BC HYDRO

T&D SYSTEM OPERATIONS

SYSTEM OPERATING ORDER 7T-41

VANCOUVER ISLAND SYSTEM OPERATION

Supersedes SOO 7T-41 dated 26 November 2021

Effective Date: 22 April 2022

Review Year: 2026

APPROVED BY: *Original Signed by*
Bob Cielen
Operations Planning Manager,
T&D System Operations

- Requires same day posting on bchydro.com and on BCRC Extranet upon release.
- Requires same day MRS conveyance notification upon posting

Indicates Revision ‖

CONTENTS

1.0 GENERAL

This System Operating Order (SOO) provides the operating instructions, operating limits, alarms, outage requirements, and RAS arming requirements for operating the Vancouver Island – Lower Mainland connection, The System Operating Order provides details rules and procedures for load shedding, for generation shedding, outage requirements, load supply capability requirements for the Vancouver Island operating area. Further detailed in this SOO are the rules for RAS arming and alarming implemented by the Energy Management System (EMS) Transient Stability Analysis (TSA-PM) application, for automated actions and to support BCHCC Operator awareness.

The transmission paths to supply Vancouver Island (VI) loads from the Lower Mainland (LM) include:

- 2L129 - a single 230 kV circuit connecting Arnott Substation (ARN) to Vancouver Island Terminal (VIT) via submarine cable and overhead transmission and a phase shifting transformer, VIT PST1, to control flow on 2L129.

- a 500 kV interconnection path which is composed of the following sections from Kelly Lake (KLY) and Meridian (MDN) to Cheekye (CK5) / Malaspina (MSA) / Dunsmuir (DMR):
  - 5L42 from KLY – CK5
  - 5L45 from MDN – CK5
  - 5L30 and 5L32 from CK5 – MSA
  - 5L29 and 5L31 from MSA – DMR, and DMR T1 and T2 transformers.

The 2L129 circuit consists of 2 sections:

- 24.5 kilometres of submarine cables crossing Georgia Strait and Trincomali Channel, and
- 39 kilometres of overhead lines on Lower Mainland, South Gulf Islands and Vancouver Island.

The reactive power compensation associated with 2L129 is:

- A 230kV 66.1 MVAR switchable shunt reactor at Sahtlam (SAT) bus (SAT 2RX1), and
- A 230kV 66.1 MVAR fixed line shunt reactor at Taylor Bay (TBY) side (TBY 2RX1).

Operation of the 500 kV interconnection is addressed in SOO 7T-40 “Cheekye-Dunsmuir 500 kV System”. Together with 2L129 and its phase shifting former VIT PST1, the 500 kV system and 230 kV circuit form the Vancouver Island – Lower Mainland (VI-LM Interconnection).

The requirements in these operating orders cover the worst case operating conditions. Variations from the instructions, limits and arming conditions will be provided through additional Operating Plans, for specific operating conditions on a case basis. Operating Plans are engineered to support outages and short term operating requirements, superseding as necessary **any** requirements in this order.

<u>References</u>:

- SOO 1J-11 “Power System Operation – Authority and Responsibility”
- SOO 1T-11 “Transfer of Operating Authority and Guarantee of No Reclose Procedures Within the Control Centre”
- SOO 1T-11A “Operating Responsibility and Operating Authority Assignment to Desks”
- SOO 1T-22 “Outage Scheduling and Coordination”
- SOO 2T-34A “JHT/ICG/EFM Remedial Action Schemes”
- SOO 2T-34B “1L115/1L116 Local Area Protection Scheme”
- SOO 2T-34C “5L29/31, DMR T1/T2 Remedial Action Scheme”
- SOO 5T-10 “Ratings For All Transmission Circuits 60 kV or Higher”
- SOO 6T-29 “Emergency Manual Load Shedding and Peak Load Reduction Procedures”
- SOO 6T-34 “Automatic Undervoltage Load Shedding (AUVLS)”
- SOO 7T-12 “Reliability Must Run Generation Requirements”
- SOO 7T-22 “System Voltage Control”
- SOO 7T-40 “Cheekye-Dunsmuir 500 kV System” describes the Cheekye-Dunsmuir 500kV Interconnection and Transmission System.
- SOO 7T-45 “ Vancouver Island 5th Harmonic Resonance”
- OO 3T-VIT-01 ”Vancouver Island Terminal Substation Operation”

- OO 3T-ARN-01 “Arnott Substation Operation”

Definitions: (a selected list of terms and stations used in this System Operating Order)

EMS - Energy Management System
HF2 - Harmonic Filters located at ARN and VIT Substations
PST - Phase Shifting Transformer
RAS - Remedial Action Scheme
TECMP - Transmission Emergency Constraint Management Process
TSA-PM - the Energy Management System’s Transient Stability Analysis application

