If the Facility is close to another station and the ground grids need to be isolated for any reason, then the Customer must demonstrate that the Facility is properly isolated and in compliance with all applicable codes and standards. Fiber optic cables can be used for control and telecommunication circuits in order to maintain isolation between the stations. Isolation panels can be used if needed for connections to existing fences.

If Customer constructs any transmission line to be connected to TVA's transmission system, then overhead shield wires are required as well as adequate grounding at each structure in accordance with the National Electrical Safety Code. TVA requires that structure to ground resistance levels conform to TVA's standards as provided in ESP-

SDP-09-002.4.3 Transmission Line Standards - Electric Design Considerations. In areas of high soil resistance, the use of deep ground rods and/or zinc counterpoise may be needed to reach required structure ground resistance levels.

4.6 Insulation and Insulation Coordination

Insulation coordination is the selection of insulation strength. Insulation coordination must be done properly to ensure electrical system reliability and personnel safety. Basic Surge Level (BSL), surge arrester, conductor spacing and gap application, substation and transmission line insulation strength, protection, and shielding for Customer's Facility shall be in accordance with industry standards, documented and available for TVA review.

4.7 Standards and Review

Customer's Facility shall meet standards of Good Utility Practice, shall be capable of continuous supply from the TVA transmission system, and shall include one or more switching devices capable of disconnecting the Facility from the TVA Interconnection Facilities. Said switching devices must allow a means to physically and visibly isolate the new delivery point facility from TVA's transmission system. The Facility shall be capable of satisfactory coordination with any protective, monitoring, and control equipment installed by TVA and shall be consistent with Customer's one-line diagram as reviewed and approved by TVA.

TVA-installed Interconnection Facilities shall likewise be designed and constructed in accordance with Good Utility Practice and plans and specifications will be consistent with TVA's Specification Diagram and Communication Specification Diagram as reviewed and coordinated with the Customer.

Any proposed variation of agreed upon scope of the new delivery point facilities by either Customer or TVA shall be appropriately coordinated. Reasonable notice for changes must be provided or schedule delay may result.

4.8 Provisions for Future Change

Both TVA and Customer shall recognize that future changes in the TVA Interconnection Facilities and the Customer's Facility may be required. Reasonable notice and adequate time should be provided so as to ensure proper coordination of plans. Initial development of New Delivery Point Facilities should consider an ultimate configuration to as much extent as possible.

4.9 Metering and Telecommunications

Revenue metering shall be required as appropriate for new delivery points and in accordance with “Terms and Conditions - New Delivery Points” (Appendix D), which is a standard attachment to new delivery point agreements. Revenue metering at new delivery points shall comply with the applicable provisions of TOM-FTM-6-METR-017 “TVA Revenue Metering Guide for Customer-Owned Substations.” For new delivery points involving three-winding transformation in which all supplied loads are located at other metered stations, then revenue metering at the new station may not be needed. If the load is not metered at the point of delivery, TVA will compensate the revenue metering to take into account the electrical impedances of equipment located between the meter location and the point of delivery. Such loss compensation will be added to the billing for that load. Manufacturer’s test data will be required for transformers that are modeled for loss compensation. Electrical parameters for other components, (transmission lines, voltage regulators, reactors, etc.) may be needed as well.

TVA will make the following available to customers at new delivery points: (1) remote access to metering data (provided a telephone line is provided by customer), (2) metering pulses, and (3) access to metering currents and potentials (with restrictions) for customer parallel metering or other monitoring devices as explained in the revenue metering guidelines.

If a delivery point for a TVA customer is to be supplied from another utility, then additional metering requirements will be needed to accommodate the need for real-time meter data for dynamic scheduling. There will be similar real-time data needed if another utility requests delivery from the TVA transmission system. The additional metering and telecommunication requirements are provided in PSO-SPP-09.002 “IPP, Distributor Generation, Interchange, Pseudo-ties, Dynamic Schedules, and TVA Generation Requirements” but would also be subject to the interconnection agreement between TVA and the other utility for the delivery point.

