

Table of Contents

Purpose	1
1. Responsibilities	2
2. Scope/Applicability	
2.1 Background	
2.2 Scope/ Applicability	
3. Procedure Detail	
3.1 Methodology	3
3.2 Current Day, Next Day and Seasonal Planning Processes	4
3.2.1 Current Day Planning Process	
3.2.2 Next Day Planning Process	
3.2.3 Next Day Planning Analysis	7
3.2.4 Seasonal and Annual Planning Process	7
3.3 Coordination with and Notification to Other Entities and Authorities	9
3.3.1 Next Day Planning Coordination	9
3.3.2 Current Day Planning Coordination	
3.3.3 Seasonal Planning Coordination	. 10
3.4 Operating Instructions for Planned Outages	. 10
3.5 Maintaining Accurate Computer Models for Studies	. 11
3.6 Non-BES Facilities and Remedial Action Schemes	12
4. Supporting Information	12
Operationally Affected Parties	12
References	. 12
Definitions	. 13
Version History	
5. Periodic Review Procedure	. 14
Review Criteria & Incorporation of Changes	. 14
Frequency	
Appendix	14

Purpose

This document guides the California ISO (CAISO) Operations Engineers (OEs) in performing normal operations planning to ensure the (CAISO) Controlled Grid is operated in a safe and reliable manner in accordance with NERC and WECC Reliability Standards.



1. Responsibilities

CAISO Operations Planning Engineer	Perform operating studies as required for developing seasonal plans, developing operating instructions for planned outages, coordinating with and notifying other entities and authorities, and maintaining accurate computer models and tools related to the operating studies.	
CAISO Real- Time Operations Engineer	Perform operating studies as required for developing plans for Operations Planning Analysis to develop Operating Plans for current day and next day as well as developing operating instructions for planned and forced outages, coordinating with and notifying other entities and authorities, and maintaining accurate computer models and tools related to the operating studies.	

2. Scope/Applicability

2.1 Background

The CAISO maintains a set of current Operating Plans for reliable operation of the CAISO Controlled Grid as part of its Current Day, Next Day and Seasonal Planning process.

The Current Day and Next Day plans are based on engineering studies of the expected system topology, which includes planned and unplanned outages. Recommendations from these studies are documented in outage cards within the CAISO Outage Management System (OMS). The Seasonal Plans are documented in the Operating Procedures that OEs develop and keep up to date.

For Current Day, Next Day and Seasonal Planning, OEs perform engineering analyses to determine any potential reliability risks, potential SOL exceedances, develop Control Points (CPs), validate System Operating Limits (SOLs) and document instructions to mitigate any identified reliability risks.

The CAISO analysis and studies include known system configuration, including current planned and unplanned system facility outages, generation dispatch, Interchange Schedules, and Load patterns. The intent of these studies is to ensure the CAISO will not burden the Interconnection as a result of unscheduled changes in system configuration or generation dispatch, while meeting capacity and energy reserve requirements, voltage and reactive requirements, Interchange Schedules and ramps, and operating within System Operating Limits (SOL) and identified Interconnected Reliability Operating Limits (IROLs).



2.2 Scope/ Applicability

This document addresses the following specific topics:

- General Information
- Study Methodology
- Current Day, Next Day and Seasonal Planning Processes
- Coordination with and Notification to other Entities and Authorities
- Operating Instructions for Planned Outages
- Maintaining Accurate Computer Models for Studies

3. Procedure Detail

3.1 Methodology

OEs perform operating studies as required for developing current day, next day and seasonal plans in order to:

- Analyze reliability issues and risks and develop any required Control Points.
- Identify any required SOLs to be monitored.
- Recommend specific mitigation actions/steps to mitigate verified concerns in RTCA stay within any set limits in order to minimize reliability risks.
- Analyze any risks that may impact the Diablo Canyon Power Plant (DCPP) per PGAE's System Dispatch Instruction O-23, Operating Instruction for Reliable Transmission Service to DCPP.
- Identify non-BES facilities within and outside CAISO Transmission Operator (TOP) Area that are necessary to be included in OPA and Real-Time Assessments.
- Identify Remedial Action Schemes (RAS) outside CAISO TOP Area that are necessary to be included in OPA and Real-Time Assessments.