LM - Lower Mainland operating area
VI - Vancouver Island operating area
SVI – Southern portion of the Vancouver Island operating area
VI-LM Interconnection – the connection of the VI and LM operating areas via 2-500 kV circuits and 1-230 kV circuit with Phase Shifting Transformer
VI Dependable Generation – term used only in calculation of RMR requirements, defined in Attachment 1, Table 1.1.1

ARN - Arnott Substation located in the LM, and also a terminus for 2L129
CK5 - Cheekye 500 kV Substation
DMR - Dunsmuir Substation which connects VI to LM via 2 500 kV cable and OH circuits, and transfers energy into the North-Central VI
EFM – NTE Discovery Park Ltd. – Duncan Bay Substation ‖
GLD - Gold River Substation
ICG - Island Generation Facility
JHN - John Hart Generating Station
JHT - John Hart 138 kV Transmission Switchyard and Dam Facilities
KLY - Kelly Lake Substation
PAL - Port Alberni Substation
MSA - Malaspina Substation
VIT - Vancouver Island Terminal, a terminus for 2L129 with PST for flow control to the Central-South VI area.

2.0 RESPONSIBILITIES

Refer to SOO’s 1T-11 and 1T-11A for the assigned responsibilities within the BC Hydro Control Centre (BCHCC).

Refer to SOO 1T-22 for Outage Scheduling and Coordination responsibilities.

3.0 OPERATING PROCEDURES

3.1 Normal Energizing and Synchronizing 2L129 with TBY 2RX1 in Service

2L129 is normally energized from Arnott (ARN) as the "LEAD" end. The voltage at ARN 230 kV bus prior to energizing the line shall be below 237 kV (1.03 pu) assuming that the TBY shunt reactor is in-service.

Energizing 2L129 from VIT as the “LEAD” end is possible. The voltage at the VIT 230 kV bus prior to energizing the line shall be below 232kV (1.01 pu) assuming that the TBY shunt reactor is in-service.

Phase angle telemetering will be provided at VIT and ARN. The synchrocheck relay will allow the circuit breaker to close if the phase angle across the circuit break is 20 degrees or less.

If Vancouver Island is connected to the Mainland via the 500 kV path then 2L129 can be manually closed at either ARN or VIT when the phase angle across the circuit breaker is below 15 degrees.

If phase angle telemetry is not available the circuit breakers associated with 2L129 then call out CPC technicians to the appropriate station to measure the angle.

3.2 Energizing and Synchronizing 2L129 without TBY 2RX1

If TBY 2RX1 is not available, energizing 2L129 from ARN as the “LEAD” end requires the voltage at ARN 230kV bus below 235 kV (1.02 pu).

3.3 Adjusting ARN 230 kV Bus Voltage

To meet the energizing voltage requirement at ARN 230 kV bus, the Operator can:

- Disable the ING and MDN Auto-Var schemes and manually reduce the ING 230 kV voltage by switching off/inserting ING and/or MDN capacitors / reactors or absorbing MVARs at Burrard Synchronous Condenser Station (BSY) until ARN 230 bus voltage below the required voltage.

After synchronizing 2L129, manually adjust voltage at ING 230 and MDN 230 bus within the normal system operating range, then enable the ING and MDN Auto-VAR schemes.

Note: DO NOT re-energize any shunt capacitor until 5 minutes after it was de-energized (Refer to Section 1.0 of SOO 7T-22).

3.4 VIT Phase Shifting Transformer (PST)

3.4.1 General

The phase shifting transformer at VIT is designated VIT PST1, and is rated at 650 MVA with has 33 taps for phase angle range of +/-25º. The PST can regulate the power flow on the 2L129 operating with 5L29/31 in parallel. See OO 3T-VIT-01 for additional operational details.

3.4.2 Methods of Control

In MW control mode, the taps will automatically change to maintain the selected MW flow. In TAP control mode, the tape is fixed until it is changed via supervisory control. The TAP control mode is the normal mode to minimize wear on the tap changer.

3.4.3 Overload Protection

Within the PST protection, there are redundant (in both the primary and standby relays) overcurrent elements for sensing various system conditions:

- Severe overload (greater than about 900MVA) is detected by an overcurrent relay with the setting of 2260 amps and a 15 second dropout timer (i.e.: tap changer remains blocked for 15 seconds after the current drops below 2260A). When a severe overload occurs, a “LTC Overload” alarm as well as a “LTC Control Blocked” alarm will be raised.
- Moderate overload (about 715 MVA to 900 MVA) is detected by an overcurrent relay with the setting of 1796 amps. When a moderate overload occurs, runback will be triggered at about 715 MVA and a “2L129/PST1 Overload” alarm will be raised. If the tap changer reaches tap position 1 and an overload condition is stilled sensed, a “Runback Unsuccessful” alarm is asserted.
- Very light load is detected if the PST current is below 100A. The relay asserts a contact that indicated the PST is out of service. This blocks automatic operation of tapchanger.