For special circumstances, such as unusual load operating conditions, TVA may require the Customer to provide equipment necessary to supply TVA with communications data points or signals for load control, load monitoring, load projection, or equipment status monitoring.

4.10 Voltage, Reactive, and Power Factor Control

New Delivery Point Facilities should be designed to operate within reasonable voltage variations provided by TVA's transmission system. TVA strives to operate its transmission system to conform to contractual delivery point voltage levels, which are as follows: *Under normal operating conditions, delivery point voltages provided to TVA power distributors should fall within three percent above or below the normal operating delivery voltage, which for deliveries of 46-kV and higher, should be no more than five percent higher or lower than the nominal voltage. For industrial customers during normal operating conditions, the delivery point voltage should be within seven percent above or below the normal operating voltage.* New delivery point facilities should have tap ranges and regulation equipment necessary to operate within these voltage limits. However, these contractual voltage levels do not apply to temporary abnormal system conditions, which can result in much lower or higher voltages. Consequently, the delivery facilities should be designed for protection outside these contractual voltage levels. TVA strives to limit its transmission voltages to no less than 95 percent of nominal voltage during single contingency conditions conforming to NERC category B events.

Customers at new delivery points should operate their facilities such that the power factor at the delivery point is never less than 0.95 lagging at all times. During the lowest 60-minute consecutive demand period of each month, Customer's power factor should not go leading. Minimum demand periods of less than 25 percent of the monthly peak demand are excluded from leading power factor requirements. Any operation outside of these power factor limits will result in reactive billing penalties.

Additional reactive power limits are imposed on certain industrial customers due to load size and operating characteristics. Such "non-conforming" loads will be required to maintain a power factor of not less than 90% lagging or leading at the delivery point.

4.11 Generation Control

New Delivery Points may involve some form of distributed generation or co-generation and, if so, must conform to "Dispersed Power Production Guidelines for TVA and Distributors of TVA Power" (Appendix B) as well as "TVA's Facility Connection Requirements Document - Generation and Transmission."

4.12 Supervisory Control and Data Acquisition (SCADA)

TVA typically does not require remote control ability or remote indication of Customer's facilities at new load delivery point. However, where TVA installs or has operational control of line breakers or motorized switching devices, SCADA will be provided by TVA. In such cases, remote control and/or indication by TVA of Customer facilities may be desirable. Also, for large industrial loads, SCADA facilities may be required for coordination of loading issues.

4.13 Short Circuit Conditions

New delivery point facilities must be designed to withstand maximum short circuit conditions provided by the TVA transmission system. During the scoping phase for a new delivery point project, TVA will provide fault current data anticipated.

4.14 Power Quality

New loads connected to the TVA transmission system must not adversely affect TVA's ability to provide an acceptable level of power quality to other connected loads. Voltage imbalance, voltage flicker, harmonics, temporary over- or under-voltages and transient overvoltages can adversely impact other loads. New loads must comply with TVA's power quality requirements as explained in Guidelines for Connecting Voltage Disturbing Loads. A general summary of these requirements include:

(i) Voltage Imbalance - not to exceed 1.0% (above or below) of normal operating voltage level at any PCC (Point of Common Coupling);

(ii) Infrequent Maximum Voltage Variation - voltage variations with a period greater than ten minutes must conform to Table 4.1;

Number of Changes N	Percent Voltage Change at PCC	
	MV	HV-EHV
N≤4 per day	5	4
N≤2 per hour	4	3
2<N≤6 per hour	3	2.5

MV - Medium voltage, less than 34kV
HV - High voltage, 34-161-kV
EHV - Extra high voltage, >161-kV

Table 4.1 Limits for Infrequent Voltage Fluctuations

(iii) Voltage Flicker - new facility must be designed not to exceed P_{st} 99% of 0.8 at the PCC for all ties closed condition and must not exceed P_{st} 95% of 1.0 at the PCC for any system contingency; and

(iv) Harmonic Current Distortion - must remain below IEEE 519 Limits at any PCC for a 95% compliance using ten minute observation periods.

5.0 CONSTRUCTION OF NEW DELIVERY POINT FACILITIES

Construction of New Delivery Point facilities should conform to Good Utility Practice and be implemented in a safe manner.

