Reclamation Manual

Directives and Standards

TEMPORARY RELEASE
(Expires 03/30/2013)

Methodology Supporting the Identification of Reclamation's Critical Assets

The following is the risk-based methodology that will be employed by Reclamation to identify Critical Assets amongst Reclamation facilities, features, and systems supporting the Bulk Electric System (BES). This document may be revised periodically to support changes in identification criteria or regulatory requirements.

Critical Asset Identification Methodology
Pursuant to NERC CIP-002 Requirement R1

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Version History			
Version	**Date**	**Action**	**Change Tracking**
0	9/04/2008	Methodology draft completed	New
0	9/30/2008	Regional Comments incorporated into draft	Revised
0	10/6/2008	Draft to be sent to BAs/TOPs for comments	Revised
1	1/15/2009	Comments from BAs/TOPs incorporated	Issued
2	12/13/2010	Revised to allow each Region to determine if there is a need for BA/TOP input for each facility, and to correct deficiencies identified in application of the methodology	Revised
3	12/8/2011	Minor edits, added regional role in annual review, added determination of manual-local or manual-remote operation of Blackstart units, added 1500 MW brightline for single facility loss determining critical asset.	Revised

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Pursuant to NERC CIP-002 Requirement R1

Bureau of Reclamation
Technical Resources
Power Resources Office
Denver Colorado
December 2011

Reclamation Manual
Directives and Standards

TEMPORARY RELEASE
(Expires 03/30/2013)

Critical Asset Identification Methodology

Pursuant to NERC CIP-002 Requirement R1

The following methodology is to be used to identify critical infrastructure, facilities, and systems that affect the Bulk Electricity System (BES) that are owned or operated by the Bureau of Reclamation[1]. These facilities are called Critical Infrastructure/Facility Assets (Critical Assets). A list of Critical Assets will be provided to the Director, Information Resources Office, to identify the Critical Cyber Assets as required by the North American Electric Reliability Corporation (NERC) CIP-002 standard. The methodology utilizes a spreadsheet and has four fundamental parts. The first part develops a list of Reclamation assets that need to be evaluated. The second part is an initial assessment of the role of the asset in the BES. The third part includes an assessment of the risk to the BES by the Reclamation asset. The results of Reclamation's initial and risk assessments may be sent to the Balancing Authority (BA) or Transmission Operator (TOP), at the discretion of the jurisdictional Region. The input of the BA/TOP may be considered in Reclamation's final assessment. The BA/TOP may be provided the opportunity to complete additional assessments, concur with Reclamation's information, or modify the results and provide additional documents. The final part consists of completing the risk assessment considering any new or previously supplied BA/TOP information. The results of the risk assessment are compiled into a final list, which is submitted by the Manager, Power Resources Office (PRO), to the Director, Technical Resources for approval, and transmittal to the Director, Information Resources Office.

In the following methodology there are a number of steps where interaction among the PRO and the Directorate representatives for the Reliability Compliance Workgroup is necessary. The various assessments and steps can occur as part of the same review of the actual mechanism for the assessments (i.e. the Excel Workbook spreadsheets).

A. Determination of Reclamation Assets To Be Evaluated

1. The following Generator Owner (GO)/Generator Operator (GOP) assets or systems will be analyzed under the "GO" tabs of the associated Excel spreadsheet:

    a. **Generation Resources –** Generation resources owned or operated by Reclamation. In instances where a Generator Step-up Transformer (GSU) connects to a high-voltage cable, and the terminals of the high-voltage cable connect to the BES, the high-voltage cable will be included as part of the Generation Resource.

[1] The NERC draft document "Security Guideline for the Electricity Sector: Identifying Critical Assets" as extracted from meeting notes of a CIPC Meeting of June 5-6, 2008 was used in the preparation of this methodology.

b. **Control Centers –** Control centers containing primary or backup control systems that are used to monitor and/or operate BES equipment.