The runback conditions will force the controller into the tap control mode. When the overload conditions disappear, it will be the Operator’s discretion on whether to manually set the controller back into MW control mode.

Loss of the northern LM-VI 500 kV path of or loss of both 2L123 and 2L128 will signal the controller to block tap changer operation and assert a “LTC Control Blocked” alarm until the controller is reset by the Operator (see Attachment 2, Note 6 of Table 2.1 and Note 5 of Table 2.2).

When control is switched to the MW control mode, the controller will adjust the taps (either raise or lower) to keep the power flow on 2L129 at the specified MW setpoint (either set locally by the field technician or remotely by the Operator) within a pre-defined dead band.

3.4.4 Switching VIT PST1

VIT PST1 can be energized and de-energized from either locally or remotely, provided the metal oxide surge arresters on both ends of the PST are in service.

With 2L129 in service, PST switching can proceed as follows:

The PST can be bypassed/inserted (i.e. close/open VIT 2CB42) without off-loading 2L129. Interlocks have been provided so that it can only be bypassed when tap changer is in the zero shift position (tap position 17).

3.5 1L115 and 1L116 Overload Protection Scheme

Refer to System Operating Order 2T-34B for details. The scheme protects 1L115 and 1L116 circuits from conductor damage due to sustained overloads. There are two types of transfer trip schemes:

3.5.1 Single Line Operation:

If 1L115 or 1L116 is out-of-service or open-ended at DMR, an overload (trip signal from 49LS thermal relay) of the remaining line would send DTT to open line at LTZ (LTZ 1CB3 or 1CB1 respectively.)

3.5.2 Parallel Line Operation:

If both 1L115 and 1L116 are in-service an overload (trip signal from 49LS thermal relay) from either of the lines would open both 1L115 and 1L116 at JPT (JPT 1CB4 or 1CB6.)

Note: 1L115 and 1L116 do not have stand alone line protection for sections DMR to LTZ or LTZ to JPT; 1L115 and 1L116 line protection protects 1L115 and 1L116 from DMR to LTZ to JPT as one zone.

3.6 VIT 230 kV / 132 kV Transformers (T5/T6/T9/T10) Outage

A single contingency outage of VIT T5 or VIT T6 will result in loss of both transformers as they are in the same protection zone. Loss of the two transformers may cause heavy overloading on the remaining VIT transformers and 1L115/1L116. 1L115 and 1L116 may be tripped open at Jingle Pot substation (JPT) by their overload protection scheme.

Scheduling of VIT T9 or T10 outages needs a great deal of care, especially during high VI load conditions, as loss of VIT T5 & T6 will severely overload the remaining 230/132 kV transformer bank at VIT. 1L115 and 1L116 tripping at JPT by overload protection will follow and it may result in voltage-collapsing the Central and South 132 kV loads.

If these contingencies happen, the BC Hydro Operator shall take the following actions as soon as possible:

- Bring JOR online if it is available and increase the output, and/or
- Curtail loads at Crofton (CFT), Prevost (PVO), Ladysmith (LDY), Harewood (HWD), Koksilah (KSH), Shawnigan (SHA), Colwood (CLD) and Sooke (SOO).

For Harewood West Substation (HWW) T1 or T2 outages during periods when VI system load exceeds 2000 MW a “VIT T5 & T6” contingency may also result in moderately overloading VIT T9/T10.

3.7 Vancouver Island Load-Supply Capability

Attachments 4 and 5 are to be used by Operations Planners and Operators to assess load-supply capability when the transmission system is stressed (i.e. VI load is high and at a significant transmission asset in the Attachment's tables is OOS). These attachments have been developed to aid in identifying the load-supply capability and RMR requirements to avoid voltage collapse on the loss of 2L129 in stressed conditions. As such these attachments are used to support operation through specific N-1-1 events.

Further, a process has been developed to coordinate resources to maximize the supply to Vancouver Island (VI). The Transmission Emergency Constraint Management Process (TECMP) was established to coordinate all parties managing resource (transmission, generation, and load curtailment) that will be utilized to meet VI load demand under stressed system conditions, whether the stressed conditions are due to very high VI load or due to significant equipment outages. The TECMP process was intended not only to create operating plans but also specifies involvement, responsibilities and actions for teams from the greater organization. Please refer to the specific Transmission Emergency Constraint Management Process (TECMP) plan when issued by TDSO Operations Planning, for the detailed plans and procedures. When a TECMP plan is issued, it may supersede requirements noted in this SOO (see Section 1.0).