5.1 Customer Responsibilities

During the construction phase of the new delivery point project, TVA expects the Customer to:

1. Install metering CT's, VT's, test boxes, control cable (all of which are provided by TVA except in the case of metal-clad switchgear which is explained in the metering guidelines).

2. Provide and install all conduit required by TVA for metering, SCADA, and/or automatic control schemes.

3. Cooperate in the installation of TVA-provided sectionalizing switches on station pulloff structures or other structures as deemed appropriate.

4. Install TVA-provided underfrequency relays and associated auxiliary relays.

5. Install TVA-provided wave trap if delivery point and station configuration requires the wave trap to be located within Customer facilities.

6. Provide 120-volt ac service to TVA revenue metering, monitoring, SCADA, and switching facilities as required.

7. Provide DC service to TVA motorized switching devices as required.

8. Participate in the connection between TVA transmission system ground (static) wire and Facility's overhead static wire if appropriate.

Other participation in the construction of the facilities by the Customer may be needed for special situations.

5.2 Point of Interconnection

The typical transition point between TVA Interconnection Facilities and Customer Facilities will be at the jumper connection of the station's pulloff structure if the new facilities are supplied by a TVA transmission line connection. TVA will provide and install the new transmission line connection, including the complete dead-end assembly and all hardware to attach to the Customer's pulloff structure. The jumper between the transmission line and the facility represents the beginning of the substation facilities and where the facility ownership by the Customer begins. For delivery points where the ownership transition is made within a switchyard, such transition point shall be mutually agreed upon between TVA and Customer.

5.3 TVA Equipment Located on Customer's Facility

Customer is required to allow permission to TVA for locating any required transmission line, static wire, or switch structures and associated guys on Customer's property. TVA will coordinate the plans for any such facilities with Customer for its review and approval.

5.4 Inspection Requirements

Prior to energization, TVA will inspect and review all TVA-provided and TVA-installed equipment in the Interconnection Facilities and the Customer's Facility in accordance with TVA's Construction Standards. Customer shall inspect and review its Facility in accordance with Good Utility Practice.

6.0 OPERATION AND MAINTENANCE OF NEW DELIVERY POINT FACILITIES

Customer shall operate and maintain its Facility so as not to impact the reliability of the transmission system. TVA's System Operations Center provides routine training to customers regarding TVA's operating practices as outlined in Operating Letter No. 15 and Electrical System Operating Manual. Customer shall grant TVA access to TVA facilities (e.g., revenue meters, underfrequency relays, etc.) located in its Facility to allow operation and maintenance activities.

6.1 Synchronizing Facilities

If Customer's Facility involves a source of electric power by way of connection to generation or other transmission then synchronizing of TVA's Interconnection Facilities and the Customer's Facility shall be guided by "TVA's Facility Connection Requirements Document - Generation and Transmission."

6.2 Maintenance Requirements and Coordination

The Customer at a new delivery point should maintain its Facility in accordance with Good Utility Practice in a safe and reliable manner so as not to adversely impact the TVA transmission system. Special emphasis should be placed on Through Bus facilities as the performance of that equipment directly impacts the transmission system. TVA will be responsible for maintaining the transmission facilities connecting the Customer's facilities with the transmission system. Maintenance activities by either party may require an outage to the delivery point. Customer shall coordinate any needed outages as well as any maintenance issues with TVA's local Transmission Service Center.

6.3 Abnormal Frequency and Voltage Operation

During periods of abnormal frequency, load interruption may occur at delivery points where Customers participate in TVA's underfrequency (UF) load shed program. Resetting the lockout relay following a UF trip is not allowed until permission is received by TVA Transmission System Operator. Customers may install underfrequency or under-or over-voltage protection if needed to protect its Facility and loads supplied.

6.4 Communications and Responsibilities During Normal and Emergency Conditions

Customers should develop a working relationship with TVA's Transmission System Operators and the local Transmission Service Center in order to coordinate operating and maintenance needs. In case of failure of communication or in an emergency involving hazard to life or property, Customers should take the necessary prompt action. Reporting of such actions should be made to the Transmission System Operator as soon as possible.