Note: control centers that control only one facility (e.g. a control room) are excluded (reference: CIP Guideline entitled "*Control System – Business Network Electronic Connectivity:*" "Those facilities, systems, and equipment that comprise the operational real-time control environment, services, diagnostics, and functional capabilities necessary for the effective and reliable operation of the BES.").

2. The following Transmission Owner (TO) assets or systems, including generator interconnection assets, will be analyzed under the "TO" tabs of the associated Excel spreadsheet:

   a. **Switchyards and Substations** – Switchyards and Substations are facilities containing BES transmission elements that perform electrical element switching, transforming voltage, regulating power, or metering on the BES. They may also contain those elements necessary for a Reclamation generation facility to interconnect to a TOP/BA's transmission system. This may also include transmission line termination equipment owned by Reclamation.

   b. **Transmission Lines** - Transmission lines that are owned by Reclamation. For the purposes of this analysis, equipment included will be the wires and appurtenances, that connect the generator step-up transformer high-side bushings to the Switchyard or Substation, or any other equipment/method used to connect to the BES. High-voltage cables are excluded, as previously identified in Section A.1.a. Generation Resources.

   c. **Systems –**A piece of equipment, or group of equipment, that performs a function essential to maintaining the reliable operation of the BES. Systems, in this case, are those that if destroyed, degraded, or compromised may influence the ability to maintain reliable operation of the BES. This includes systems that support wide-area reliability through: (Note that when a system is a part of a facility otherwise included, it will be analyzed as part of that facility; e.g., a SCADA system is considered a part of the control center with which it is associated.)

      i. Situational awareness,
      ii. Supervising and control capability,
      iii. Special Protection or Remedial Action schemes

iv. Systems essential to BES restoration
v. Other systems that may perform a function directly related to BES system reliability

Systems with a scope limited to a single facility, where that facility has been identified as a Critical Asset, will receive further evaluation as a Critical Cyber Asset. For example, a control system with a scope limited to a single generation resource would not be evaluated as a Critical Asset; however, if the control system is associated with a single generation resource identified as a Critical Asset, it will receive additional evaluation.

3. The PRO will prepare the initial lists of assets to be evaluated. The lists of assets will be transmitted to the Workgroup. The Regional members of the Workgroup will then review or coordinate review of their Region's facilities to determine if the lists are complete and correct. Corrections and changes to the lists will be sent to the PRO for incorporation and consolidation.

B. Initial Assessment

The following criteria will be used to determine whether facilities, systems or equipment are part of the BES, and possibly a Critical Asset.

1. Review NERC criteria for qualifying facilities to identify any changes since last review.

   a. Current criteria from NERC's "Statement of Compliance Registry Criteria[2] (Revision 5.0)" III(c)[3] Generator Owner/Operator: (GO Tabs)

      i. Individual generating unit greater than 20 MVA (gross nameplate rating) and is directly connected to the bulk power system, or;
      ii. Generating plant/facility greater than 75 MVA (gross aggregate nameplate rating) or when the entity has responsibility for any facility consisting of one or more units that are connected to the bulk power system at a common bus with total generation above 75 MVA gross nameplate rating, or;
      iii. Any generator, regardless of size, that is a Blackstart unit, material to and designated as part of a transmission operator entity's restoration plan[4].

[2] http://www.nerc.com/files/Statement_Compliance_Registry_Criteria-V5-0.pdf
[3] Note that criteria III.c.4 is not included, as there are no known Reclamation facilities that would not already be included as part of the other three criteria.

b. Current criteria from NERC's "Statement of Compliance Registry Criteria (Revision 5.0)" III.d. Transmission Owner/Operator (TO Tabs)

   i. An entity that owns/operates an integrated transmission element[5] associated with the bulk power system 100 kV and above, or lower voltage as defined by the Regional Entity necessary to provide for the reliable operation of the interconnected transmission grid; or,
   ii. An entity that owns/operates a transmission element[5] below 100 kV associated with a facility that is included on a critical facilities list[6] that is defined by the Regional Entity (Western Electricity Coordinating Council (WECC)).