Attachment 4 provides the VI load-supply capability with and without the associated PST for various system conditions, and the assumptions used to determine the capability. The purpose of Attachment 4 is to provide recommendations on the VAR requirements for voltage support under increasing loads supplied from AC sources (typically the winter heavy loading). In a forced outage scenario, for Real Time Operations purposes, Attachment 4 is preferred to assess immediate operating requirements. Attachment 4 is not implemented in TSA-PM.

Attachment 5 introduces a load ratio definition. VI load supply capability is sensitive to VI load patterns, which can be described as VI load ratio. Higher load ratios will result in a lower VI load supply capability. Conversely lower VI load ratio values will result in higher VI load supply capability.

For the purposes of Attachment 5:

- Load Ratio = (C&SVI Load)/(VI load)

In addition to load ratio, Attachment 5 also includes more transmission component outage scenarios. For preparing operating plans following sustained forced outages or for use in preparing a TECMP, Attachment 5 is recommended to prepare the detailed plans. Attachment 5 is not implemented in TSA-PM.

The assumptions used in Attachment 4 and Attachment 5 are:

- The VI load supply capability includes AC injections from AC transmission sources, and island generation.
- 1L18 is available to supply the South Gulf Island load either from the VI side or the LM side.
  When VI load is at or above 2000 MW, the South Gulf Island load shall be radially supplied from the LM side.
- The priority sequence to serve Vancouver Island load are as follows:
  1. Central & North VI generation (C&N VI Gen)
  2. Jordan Generation
- The half-hour emergency rating of 231 MVA at 0ºC ambient temperature is used for each of VIT T5 and T6.
- The continuous rating of 185 MVA at 0ºC ambient temperature is used for each of 1L115 and 1L116.

Under stressed conditions the supply may not be able to meet the load demand. Load Shedding will be used as the last resort.

3.8 Transmission Overloads – Bulk Customer/Generation Reductions

Overloads on transmission facilities to DMR, JHT, PAL, or Crofton (CFT) may occur for various system configuration or contingencies.

See SOO 2T-34A for JHT/ICG/EFM Remedial Action Schemes (RAS) to protect transmission lines between ICG to JHT and DMR from overloading.

1L117 would be thermally overloaded for loss of 1L118 when 2L154 is OOS. Similarly, 1L117 would be thermally overloaded for loss of 2L154 when 1L118 is OOS.

- The total combined transfer from LDR on 1L117 and 1L118 circuits must be limited to the 1L117 rating as it is the lower of the two circuit ratings when 2L154 is OOS.
- The total combined transfer from LDR on 1L117 and 2L154 from GLD must be limited to the 1L117 rating when 1L118 is OOS.
- Local generations, such as KKS, CSS, SCA, or LDR would be restricted when 2L154 or 1L118 is OOS.

Loss of either 1L105 or 1L114 <u>may</u> limit the PAL mill loading. The total combined transfer from DMR on 1L114 and 1L105 circuits must be limited to the 1L105 rating as it is the lower of the two circuit ratings. This is necessary to protect 1L105 from thermal overload after loss of 1L114.

- There is no automatic overload protection on these lines.
- With low local generation (such as ASH G1 OOS or at low output) while the area load is heavy, Operators' manual actions for load curtailment (the mill load at PAL Substation) may be required pre-contingency.
- If either 1L105 or 1L114 is out of service at the same time that ASH G1 is down, the mill load at PAL Substation may have to be limited to the thermal rating of the remaining line.
- Load can be manually shed if necessary using load shedding screen.

Loss of either 1L139 or 1L140 <u>would</u> limit the CFT mill loading to the thermal capacity of the remaining line. The Operator must monitor the loading on the two circuits to ensure the remaining line will not be overloaded because there is no automatic overload protection on these lines. Load can be manually curtailed or shed if necessary using load shedding screen.

3.9 Peak Load-Shaving Voltage Reduction (PSVR) Scheme

Facilities have been installed in the VI System to reduce load at the larger distribution substations when required during emergencies. These facilities were installed primarily to minimize load curtailment requirements when VI capacity is severely constrained, for example during the loss of both MSA-DMR 500 kV circuits and regional line constraints such as loss of 1L14. Under these conditions, the Operator can reduce the load at the participating substations 5% to 7% by reducing their distribution bus voltage levels by 5%.

Generally, the PSVR scheme will be used in conjunction with operational plans developed to resolve potential VI supply deficiencies.