These operating studies include, but are not limited to, steady state power flow, voltage stability and transient stability. In performing these studies, OEs follow the guidelines defined in the CAISO Operating Procedure 3100, Establishing System Operating Limits for the Operations Horizon.

To ensure system reliability, OEs may perform operating studies and calculate Transfer Capability as outlined in the CAISO Tariff Appendix L. Details on how studies are performed, analyzed, documented and communicated for different time horizons are provided in the next section.



3.2 Current Day, Next Day and Seasonal Planning Processes

Operations planning covers the current day, next day and seasonal time horizons. Each of these processes are detailed below.

3.2.1 Current Day Planning Process

This is also referred to as the Real-Time or same-day operations planning process. The default Current Day Planning process is to follow Operating Procedures developed as part of the Seasonal Planning process and/or Engineering recommendations in outage cards as provided for in the Next Day Planning Process. The need to update the Current Day planning process is usually triggered by a Real-Time event that may require additional operating studies to protect the system against the next critical contingency or contingencies and to update previously enforced CPs/SOLs, or to add new CPs/SOLs.

A Real-Time study is needed when the system configuration changes and there is not an offline study available that sufficiently depicts the Real-Time system configuration, or if Operating Personnel request a study to be performed due to changes in expected system conditions. (e.g., urgent outages, forced outages PSPS, wildfire or load forecast changes) In addition, the OEs or Transmission Dispatchers conduct daily assessments for the Current Day planning process by reviewing the system conditions and changes in the assumptions used in the Next Day Planning process. If the changes in the assumptions are significant, further analysis is performed to identify and address any potential reliability concerns. The revised or new mitigation plans, if required as a result of Current Day studies, may include generation commitment recommendations, development or revision of CPs/SOLs, and development or revision of Real-Time monitoring tools for System Operators. The Operating Plans for outages are documented in outage cards.

The current day operations planning process is further described as follows:

- CPs/SOLs are established based on Operating/Real-Time studies. System Operators observe established CPs/SOLs by monitoring the Energy Management System (EMS), RTCA, Real-Time PI tools, and Excel nomograms.
- Following a significant event in Real-Time, a System Operator may contact and request a review of the event by an OE or study it themselves.
- OEs or Transmission Dispatchers perform operating studies and determines if new CPs/SOLs and/or generation dispatch instructions are required, and documents the results accordingly in the outage card that is created to track the Real-Time event.
- As needed, the OE revises existing Real-Time monitoring displays, or develops new displays, based on newly determined CPs/SOLs. (This is for PI and it will be going away with violation trending in RTCA)



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Normal Operations Planning Process

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- OEs or Transmission Dispatchers performs daily assessment of Current Day system conditions after midnight for the current operating day and updates the Next Day Planning studies as required.
- OE communicates his/her recommendations to the CAISO System Operators.
- In accordance with Reliability Standard FAC-014, the CAISO System Operators will communicate any SOL changes and/or instructions to affected BAs, TOPs and the RC through OMS, and/or phone calls to ensure that normal Interconnection operation will proceed in a reliable and consistent manner.
- Identified procedure constraints, such as nomograms, contingencies, flowgates and MOCs, are implemented according to CAISO Operating Procedure <u>3610</u> <u>Nomograms, TCORs, Flowgates, Contingencies, and MOC</u>.

3.2.2 Next Day Planning Process

The next day planning process covers planned operations for the operating day+1.

The Next Day planning process enables the CAISO to ensure that Control Points can be managed and meet SOLs, and not exceed any identified IROL for scheduled system configuration incorporating current planned and unplanned outages, generation dispatch, Interchange scheduling and load patterns. The Next Day Planning process is comprised of conducting daily analysis for the operating day +1. Details of the "Study" and "Analysis" tasks for Next Day planning are outlined below.