2. Review the WECC PRC Regional Standards for Reclamation facilities or features, identified on the Attachments (see TO tabs) to verify accuracy.

3. Other Facilities requiring additional evaluation:

   a. Hydro-generation control centers and backup control centers that control multiple facilities (more than one) (see GO Tabs), or;

   b. Transmission substations/switchyards that support the reliable operation of the Bulk Electric System which are owned/operated by Reclamation (see TO Tabs), or;

   c. Any transmission substation/switchyard/interconnection facilities associated with a generator, regardless of size, that is a blackstart unit, material to and designated as part of a transmission operator entity's restoration plan (see TO Tabs), or;

   d. Special Protection Systems or Remedial Action Schemes that affect Reclamation units, facilities, systems or equipment. (see TO Tabs)

4. Facilities operated under a Delegation Agreement by another party are to be excluded if the other party is responsible for Generator Owner, Generator Operator or Transmission Owner compliance.

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[4] Reclamation does not use Cyber systems to initiate Blackstart at its facilities, but requires that staff be called to the facility. This is to be able to make sure that the facility will be able to start without causing damage to the equipment, or to perform necessary switching to prepare the plant for the Blackstart.
[5] Transmission elements include: circuit breaker, circuit interrupter, disconnect switch, transformer, protection system and related equipment, bus-work, control system, high-voltage conductors, etc.
[6] See PRC-STD-003 Attachment A Table 2 Existing WECC Transfer Paths (BPTP) and Attachment B Table 3 Existing WECC Remedial Action Schemes and for such listings.

5. Generation Interconnection or Transmission Owner assets that consist solely of a short jumper (not to exceed 20 feet) from a GO feature to a TO's line will be excluded from further consideration. The GO features are defined as the equipment (wires and appurtenances, etc.) that connect the generator step-up transformer high-side bushings to the TO's line, or the equipment (wires and appurtenances, etc.) that connect the high-voltage cable pothead termination to the TO's line.

6. Special Protection Systems or Remedial Action Schemes that have been deactivated will be excluded from further consideration (e.g. TOT1A and Grand Coulee Third Powerhouse Transient Excitation Boosting).

7. Any facility, equipment or system that satisfies at least one of the initial assessment criteria will be moved to the next part of the assessment called Risk Assessment Evaluation.

8. PRO will use the above criteria to perform the initial assessment of the lists prepared in step A. above. The lists and initial assessment will be sent to the Workgroup. Each Region's Workgroup member will review or coordinate review of the initial assessment for their facilities. Comments and corrections will be provided to PRO for consolidation into the lists and initial assessment.

C. Risk Assessment Evaluation (Reclamation)

The risk assessment criteria that follow are to be used by Reclamation, in evaluating the facilities passing through the initial assessment.

1. Generation Facilities risk assessment evaluation criteria

   a. Essential generation

      There is the potential for loss of 1500 MW of generation at one facility. (EOP-004-1, NERC Disturbance Report Form item 3)

   b. Essential to "Blackstart"

      Generating units/facilities designated as "Blackstart" as specified in overall coordinated Regional Systems restoration Plans **and** critical to initial system restoration. (EOP–007-0 with applicability to EOP-005-1 and EOP-008-0) An example would be any generator that is designated as Blackstart and is in a restoration plan. Being in a restoration plan does not qualify by itself as a risk

assessment evaluation criteria. Likewise, being capable of providing emergency station power, but not being critical to initial system restoration will not qualify as a risk assessment evaluation criteria

2. Control Center risk assessment evaluation criteria

   a. Provides essential information used by Reclamation to make operational decisions regarding BES reliability.

      The loss of the collection, aggregation, processing, display, or annunciation of data or information from a primary or backup Control Center, is determined by an engineering evaluation or other assessment method, to negatively affect the reliability of the BES. An example of a process is Automatic Generation Control distribution to multiple units/plants.

   b. Essential for inter-utility data exchange critical to reliable BES operation.