The following 8 substations are participating in the PSVR scheme:

- Comox (CMX)
- Port Alberni (PAL)
- Qualicum Beach (QLC)
- Parksville (PVL)
- Lantzville (LTZ)
- Koksilah (KSH)
- Prevost (PVO)
- Puntledge (PUN)

Based on field tests, the peak VI load during this period could be reduced by approximately 25MW via the PSVR scheme.

Control facilities are presently in place to facilitate individual substation load reductions when required. The load-shaving voltage reduction scheme is also capable of being initiated via a master control switch at VIT, with the exception of PVO which will be controlled separately. When initiated, the set points on the tap changers' voltage regulating relays will be automatically reduced by approximately 5%. In response to the change in control settings, the tapchanger will begin to lower the distribution bus voltage after the tapchanger time delay has elapsed. When the voltage reduction has been completed, the load should be reduced at the participating substations by a minimum of 5%. This process should be completed within a minute or so. Over time, the load reduction will decrease as diversity between resistive heating elements (i.e., space heaters, stoves, ovens, etc.) decreases due to their reduced voltage and output. Within 4 hours, the load reduction will be reduced to approximately 85% of its initial reduction. After 8 hours, the load reduction will reach a steady-state limit of approximately 70% of the initial load reduction.

4.0 VOLTAGE REGULATION

Voltage regulation requires the best possible use of all VAR sources. In general, VARs should be generated as close as possible to the load that is consuming them so that VAR transfer over the transmission lines is reduced to minimize losses. VAR production should be managed to

- minimize system losses on the transmission system,
- achieve target voltage levels on key station buses,
- maintain "swinging room" on the VIT synchronous condensers, and
- keep PVO capacitor control on all of the time.

4.1 Capacitors

The most efficient way to produce VARs is through the use of fixed capacitors. Substation capacitor banks that can be switched by supervisory control should be used to provide the VAR requirements for the station in which they are located. Capacitor banks can also be used to help control "system" VAR requirements provided this does not result in overvoltage conditions on the substation low voltage buses (which might be caused if the on-load tap changers reach their maximum "buck" position and cease to regulate).

4.2 Shunt Reactors

The 500 kV -135 MVAR reactors at DMR Substation are used to control the reactive power produced by the 500 kV submarine cables. They are designated as "Level 1" equipment in accordance with SOO 1J-11. PIK and SAT 230 kV – 75 MVAR reactors are Level 4.

4.3 DMR Static VAR Compensator

The DMR Static VAR Compensator (SVC) has a dynamic range of +165 MVAR to -135 MVAR. When it is online and operating in the automatic mode, it will regulate the DMR 138 kV bus voltage at the level set by the Operator. The SVC can also control the switching of the DMR 500 kV shunt reactors and the on-load tap changers on DMR T4, T5, T6 and T7 (see SOO 7T-40). The SVC control of the DMR T4, T5, T6 and T7 tap changers have been turned off as recommended by Transmission Operations Services (TOS).

4.4 Tap Changers

Tap changers on DMR T4, T5, T6 and T7 can be controlled from the Control Centre and are used to help regulate the PAL and JHT area voltages.

The tapchangers on GLD T1 and T4 can be controlled by remotely. The taps should be adjusted to regulate the GLD bus voltage. Coordination with the operation of the GLD capacitor banks is required.

4.5 Synchronous Condensers

It is important to have as much synchronous condenser capacity as possible in service to control transient voltage swings, particularly those that occur when cable circuits to the mainland trip. VARs should be absorbed by Dunsmuir (DMR) 500 kV reactors or be produced by substation capacitors to keep the Vancouver Island Terminal (VIT) synchronous condensers operating in the slightly "bucking" or close to zero, if possible. During the summer light load period, to keep the 230 kV voltage in the Victoria area within the cable ratings, synchronous condensers might have to be operated in the maximum bucking region. VIT SC1 is permanently unavailable and planned to be removed from the system. When the 3 synchronous condensers, VIT SC2, SC3, SC4, are on line then the acceptable operating range is –206 MVARS to 255 MVARs. Normally all three synchronous condensers will be in service with their control set for automatic voltage regulation.

Automatic control of the three synchronous condensers is linked to 138 kV capacitor banks at Prevost Substation (PVO). A PLC at VIT inserts or removes capacitors at PVO to keep the synchronous condensers loading near 0 MVARS. The Operator has supervisory control to turn on or off this feature at PVO.

SOO 6T-34 describes the automatic undervoltage load shedding scheme which is implemented to prevent a voltage collapse of the integrated electric system following the loss of major transmission or reactive power support facilities. The Operator will arm and disarm the scheme in accordance with system conditions. Arming is implemented in either the LM area, or VI area or both operating areas.