The CAISO Day-Ahead Market process accounts for expected system configuration incorporating current planned and unplanned outages, generation dispatch, Interchange scheduling and load patterns, based on approved outages. The process ensures system reliability by dispatching generation to meet load and Interchange while respecting expected transmission constraints. The OE reviews the Day-Ahead Market results to ensure that Control Points can be adequately managed and no SOL or IROL exceedances are expected for the next operating day. In addition, for the Operational Planning Analysis, the OEs conduct Day-Ahead Reliability Analysis studies every day to review expected planned transmission and/or generation outages, generation dispatch and load patterns and ensure that no SOLs or IROLs are exceeded for the Day-Ahead target date. With System Operator input, Operating Plans are developed and adjustments are considered for any reliability concerns identified through studies.

These Operating Plans include generation commitment recommendations, development of CPs, identification of SOLs that require monitoring, and development of real-time monitoring tools for System Operators. The Operating Plans for Outages are documented in outage cards.



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OEs/Grid Operators will follow these steps as appropriate in planning for next day operations per the pre-defined timeline:

- Set up study base case(s) to account for expected system conditions, including, but not limited to, system load, generation pattern, import/export levels and expected planned Outages within the CAISO and neighboring region.
- Run power flow and contingency analysis for all credible contingencies and document the mitigation steps in the Operational Planning Analysis, which is called the Day-Ahead Reliability Analysis (DARA) report.
- Run additional stability studies for normal and/or contingency conditions, as appropriate and determined by the responsible engineer(s).
- Analyze the study results to ascertain reliability risks and to determine any reliability requirements in the form of CPs/SOLs that protect for normal conditions and against all credible contingencies.
- Evaluate any operating instructions and operating limits from the PTOs to determine if any revisions are necessary.
- Obtain, verify, and utilize System Operator input.
- Document any revisions to the outage related Operating Plan(s) which include, but are not limited to, CPs/SOLs and instructions in the Market Impacts section of the OMS card for the operating day.
- Develop and make available any Real-Time monitoring tools/displays for the operating day to show the expected N-1 flows and N-1 flow limits.
- Review the RC's Next Day Reliability Analysis report for any inconsistencies and resolve any issues or conflicts by working with the RC study engineer.
- Share the DARA report with the RC and adjacent BAs and TOPs by uploading the report to the secure <u>RC West Portal</u>.

Notify Operations Planning and PTOs of aforementioned revision to ensure consistency. In accordance to FAC-014 Reliability Standards, The CAISO System Operators communicate any Operating Plan changes and/or instructions to the affected neighboring BAs, TOPs and the RC through OMS and/or phone calls to ensure that normal Interconnection operation will proceed in a reliable and consistent manner.



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3.2.3 Next Day Planning Analysis

Operating personnel conduct daily analysis as part of the Next Day planning process. Listed below are some of the steps taken by Operating Personnel to implement Operating Plans:

- Commit sufficient generation within various pockets (local areas) of the CAISO grid that have reliability requirements. These generation requirements are based on Operating Procedures developed by OEs to address reliability concerns for local pockets.
- Commit sufficient generating units to mitigate potential congested areas due to planned or unplanned transmission outages.
- Procure sufficient operating reserves to meet the operating criteria as required by NERC and WECC Standards.
- Procure sufficient regulation to meet CPS and BAAL requirements to ensure Interchange schedule ramps can be met.

System Operators also participate in the next day system planning and study processes to include operating personnel perspective, and maintain their awareness of the planning purpose. In this regard, Operations staff goes through the following daily process:

- Operations has daily meetings, at least twice a day. The OE, Outage Coordinators and other Operations personnel attend these regularly scheduled meetings at 0800 and 1530 Monday through Friday.
- The 0800 meeting is to discuss and evaluate current system conditions, studied system conditions and planned system conditions. The main focus is to review the operational plan for the next day. Address system reliability and market operations concerns as needed.
- The 1530 meeting follows the same evaluation, with focus on day-ahead market results, system reliability, verification of unit commitment, and acknowledgement from system operations real-time representatives that the next day plan is without operational concerns. This meeting also examines the next day to three (3) days out time frame for reliability and market issues and concerns. Additional meetings are scheduled as deemed necessary by System Operations management.