      The loss of inter-utility data exchange from the primary or backup Control Center is determined by engineering evaluation to negatively impact the reliability of the BES.

   c. Essential for the control of, or data acquisition from a Critical Asset.

      The loss of supervisory control or data acquisition function for a Critical Asset could negatively impact the reliability of the BES. This criterion includes Special Protection or Remedial Action Schemes. This criterion does not apply when the Critical Asset satisfies only C.1.b. above or C.3.a below.

   d. Essential for control or data acquisition for a set of BES assets determined collectively to be critical to reliable BES operation.

      Loss of supervisory control or data acquisition function for a set of BES assets determined collectively, by an engineering evaluation or other assessment method, to be critical to reliable BES operation.

3. Transmission Facilities risk assessment evaluation criteria

    a. Essential to restoration

        i. The switchyard/substation is associated with Generating units/facilities designated as "Blackstart" as specified in overall coordinated Regional Systems restoration Plans **and** critical to initial system restoration (EOP–007-0 with applicability to EOP-005-1 and EOP-008-0), or;

        ii. The switchyard/substation or line is included as part of a Cranking Path documented in the regional system restoration plan (EOP-005-01).

    b. Essential to critical generation

        i. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, may result in the loss of generation identified as a Critical Asset, or;

        ii. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, may result in loss of 1500 MW or more of generation. (EOP-004-1)

4. Special Systems risk assessment evaluation criteria

    a. Essential to operation of a Special Protection Scheme (SPS) or Remedial Action Scheme (RAS) critical to the reliability of the BES.

        The equipment is part of a SPS/RAS as identified in BA, TOP, Reclamation or regional system protection documentation.

    b. Essential by virtue of their functions to the BES.

        Engineering evaluation determines the asset to be critical to reliable operation of the BES. RASs that only impact the local BES will not be considered critical assets. (E.g. a RAS to back off generation on radial lines if the ambient temperature and generation exceed preset amounts.)

5. The PRO will prepare the initial risk assessment evaluation and transmit the evaluation to the Workgroup for correction and comment.

D. Initial Summary of Critical Assets

1. Those powerplants, control centers, transmission features, SPS/RAS features or equipment, that are not removed by the excluding factors, and satisfy one or more of their associated risk evaluation criteria will be designated as Critical Assets.

2. Critical Assets will be compiled in a list; along with a summary of the criteria used to identify the Asset as critical.

3. The PRO will prepare the initial summary of Critical Assets and transmit the summary to the Workgroup for correction and comment.

E. Coordination with BAs and TOPs

1. Following consolidation of comments received on steps A through D, the PRO will transmit the lists, assessments and summary to the Workgroup so that the Regions can perform the tasks in steps E and F.

2. Each Region should consider the need to coordinate this risk assessment with their facility's BAs and TOPs. If no changes, to the facilities or the interconnected system, have occurred since the prior risk assessment, the Region may decide not to request input from the BA/TOPs, as their input would not have changed. If the Region determines that no additional input is necessary, the assessment process for that asset would proceed to section G.

3. After Reclamation's initial determination of the Critical Assets, the listing of each step of the process will be sent to the impacted BAs and TOPs. They will be asked to comment on the following:

    a. Are there assets that should be included in, or removed from the evaluation methodology?

    b. Are there assets whose description needs clarification or to be changed? If so what are their recommended changes.

    c. For individual assets, are there any Reclamation risk assessment evaluations that should be changed? Evaluations that should be changed will require the BAs or TOPs to provide evidence in the form of a copy of an engineering evaluation, authoritative studies or other documentation to support the requested change.

4. The impacted BAs and TOPs will be requested to address the criteria listed in the following section, and provide supporting evidence if criteria apply to a facility, feature, equipment or system.