4.6 Harmonic Filters

VIT and VIT harmonic filter contribute a total of 94.7 MVAR @ 60 Hz at their respective station buses at nominal system voltage. The individual filter contributions at each station are:

- 5HF2 21.6 MVAR
- 7HF2 12.0 MVAR
- 11HF2 15.4 MVAR
- 13HF2 11.1 MVAR
- HP2 34.6 MVAR

The VIT harmonic filters contribute to high voltages in the South VI area in light load conditions, particularly experienced in spring, summer and early fall. It is recommended to remove the higher harmonic filters, leaving in service only the 5^{th} & 7^{th} to address 5^{th} harmonic resonances in the South VI area (see SOO 7T-45 for further information). In heavy load conditions, particularly experienced in winter, all of the filters should be returned to in-service to prop up voltage under increasingly higher South VI area loading.

The ARN filters reduce the natural 5^{th} harmonic voltage/current present in the Metro South area. Normally, the system is operated with all of the ARN filters in-service year round.

If any of the individual HF2 filters need to be taken out of service, the appropriate protection must be blocked. It is not possible to have only one of the individual HF2 filters in operation by itself, as the protection works in a balanced scheme that involves 2 filter sections. Either the 5th + 7th harmonic filters in service or the 5th + 11th harmonic filters in service are acceptable operating configurations. The BC Hydro Control Centre Operator must have Field CPC techs block parts of the HF2 protection to operate in these configurations.

Individual filters (5th, 7th etc.) can be isolated in pairs and the remaining filter sections can be kept in service in pairs (e.g. 5th and 7th together) by locking open the designated manual disconnect switches. This will require the bank to be de-energized before these switches can be opened. See Operating Orders 3T-VIT-01 and 3T-ARN-01 for detailed requirements.

4.7 Voltage Levels

Voltage levels listed below are intended as guides to **normal** operation. See SOO 7T-22 for normal target voltage levels at selected substations when the 500 kV cable circuits are in service.

4.7.1 High Voltage Conditions

High voltage can be a problem in the Victoria area 230 kV system due to the O/V constraints on the 230 kV cable systems. These cables have a maximum continuous rating of 241.5 kV and a 15 minute emergency rating of 253 kV.

230 kV cables should never be operated for more than 15-20 minutes with cable overvoltage alarm coming in from the station or if 230 kV is above 244 kV.

In general, high voltages on the Vancouver Island System can be reduced by one or more of the following:

a) switching in any available reactors at Pike Lake (PIK), Sahtlam (SAT), DMR, and MSA.
b) switching out substation capacitor banks, and switching out harmonic filters VIT 11HF2 and VIT 13HF2 and HP2.
c) Increase MVAR absorption on Island Generation.
d) Increase the VIT to ARN flow on 2L129. Consider reducing ARN end voltage further with LM Autovar schemes, ARN harmonic filter switching, etc.
e) If JOR is available, run in synchronous condenser or generation mode to load the 138 kV lines or absorb MVARs.
f) Adjust GTP T14 taps to shift VARs to the South Vancouver Island 138 kV system from 230 kV system from SAT to HSY while maintaining 138 kV voltage below 142 kV. If available, JOR may have additional capacity to absorb VARS with changes to GTP taps.
g) Reducing the 138 kV system voltage by adjusting VIT synchronous condensers and by lowering DMR taps. Use DMR SVC to absorb max amount of MVARS (-135 MVARS); keep PVO capacitor control in auto all of the time.
h) switch out 2L154 DMR-GLD (29.5 MVARs).
i) switch out 2L145 PIK-ESQ (49.5 MVARs).
j) switching out 5L31 (or 5L29). This will make additional reactors available at DMR (last resort).

4.7.2 Low Voltage Conditions

Generally, substations have sufficient voltage regulating facilities to allow voltage drops of 10%. Further, the voltage at John Hart has gone as low as 130 kV. In the Port Hardy area, our transformers have exceptionally wide-range tap changers (20% boost) so they can adjust to large changes in system voltage. The Victoria area substations were originally designed for a base bus voltage of 132 kV. The substation transformer tapchanger ranges (± 12.5%) allow the SVI voltage to sag to 120 kV before a max tap position is reached.

4.7.3 General Guidelines for Voltage Contingencies

In general, the Operator should be guided by SOO 7T-22 which states in part that:

- Voltage deviation of plus or minus 10% can be tolerated for several hours on most equipment except cables; and,
- Voltage deviation of 20% below normal cannot be tolerated for more than 15-20 minutes.
- Cables are normally protected by overvoltage protection and tripping is usually set at 10% above normal. If voltage deviation exceeds 8% above normal then the cable circuit should be dropped first if the correction is not possible within a few minutes. If the voltage exceeds more than 10% then overvoltage protection should trip automatically, but manual tripping should be done as a backup in case the protective relay has failed.