7.0 SUPPORTING DOCUMENTATION

1. NERC Reliability Standard FAC-001 - Facility Connections Requirements (April 1, 2005)
2. NERC Reliability Standard TPL-001 - System Performance Under Normal Conditions
3. NERC Reliability Standard TPL-002 - System Performance Following Loss of a Single Bulk Electric System Element
4. NERC Reliability Standard TPL-003 - System Performance Following Loss of Two or More Bulk Electric System Elements
5. SERC Facility Connection Requirements Guideline (May 28, 2009)
6. TOM-FTM-6-METR-017 - TVA Revenue Metering Guide for Customer Owned Substations
7. PSO-SPP-09.002 "IPP, Distributor Generation, Interchange, Pseudo-ties, Dynamic Schedules, and TVA Generation Requirements
8. ESP-SDP-09-002.4.3 - Transmission Line Standards - Electric Design Considerations
9. PSO-SPP-9.5.001 - Underfrequency Load Shedding
10. Guidelines for Connecting Voltage Disturbing Loads

11. TVA's Facility Connection Requirements Document - Generation and Transmission

12. Operating Letter No. 15

13. Electrical System Operating Manual (current edition)

14. Transmission Service Guidelines

8.0 DEFINITIONS OF TERMS

1. Customer – the requestor of a new delivery point. In this document, it is assumed that the Customer will also be the owner and operator of the facilities to be connected to TVA's transmission system; however, in some cases this may not be so.

2. Facility – the Customer's facilities to be provided as its part in developing the new delivery point facilities for supplying load from the TVA transmission system.

3. TVA Interconnection Facilities – facilities provided and owned by TVA to provide a connection point for Customer's Facility from TVA's transmission system as part of developing a New Delivery Point for supplying load.

4. New Delivery Point Facilities – includes both TVA Interconnection Facilities and the Customer's Facilities.

5. Good Utility Practice - good, modern practices and procedures for generally accepted by the electric utility industry designing, operating, and maintaining utility facilities as noted in Terms and Conditions - New Delivery Points.

6. Delivery Point - where a Customer's load is connected to the transmission system. Typically, this is where the Customer-owned Facility connects to the TVA transmission system; however, lease or rental arrangements can extend the contractual point of delivery to a different location.

7. Scoping Workshop - A meeting to develop the technical scope of a capital project prior to design and construction. The workshop is a part of the scoping process that may include a site visit and other coordination before and after the scoping meeting between the parties involved.

8. Scoping Checklist - A standard list of items for discussion in a Scoping Workshop.

9. Through Bus - substation facilities related to the loop supply of a station where the power flow on the connected transmission system can flow across. Circuit breakers and switches are considered part of Through Bus.

10. TVA Act- enacted by the Senate and House of Representatives of the United States in 1933, the “Tennessee Valley Authority Act of 1933” [48 Stat. 58-59, 16 U.S.C. sec 831] created the federally owned corporation named “Tennessee Valley Authority.”

NEW DELIVERY/METERING POINT

Information for _____Substation

A new delivery/metering point for _____
(Customer Name)

Instructions - Please fill out as much information on the proposed delivery point or metering point as is known. Attach additional sheets if needed.

1. Location **Provide geographical reference(s) where the Substation will be located:**
_____
_____

Is the proposed location adjacent to a TVA transmission line or substation?_____

Name of adjacent TVA facility_____

Does Customer own (or have an option to purchase) the land for the proposed substation? _____. *Note - Land ownership will be required before the technical scoping of the project can be performed. It is desirable that TVA review the substation site before purchase.*

2. In-Service Date **The planned in-service date is _____.**
(date)
TVA's work in the substation needs to be completed by _____.
(date)

3. Loads **The initial load served by this substation will be _____ MW and will be _____MW 10 years later. The power factor will be _____.**

The initial load will be transferred from _____ Substation.

If the low side bus is split, the loads will be divided as follows: _____
_____

Any special load considerations?
Large motor starting? _____
Harmonic- or flicker-producing loads? _____
Any on-site generation plans? _____

4. Voltage **The high side of the Substation will be _____-kV. The low side will be _____-kV.**
If there is a third voltage, it will be ____-kV.