F. Risk Assessment Evaluation (BA/TOP)

An assessment of the risk criteria may require input from the BAs or TOPs (primarily Western and Bonneville for Reclamation Facilities). Such input can be for the normal conditions, or for recurring operating conditions of limited duration, such as during particular line outages for maintenance.

1. Generation Facilities risk assessment evaluation criteria

    a. Essential generation

        i. Loss of either a single unit or combined units (subject to common mode failure) at a generation plant could cause the impacted BA to violate its Contingency Reserve requirements (BAL-002 R1).

        ii. There is the potential for loss of 1500 MW of generation at one facility. (EOP-004-1, NERC Disturbance Report Form item 3)

    b. Essential to voltage support

        Loss of either a single unit or combined units (subject to common mode failure) at a generation plant, as determined by an engineering evaluation or other assessment method, which may result in:

        i. Sustained voltage excursions equal to or greater than ±10 percent (EOP-004-1), or;

        ii. Frequency or voltage going below the under-voltage load shed points for the BA, TOP or Reclamation (EOP-004-1), or;

        iii. System-wide voltage reductions of 3 percent or more (EOP-004-1), or;

        iv. System Operating Limit (SOL) or Interconnection Reliability Operating Limit (IROL) violation (FAC- 011-2).

c. Essential to Frequency Response

Loss of either a single unit or combined units (subject to common mode failure) at a generation plant, as determined by an engineering evaluation or other assessment method, which may result in frequency going below the under-frequency load shed points for the BA, TOP, or Reclamation (EOP-004-1).

d. Essential to constraint mitigation

i. A generating unit or plant has been determined essential to BES reliability through an engineering study and deemed "must run for reliability[7]".

ii. The loss of the generation, as determined by an engineering evaluation or other assessment method, may result in a SOL or IROL violation (FAC-011-2).

e. Essential to "Blackstart"

Generating units/facilities designated as "Blackstart" as specified in overall coordinated Regional Systems Restoration Plans **and** critical to initial system restoration. This is broken into two related questions: Is the Blackstart to be done manually (Local-Manual or Local-Automatic) at the plant or by Supervisory Control (Remote).
(EOP–007-0 with applicability to EOP-005-1 and EOP-008-0)

2. Control Centers risk assessment evaluation criteria

a. Provides essential information used by BA or TOP to make operational decisions regarding BES reliability.

The loss of collection, aggregation, processing, display, or annunciation of data or information from a primary or backup Control Center to the BA or TOP, is determined by an engineering evaluation or other assessment method, to negatively affect reliability of the BES. An example of a process is Automatic Generation Control distribution to multiple units/plants.

b. Essential for inter-utility data exchange critical to reliable BES operation.

[7] To the extent that the "must run for reliability" determination was a system study and not a product and/or caused by market created flows, is to be considered critical.

The loss of inter-utility data exchange from the primary or backup Control Center determined by engineering evaluation to negatively impact the reliability of the BES.

c. Essential for the control of, or data acquisition from a Critical Asset.

The loss of supervisory control or data acquisition function for a Critical Asset could negatively impact the reliability of the BES. This criterion includes Special Protection or Remedial Action Schemes. This criterion only applies for Blackstart Critical Asset when they can be started for Blackstart by Supervisory Control; see 1.e. above or 3.a below.

d. Essential for control or data acquisition for a set of BES assets determined collectively to be critical to reliable BES operation.

Loss of supervisory control or data acquisition function for a set of BES assets determined collectively, by an engineering evaluation or other assessment method, to be critical to reliable BES operation.