If there is no cable circuit involved and the voltage is still above 10% then the Operator should take lines out of service if necessary. As stated before, 10% above normal voltage can be tolerated for several hours but equipment should not be subjected to 20% above normal voltage for more than a couple of minutes. If voltage falls 20% below normal then shed load to correct the voltage.

Refer to SOO 6T-29 for manual load shedding recommendations.

5.0 REMEDIAL ACTION SCHEMES

5.1 General

This section describes both wide area and local RAS that support VI area operations. The most significant is called VI RAS. Details for VI RAS are found in Sections 5.2 and 5.3.

Additional local RAS schemes for the VI operating area are described in Section 5.4 through 5.7.

5.2 VI Remedial Action Scheme (VI RAS)

Remedial action schemes are applied quickly to shed an appropriate amount of VI loads, shed some generation at G.M. Shrum (GMS), Peace Canyon (PCN), Revelstoke (REV) and/or Mica (MCA) and direct transfer trip some 500kV lines.

The following contingencies use the Vancouver Island Remedial Action Scheme (VI RAS) to resolve problems that simultaneous or sequential contingencies can cause (such as generator transient instability, voltage collapse, or equipment damage):

A. Loss of the 500kV LM-VI path which means:
   (a) 5L29 & 5L31, or
   (b) 5L30 & 5L32, or
   (c) 5L42 & 5L45, or
   (d) DMR T1 & T2.
B. Loss of both DMR-SAT 230kV circuits (2L123 & 2L128).
C. Loss of 2L129 with 2L123 or 2L128 OOS
D. Loss of 2L123 or 2L128 with 2L129 OOS

The VI RAS consists of:

- VI Load Shedding RAS,
- MCA/REV/GMS/PCN Generation Shedding RAS, and
- Direct Transfer Tripping RAS

5.2.1 VI Load Shedding RAS

The VI Load Shedding RAS has PLCs which are located at Vancouver Island Terminal (VIT).

- Upon loss of the 500 kV LM-VI path, the RAS will initiate fast load shedding within 15 cycles as well as slow load shedding after a 2 second delay for the first step and 10 second interval for each succeeding step.
- Upon loss of two of 2L123, 2L128, and 2L129 simultaneously or sequentially, the RAS will initiate only slow load shedding after 1 second delay for the first step and 10 second interval for each of the following steps.
- The slow load shedding is supervised by the overload condition of the remaining 230 kV circuit in such a way that load shedding will continue until the current on the remaining 230 kV circuit is below the corresponding setting.

The patterns and amount of the fast load shedding are determined in advance, and armed by TSA-PM.

Please refer to Tables 2.1 and 2.2 of Attachment 2 for the VI load shedding requirements.
Please refer to Attachment 3 for line ratings, forecasted loads and load shedding block information, and the EMS display of the 7T-41 VI Load Shed RAS implementation.

5.2.2 Generation Shedding RAS for Loss of the 500kV LM-VI Path

In response to the VI load shedding for loss of the 500 kV LM-VI path, generation shedding at REV/MCA/GMS/PCN may be required to prevent excessive increase in power transfers to the neighboring transmission systems of BPA and Alberta. Please refer to Table 2.3 of Attachment 2 for the generation shedding requirements.

5.2.3 Direct Transfer Tripping RAS (DTT RAS)

To prevent the Sunshine Coast load from being fed from Vancouver Island and potential high voltages for loss of 5L42 & 5L45 or 5L30 & 5L32, the following Direct Transfer Trip (DTT) RAS are installed:

- Loss of 5L30 & 5L32 simultaneously or sequentially, DTT trip 5L29 & 5L31.
- Loss of 5L42 & 5L45 simultaneously or sequentially, DTT trip 5L30 & 5L32 and 5L29 & 5L31.

These DTT RAS are implemented locally at the stations. There is no arming functions at the BCHCC.

5.2.4 VI RAS Pre-Outage and Post Contingency Requirements

The pre-outage operating restrictions are specified in Attachment 1 and the load shedding and generation shedding requirements in Attachment 2.

The purpose of the pre-operating restrictions, load shedding or/and generation shedding is to achieve one or more of the following objectives following contingencies:

- To prevent system transient instability, or voltage collapse, or cascading outages.
- To prevent post-contingency loading on the remaining 2L129 from exceeding its half-hour emergency rating (see Table 3.1).
- To prevent post-contingency loading on the remaining 2L123 or 2L128 from exceeding its half-hour emergency rating.
- To prevent unacceptable high voltages in the system post contingency and generation shedding.