5. High Side Protection **High voltage equipment will consist of: _____**

6. Transformers **Transformers to be initially installed_____.**
(insert number, voltage rating & MVA rating)

In the foreseeable future the substation will have _____ transformers.
Is there anything unusual about these transformers? (Impedance, grounding, phasing, etc.)
_____
_____

7. Metering

The arrangement of the low side facilities will initially require _____sets of TVA metering instruments transformers (VTs & CTs) , and meters.

Years later, ____ sets of TVA metering instruments, transformers (PTs & CTs), and meters will be required.

Are there any other factors which may affect whether high-side or low-side metering is installed?

_____

_____

Does the customer want bar kits (if window-type CTs)? Yes____ No____ ***Note: Window-type CTs will be used for ratios of 1200-5 and higher at distribution voltages.***

Will the customer desire metering pulses? Yes____ No____

8. Transmission Line Connections

If customer's proposed station is not adjacent to a TVA transmission line or substation, does Customer plan to construct the required tapline? _____. If so, describe tapline specifications (length, conductors, impedance, capacity) _____

_____

_____

Note - The design of any customer-constructed transmission line connected to the TVA transmission system will be reviewed adn approved by TVA before connection.

What are the maximum design tensions, the pull-off heights, and the orientation of the customer's dead-end or pull-off structures to be connected to TVA facilities?_____

_____

_____

9. Regulating Equipment

Regulators will be (include voltage, kVA rating & percent regulation): _____

_____

Automatic Tap Changers (include voltage & percent steps):_____

_____

Capacitor Banks (include voltage, number of banks & MVAR rating): _____

_____

10. Reactors

Voltage & Impedance for Phase Reactors:_____

_____

Neutral Reactors (which neutral, impedance): _____

_____

11. Drawings

The customer will provide TVA with appropriate drawings of the substation, including electrical single-line diagram and general arrangement diagram by _____.
(date)

Note - These drawings will be required before the technical scoping of the project can be performed. Preliminary copies, if available, should be submitted with this form.

12. Future Plans

Explain any future plans for the proposed station: _____

_____

_____

13. Other Information **Provide any additional information that TVA may require in order to provide the necessary facilities in a timely manner:**_____

14. Contact Person **Provide name and telephone number of the customer's representative that may be contacted by TVA engineers**
Name: _____
Phone:_____

15. Signatures **Distributor Representative:**_____
Date Signed:_____

DISPERSED POWER PRODUCTION GUIDELINES

FOR TVA AND DISTRIBUTORS OF TVA POWER

These guidelines are intended to assist TVA and the distributors of TVA power in developing arrangements for the effective utilization of dispersed power production in the Tennessee Valley. TVA develops and administers these guidelines which are applicable for purchases by TVA and by distributors of TVA power from dispersed power production facilities and for utilization of dispersed power production on the region's power system. The guidelines may be modified by TVA from time-to-time as it deems appropriate.

10/01/05 (Guidelines last revision)

10/01/06 (Schedule CSPP last revision)

Distributed Generation Protection

TVA
Transmission Planning Department
Relay Planning Section
&
Electric System Operations
System Protection Department

June 20, 2002
Revision 1

TERMS AND CONDITIONS
(New Delivery Point)

SECTION 1 - COORDINATION

1.1 Objectives of Coordination. The parties agree that it is necessary to coordinate their efforts under this agreement to ensure that the following objectives are met: (a) timely and efficient completion of construction and connection of the New Substation to the TVA system, (b) timely and efficient completion of the metering installation, (c) the safe, reliable, and efficient operation of TVA's facilities, (d) prevention of any undue hazards to TVA's facilities and operations, and (e) the safety of the parties' personnel. Each party will use reasonable diligence in carrying out its responsibilities under this agreement and will notify the other of any significant changes in schedule.

1.2 New Substation Plans and Specifications. Distributor shall consult with TVA in designing the New Substation and shall use plans and specifications that TVA concurs will ensure consistency with objectives (c) and (d) in subsection 1.1 above. Distributor will design, construct, operate, and maintain the New Substation in accordance with good, modern practices and procedures.