3.2.4 Seasonal and Annual Planning Process

The Seasonal Planning Process entails planning for the upcoming operating season. The Seasonal Planning work starts several months prior to the Operating Season, and Seasonal Plans are implemented on or just before the first day of a new operating season. All seasonal plans shall incorporate the current Outage Management Long Range Outage Plan affecting all Bulk Electric System (BES) equipment.



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Normal Operations Planning Process

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Seasonal Planning for the 500 kV grid:

CAISO OEs conduct operating studies for the 500 kV grid to prepare Seasonal plans. These studies are performed as part of the seasonal OSS studies and are coordinated among various entities (including other Balancing Authorities, Transmission Operators and the Reliability Coordinator) within WECC. The CAISO OEs perform and coordinate the seasonal studies for California-Oregon Intertie (COI, Path 66)-Sierra-NW/Pacific DC Intertie (PDCI, Path 65) North-to-South studies. The main goal of the OSS process is to establish seasonal TTCs and identify any potential long term N-1-1 IROLs. The study process also includes integrating new major transmission and generation projects into the grid, analyzing their impacts on system reliability and on the BES. Based on the analysis of the seasonal OSS study, the CAISO OEs document and update bulk system operating procedures with newly established TTCs for the major paths. All the TTC updates and operating procedure changes are made effective on the first day of the studied operating season. Seasonal TTC changes are communicated through the WECC Process to the affected neighboring BAs, TOPs and the RC.

Seasonal Planning for the rest of the CAISO grid:

As part of developing Seasonal Plans for rest of the CAISO grid, Operating studies are conducted and operating procedures are updated, as necessary, to reflect any changes in seasonal CPs, SOLs, default switch positions, RAS logic changes, etc.

Annual Operations Planning:

As part of the Annual Operations Planning process, OEs present an operational outlook to the System Operators on an annual basis, normally before the summer operating season. The main purpose of this is to communicate any significant changes to the system and to operating procedures and to seek feedback from Real-Time operations. This outlook covers known additions, modifications, and enhancements to the CAISO Controlled Grid and assumed load and generation patterns. Operating personnel are able to provide feedback from their perspective to the known changes, assumptions and identify operational concerns for further review. With this feedback as the starting point, OEs prepare a list of reliability and congestion issues in local areas, and documents these issues with mitigation recommendations in the seasonal operating procedure update cycle.

Operating Procedures:

Operating procedures document operating limits and instructions for both system normal conditions and for select N-1 and/or N-2 contingency conditions. These procedures typically cover the following items:

• Identifying Reliability concerns

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- Identifying CPs, SOLs and IROLs that can potentially become limiting in real-time operations
- Delineating mitigation options

These procedures are updated either seasonally or on an as-needed basis.

Results of Seasonal studies, annual studies, and any other studies needed to integrate new generation and transmission into the grid are documented in various Operating Procedures. In terms of CPs that need to be monitored, SOLs or IROLs that need to be respected, and Generation that needs to be committed in the Day-Ahead to meet Critical Contingency needs for various areas within the CAISO.

All operating procedures developed by OE staff that require major modifications need to be approved by key operating personnel.

Operating Tools:

OEs develop various operating tools for Operating personnel for daily use and for monitoring. These tools are maintained by OEs as part of the Seasonal/Annual Planning process, or as needed based on expected system topology. The types of tools utilized in Real-Time includes, but is not limited to:

- PI Displays
- EMS displays
- State Estimator
- Real-Time Contingency Analysis
- Other Advanced Real-Time tools available to OEs (e.g. Real-Time Voltage Stability Analysis, etc.)

Capacity commitment tools are to be used by Operating personnel for daily capacity commitment based on reliability needs for various load pockets.

3.3 Coordination with and Notification to Other Entities and Authorities

3.3.1 Next Day Planning Coordination

The CAISO coordinates its next day plan with its neighboring BAs, TOPs and the RC as follows:

The next day operations planning is coordinated with neighboring BAs, TOPs and RC through OMS. Any studies conducted by OEs for scheduled/forced Outages, and CPs/SOLs established as a result of these studies are coordinated with affected parties through OMS.