3. Transmission Facilities risk assessment evaluation criteria

a. Essential to restoration

i. The switchyard/substation is associated with generating units/facilities designated as "Blackstart" as specified in overall coordinated Regional Systems Restoration Plans **and** critical to initial system restoration. This is broken into two related questions: Is the Blackstart to be done manually (Local-Manual or Local-Automatic) at the plant or by Supervisory Control (Remote). (EOP–007-0 with applicability to EOP-005-1 and EOP-008-0), or;

ii. The switchyard/substation or line is included as part of a Cranking Path documented in the Regional System Restoration Plan (EOP-005-01).

b. Essential to critical generation

i. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, that may result in the loss of generation identified as a Critical Asset.

ii. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in loss of 1500 MW or more of generation. (EOP-004-1)

iii. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in a SOL or IROL violation (FAC-011-2).

c. Essential for voltage support.

i. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in: (EOP-004-1)

a.) Sustained voltage excursions equal to or greater than ±10 percent, or;
b.) Frequency or voltage going below the under-voltage load shed points of the BA, TOP or Reclamation, or;
c.) System-wide voltage reductions of 3 percent or more.

ii. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in a SOL or IROL violation (FAC-011-2).

d. Essential for frequency support.

The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in Frequency or voltage going below the under-frequency load shed points of the BA, TOP or Reclamation.

e. Essential for system stability.

i. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method or other assessment method, which may result in: (EOP-004-1)

a.) Complete operational failure or shutdown of the transmission system, or;
b.) Diminished system restoration capability, or;
c.) Transmission line thermal limits exceeded beyond 135 percent of normal rating, or;
d.) Impact to reliability of a neighboring system.

NOTE: If a WECC defined path Operator states that it does not believe that, a given line of the path is critical to system stability that will be a consideration in determining if the element is critical.

ii. The loss of the switchyard/substation, as determined by an engineering evaluation or other assessment method, which may result in a SOL or IROL violation. (FAC-011-2)

4. Special Systems risk assessment evaluation criteria

   a. Essential to operation of a Special Protection Scheme (SPS) or Remedial Action Scheme (RAS) critical to the reliability of the BES.

      The equipment is part of a SPS/RAS as identified in BA, TOP, and Reclamation or Regional System Protection documentation.

   b. Essential by virtue of their functions to the BES.

      Engineering evaluation determines the asset to be critical to reliable operation of the BES. RASs that only impact the local BES will not be considered critical assets. (E.g. a RAS to back off generation on radial lines if the ambient temperature and generation exceed preset amounts.)

G. Final Determination of Critical Assets including Review of any Comments Received from the Coordination with BAs and TOPs

The final determination will be made by Reclamation. New or previous comments and supporting evidence from the BAs and TOPs, and supporting documents will be reviewed. The Regional Workgroup representative will update the lists, initial assessment, and risk assessment evaluation based on any input they have received from their TOP's and BA's. Based on Reclamation's assessment criteria and the comments from the BA/TOPs and the supporting documents provided, each facility, which passed through the Initial Assessment, will be evaluated to determine if it is a Critical Asset. After PRO receives the revised the lists, initial assessment, and risk assessment evaluations from the regions, they will be consolidated into the final workbook for that review. The summary lists of Critical Assets will be updated to reflect any changes.

H. Final Summary of Critical Assets

1. Those powerplants, control centers, transmission features, SPS/RAS features or equipment, that are not removed by excluding factors and satisfy one or more of their associated risk evaluation criteria will be designated as Critical Assets.

2. Critical Assets will be compiled, by PRO, in a finalized list; along with a summary of the criteria used to identify the Asset as critical.

I. Approval of the Critical Assets

The Critical Assets list will be sent to the Senior Advisor, Hydropower, for review. Once the Critical Asset list has been reviewed by the Senior Advisor, Hydropower, the Critical Asset list will be finalized. The final Critical Asset list will be submitted to the Director, Technical Resources for approval by the Manager, Power Resources Office.

J. Transmittal of the Approved Final Summary of Critical Assets

The approved Critical Asset list will be transmitted to the Director, Information Resources Office for use in determining and reviewing the Critical Cyber Assets. In addition, copies will be transmitted to each of the Reliability Council Representatives

K. Documentation

Documentation supporting the evaluation of an asset as a Critical Asset will be retained in the files until: (1) the asset is removed from being a Critical Asset, (2) revised supporting documentation is received, or (3) the existing documentation exceeds five years since the last revision.