1.3 New Substation Protective Scheme. Distributor shall also consult with TVA in planning for the installation, operation, testing, calibration, and maintenance of the protective scheme for the New Substation. Such protective scheme shall include backup protection for the New Substation in the event of failure of primary interrupting devices. As a minimum, backup protection would normally involve secondary interrupting devices and equipment such as backup relays and backup circuit switchers. Distributor agrees not to install, operate, or maintain any protective devices without TVA's concurrence that objectives (c) and (d) in subsection 1.1 above will be fully met.

1.4 TVA Review. Any review by TVA of Distributor's plans provided for in this agreement should not be considered an endorsement that they are adequate for Distributor's purposes. TVA will not unreasonably withhold its concurrence following any such review.

1.5 Metering. TVA and Distributor will coordinate their work under section 2 below to the extent necessary and practicable.

SECTION 2 - METERING

2.1 TVA's Installation Work. TVA at its expense shall provide and install the revenue meter and related items necessary to determine the power and energy taken by Distributor at the New Substation. This metering installation will be at a mutually satisfactory location in the New Substation.

2.2 Distributor's Installation Work.

2.2.1 Current and Voltage Transformers. Distributor shall, at its expense and in accordance with plans and specifications furnished or approved by TVA, install the metering current and voltage transformers (furnished by TVA). This will be done on the source side of any station service transformers and voltage correction equipment.

2.2.2 Miscellaneous Facilities. Distributor shall install all other facilities required for the metering installation, including a prewired meter cabinet (provided by TVA) and the foundation (if necessary) for TVA's meter cabinet, the primary connections from the metering transformers to Distributor's facilities and the conduit (together with any required test boxes) and cable extending from the metering transformer secondaries to the meter cabinet. Distributor will furnish the supplies and materials needed under this subsection 2.2.2, except that TVA will furnish the cable and test boxes.

2.3 Remote Access to Metering Installation.

2.3.1 Installation of Circuit. For TVA's metering purposes, including power quality monitoring, Distributor shall provide and install (or have installed) a telephone circuit (Circuit) and, if needed, protective conduit extending from TVA's revenue meter to a location specified by TVA. If TVA furnishes a telephone switcher, Distributor shall install it at an agreed upon location. Distributor installation of the Circuit and telephone switcher shall be in accordance with guidelines and specifications furnished or approved by TVA. Distributor shall install and then operate and maintain the Circuit (and any such conduit) at its expense. TVA will connect the Circuit to the revenue meter.

2.3.2 Distributor Access to Meter Data. TVA agrees to allow Distributor (a) remote access to TVA's metering data through the Circuit and (b) access to the metering information available from the readout display of the revenue meter. Use of the Circuit and access to the readout display will be coordinated between TVA's and Distributor's operating representatives to ensure unrestricted telephone access by TVA for data retrieval purposes during such periods as specified by TVA.

2.3.3 Remote Access Equipment. It is recognized that Distributor will need equipment not provided by TVA in order to obtain metering data by remote telephone access. If requested, TVA will assist Distributor in selecting such equipment, but acquisition of the equipment shall be the sole responsibility of Distributor.

2.4 Control of Metering Installation. Except as specifically provided otherwise in this agreement (or as agreed otherwise by TVA), the metering installation shall be for TVA's exclusive use and control. It may be used by TVA separately or in conjunction with any other metering facilities of TVA. TVA will place its seals on the revenue meter and metering facilities in the metering installation, and Distributor shall assure that those seals are not broken except at TVA's request.

2.5 Maintenance of Metering Installation.

2.5.1 TVA's Responsibilities. TVA at its expense shall test, calibrate, operate, maintain, and replace the portion of the metering installation provided and installed by TVA.

2.5.2 Distributor's Responsibilities. As requested by TVA from time to time, Distributor at its expense shall perform necessary maintenance (including making of replacements) of the remaining portion of the metering installation. In doing this work Distributor shall furnish the necessary materials, except that TVA shall furnish for installation by Distributor any replacements required for the current and voltage transformers, metering cable, and test boxes.