California ISO Operating Procedure

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Normal Operations Planning Process

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The CAISO Operations Planning staff communicates the Next Day Operating Plan to neighboring BAs, TOPs and RCs through OMS, as applicable, and wherever confidentiality agreements allow. The Next Day Operating Plan(s) are communicated to the RC for all scheduled Outages. If a scheduled Outage impacts only a local area, then the Next Day Operating Plan is coordinated with the TOP for this local area. If a scheduled Outage impacts a neighboring BA and TOP (such as an Outage for an intertie), then the Next Day Operating Plan is communicated to all affected BAs and TOPs. All current Outages are made available to the RC by 1200 the day prior to the operating day.

In addition to this, OEs work closely with Engineers at affected neighboring TOPs and BAs when preparing the Next Day Operating Plan(s).

3.3.2 Current Day Planning Coordination

The CAISO coordinates its current day Operating Plan with its neighboring BAs, TOPs and the RC as follows:

The current day operations plan is coordinated with neighboring BAs, TOPs and the RC through OMS. Any studies conducted by OEs for scheduled/forced Outages, and CPs/SOLs established as a result of these studies, are coordinated with affected parties through OMS. The CAISO communicates the Next Day plan to neighboring BAs, TOPs and RC through OMS, as applicable, and wherever confidentiality agreements allow. The Next Day Plan is communicated with the RC for all planned and unplanned Outages. If an Outage impacts only a local area, then the Next Day Plan is coordinated with the TOP for this local area. If an Outage impacts a neighboring BA and TOP (such as an Outage for an inter-tie), then the Next Day Plan is communicated to all affected BAs and TOPs.

3.3.3 Seasonal Planning Coordination

Seasonal planning coordination is done through the WECC OSS process and through operating procedure updates. TTC studies are conducted based on assumptions, criteria and methodology set forth in the seasonal study plans and the WECC OSS handbook. Any potential long-term N-1-1 IROLs are also identified as part of this study process. All the study results and changes to major paths TTCs need to be approved by the WECC committee and are shared with all the WECC OSS process participants, including neighboring BAs, TOPs and the RC.

3.4 Operating Instructions for Planned Outages

Outage cards document Operating Plans for operating conditions with planned transmission or generation Outages. OEs study the outage conditions to assess the reliability risks based on the reliability criteria, and determine CPs/SOLs and mitigation plans for pre and post contingency actions. OEs document and communicate the study results in the form of CP



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and PI displays for monitoring Real-Time conditions. Identified OMS constraints, such as nomograms, contingencies, flowgates and MOCs, are implemented according to Operating Procedure <u>3610 Nomograms, TCORs, Flowgates, Contingencies, and MOC</u>.

Outage cards can be used to communicate Operational Plans with neighboring BAs, TOPs and other operating entities that may be affected by the CPs/SOLs in both the current day and next day processes.

3.5 Maintaining Accurate Computer Models for Studies

Accurate computer models are maintained in several ways. Some examples are:

- OEs update GE Positive Sequence Load Flow (GE PSLF) software base cases for Area Planning studies to reflect the topology of the current system and the relevant seasonal assessment operating limits.
- OEs develop GE PSLF base cases for three seasons every year -spring, summer and winter (starting cases used for this are WECC operating power flow base cases). These cases are used as the baselines for seasonal assessment of major transmission path (COI, P15, P26 and SCIT) TTCs or studied limits, which are incorporated in associated operating procedures.
- The CAISO Network Applications Group updates the EMS model, based on seasonal study results and regular database build schedule, to capture any new transmission / generation or other network topology changes. This network model is frequently used by Operations and OEs to perform operational studies. New facility projects are managed through CAISO's RIMS process.
- OEs develop and maintain various screens/tools to help Operations monitor critical CPs/SOLs for normal and scheduled/forced Outage conditions and to reflect any CP/SOL changes from seasonal studies.