SECTION 3 - METERING OUTPUTS

3.1 Access to Outputs. Distributor may desire access to metering outputs from the metering installation for such purposes as monitoring and load control, and TVA is willing to make such access available at no charge. Accordingly, Distributor may, at such time as it deems appropriate, provide and install at its expense such additional facilities as are necessary for obtaining access to metering outputs. This includes provision and installation of cable to be connected by TVA to a terminal block in TVA's meter cabinet. Distributor shall also furnish and install any protective facilities requested by TVA for the protection of TVA's metering installation.

3.2 Approval of Facilities. Distributor shall keep TVA informed as to Distributor's plans for installation of any such additional facilities to the extent necessary and practicable. Distributor shall neither install any facilities which are to be connected to the metering installation nor, once installed, change them without prior written notification from TVA that such installation or change is satisfactory to TVA insofar as required for the safe and efficient operation of the metering installation.

3.3 Noninterference With Metering. In exercising access to metering outputs, Distributor shall not interfere with any operation, use of, or access to the metering installation by TVA. In this regard Distributor agrees to immediately modify its facilities and operations, in any manner requested by TVA, to avoid any such interference.

3.4 No Warranty of Outputs. TVA makes no statement, representation, claim, guarantee, assurance, or warranty of any kind whatsoever, including, but not limited to, representations or warranties, express or implied, (a) as to the accuracy or completeness of the metering outputs or as to such outputs' merchantability or fitness for any purposes for which Distributor uses or will use them or (b) as to quantity, kind, character, quality, capacity, design, performance, compliance with specifications, condition, size, description of any property, merchantability, or fitness for any use or purpose of any facilities through which the metering outputs are supplied. Distributor hereby waives, and releases the United States of America, TVA, and their agents and employees from, any and all claims, demands, or causes of action, including, without limitation, those for consequential damages, arising out of or in any way connected with Distributor's use of the metering outputs.

3.5 Termination of Arrangements. The arrangements set out under this section 3, may be terminated by TVA or Distributor at any time upon at least 120 days' written notice. As soon as practicable following the effective date of such termination, TVA will disconnect the cable from the metering installation.

SECTION 4 - ADJUSTMENT OF METERED AMOUNTS

If the metering installation at the New Substation is not at the point of delivery specified in the Power Contract, the metered amounts of power and energy shall be appropriately adjusted to reflect losses (and non-metered station service or equipment use, if any) between the point of delivery and the metering installation. Distributor shall from time to time furnish TVA with the loss data for Distributor's facilities needed to allow TVA to make such adjustments.

SECTION 5 - RIGHTS OF ACCESS

Distributor hereby grants to TVA such rights to use Distributor's property as are reasonably necessary or desirable to enable TVA to carry out its responsibilities under this agreement. These rights include installation, operation, maintenance, replacement, removal, and inspection of TVA's electrical facilities and equipment (including metering equipment) installed in connection with service to Distributor.

SECTION 6 - POWER REQUIREMENTS

Distributor shall at its expense provide the battery and station service power requirements for TVA’s facilities and equipment (including metering equipment) installed at the New Substation.

SECTION 7 - TERM OF AGREEMENT

Except as otherwise provided, this agreement becomes effective as of the date of the agreement and continues in effect for the term of the Power Contract or any renewal, extension, or replacement of it.

SECTION 8 - RESTRICTION OF BENEFITS

No member of or delegate to Congress or Resident Commissioner, or any officer, employee, special Government employee, or agent of TVA shall be admitted to any share or part of this agreement or to any benefit that may arise from it unless the agreement be made with a corporation for its general benefit. Distributor shall not offer or give, directly or indirectly, to any officer, employee, special Government employee, or agent of TVA any gift, gratuity, favor, entertainment, loan, or any other thing of monetary value, except as provided in 5 C.F.R. part 2635 (as amended, supplemented, or replaced). Breach of this provision shall constitute a material breach of this agreement.

SECTION 9 - AMENDMENT

This agreement may be amended only by a writing signed by the parties.