OEs compare offline study results with Real-time events on a regular basis to verify the accuracy of the offline study models. OEs check flow patterns and voltage levels following a system event. The system events may include a major disturbance that requires system disturbance reporting. The System Operator may also alert the OE when he/she observes flow patterns or voltage levels in Real-Time that do not match what the OEs had predicted following a planned outage.



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3.6 Non-BES Facilities and Remedial Action Schemes

As described in Sections 3.1 through 3.4, CAISO staff perform various analyses and studies and this could lead to identification of non-BES facilities and RAS outside CAISO TOP Area that should be monitored for determining SOL exceedances.¹

As needed, the OEs, in coordination with Transmission Planning and PTOs, decide whether to model non-BES facilities within and outside CAISO TOP Area and RAS outside CAISO TOP Area.

OEs will discuss potential new requirements with PTOS and CAISO EMS staff in order to maintain an adequate level of granularity for both State Estimator and Real-Time Contingency Analysis. If needed, the OEs will request the inclusion of non-BES facilities within and outside CAISO TOP Area and RAS outside CAISO TOP Area. The main consideration to include non-BES facilities is their impact on flows and voltages of BES facilities. Transmission Planning and OEs will determine non-BES facilities that significantly affect BES and whether additions to the network model are required. An example of non-BES facilities that require inclusion are lower voltage facilities that provide alternate flow paths to BES facilities.

Once the non-BES facilities and RAS are added to the network model, the facilities can be monitored by System Operators in real-time, are included into security analysis, the outage review process.

4. Supporting Information

Operationally Affected Parties

Shared with the Public.

References

Resources studied in the development of this procedure and that may have an effect upon some steps taken herein include but are not limited to:

CAISO Tariff	
CAISO Operating Procedure	<u>3350 Nuclear Plant Interface Coordination</u> <u>3610 Nomograms, TCORs, Flowgates, Contingencies, and MOC</u>
NERC Requirements	NUC-001-4 R9.3.3

¹ TOP-001-5 R10

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	TOP-001-5 R10 TOP-002-4
WECC Criterion	
Other References	PGAE Operating Instructions:
	O-23 Operating Instructions for Reliable Transmission Service to Diablo Canyon Power Plant
	Contracts/ Agreements:
	NPIR Agreement between PGAE, Generation - DCPP, Electric Operations and Engineering Department and the CAISO.
	Letter Agreement Between the Transmission Entities and the San Onofre Nuclear Generating Station During Decommissioning Activities.

Definitions

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have that meaning when capitalized in this Operating Procedure.

The following additional terms are capitalized in this Operating Procedure when used as defined below:

None.

Version History

Version	Change	Date
5.0	Updated to accommodate retirement of TOP-007-WECC-1, revision of Peak RC SOL Methodology for the operations horizon and incorporation of Control Points.	4/01/17
5.1	Section 3.3.1: Removed "BES" reference as it relates to outage coordination. Added new Section 3.6 to include non-BES facilities within and outside ISO Transmission Operator Area and Remedial Action Schemes outside ISO Transmission Operator Area into scope of methodology. References Section: Added TOP-001-4 and TOP-002-4 references. Minor formatting and grammar updates.	7/12/18

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10/26/23

6.3

Version	Change	Date
6.0	Periodic Review: Section 3.2.2: Replaced reference to www.Peak.org with RC West Portal. Replaced PG&E with PGAE. Minor format and grammar updates. Added document control statement in footer.	12/19/19
6.1	Section 3.2.1: Included example and other minor updates for clarity. Section 3.2.2: Minor edit for clarity. Updated NERC Requirements, replaced instances of ISO with CAISO, removed history prior to five years and minor format and grammar updates.	2/17/22
6.2	Periodic Review: Section 3.2.3: Removed last bullet from second paragraph bullet list regarding weekends and holiday next day planning. Removed history prior to five years.	8/12/22
6.3	Removed references of the RC's COS system as this is no longer applicable with RC West. Minor formatting and grammar edits.	10/26/23

5. Periodic Review Procedure

Review Criteria & Incorporation of Changes

There are no specific criteria for reviewing or changing this document, follow instructions in CAISO Operating Procedure 5510.

Frequency

Every three (3) Years

Appendix

No references at this time.