5.3 5L29/5L31 OL RAS

A RAS scheme for protection of 5L29/31 cables from impacts of moderate to severe overloads is described in **SOO 7T-40, Section 13.0 and SOO 2T-34C**. This scheme will prevent the cables from being damaged by excessive loading on either of the two 500 kV circuits. The scheme utilizes the same locations used by the VI Load Shed RAS, but is set independently, and will eventually trip the line if load current is not reduced below the maximum dynamic rating. This scheme is not addressed in this System Operating Order. Please see 7T-40 Section 13 and 7T-40 Attachment 3 for this RAS implementation.

5.4 1L10/1L11/1L14 Overload RAS and RMR Requirement for Voltage Stability

The RAS protects lines 1L10/11/14 from conductor damage due to sustained overloads. Such overloads may occur due to N-1 (1L14 contingency) or various N-1-1 and N-2 contingencies (combinations of outages to 1L10, 1L11 or 1L14).

A 1L14 contingency will open 2L142 terminal at GTP based on the current GTP station configuration.

The RAS relays will monitor the current in lines 1L10, 1L11 and 1L14 at VIT as well as the ambient temperature at VIT. The RAS is a local detection load shedding scheme, and armed locally. Arming of the RAS is not performed by the EMS.

Five groups of load, GTP A, GTP B, CLD, KSH and SHA; would be tripped one by one every 10 seconds when any line exceeds both its trip temperature and its dynamic ampacity rating. Alarms will be generated when loads are shed. If the overload returns in less than 5 minutes the shedding sequence will continue from where it left off. After 5 minutes with no overload the controller will reset back to the original state.

Refer to SOO 2T-34 Note 5 of Table 3 for more details of this RAS schemes.

However, even with the overload RAS in service when ambient temperature is low in winter, there would still be voltage instability risks. Therefore, the following RMR requirements for voltage stability are required from November 1st to April 30th :

- System Normal and any N-1 system configurations except 1L10 OOS or 1L11 OOS:
  Limit: (1L10 + 1L11 + 1L14) VIT – 2L142 GTP < 350 MW
- 1L10 OOS or 1L11 OOS
  Limit: (1L10 + 1L11 + 1L14) VIT – 2L142 GTP < 250 MW

If these limits are exceeded then TSA-PM will initiate an alarm “VI WINTER RMR VIOLATION: SVI VOLTAGE INSTABILITY”. The action is to RMR JOR G1 and increase its output to reduce the transfers within the limits.

When SVI load exceeds 350 MW and JOR is not available to be online:

- open GTP 25CB11 in pre-outage

This action prevents low voltage in SVI area, and prevents thermal overload on 1L10 or 1L11, by dropping GTP 40 series feeder load on a contingency of 1L14 or GTP T11.

For system operating conditions with both 1L10 and 1L11 OOS, consult TDSO Operations Planning for operational instructions.

5.5 North Vancouver Island RAS (NVI RAS)

The NVI RAS addresses overload on 1L120 and other 138kV lines on loss of 2L154, that is the result of increased CSS and KKS generation injection to North Vancouver Island 138kV system. The NVI RAS is local to Gold River. Details can be found in OO 3T-GLD-01 and SOO 2T-34.

5.6 2L142 RAS

2L142 RAS is installed, to prevent power flow from SVI 138 kV system to 230 kV system under N-1-1 outages on the 230 kV transmission system between SAT and HSY. This RAS is local to GTP.

GTP 2L142 RAS will trip 2L142 at GTP and HSY if armed under condition of either the power flow into 2L142 at GTP (from the 138 kV system into 2L142) exceeds 40 MW for more than 4 seconds, or GTP 230 kV bus voltage exceeds 248.4 kV for more than 4 seconds.

Details can be found in OO 3T-GTP-01.

5.7 1L115 and 1L116 Overload Protection

Refer to SOO 2T-34B for 1L115/1L116 overload protection.

6.0 KEY FACILITY RATINGS

6.1 2L129 Rating

2L129 Emergency Rating

2L129 half hour ambient temperature dependent ratings are used in the pre-outage restrictions in Tables of Attachment 1. These ratings are shown in Table 3.1 of Attachment 3.

2L129 Single Pumping Plant Operation

With only one pumping station in service from EBT to TBY, 2L129 current rating is 658 Amps for both summer and winter.

6.2 DMR 500/230 kV Transformer T1 & T2 Temperature Adjusted and Short Term Rating

See SOO 5T-14 Transformer Ratings for the normal and emergency rating information.

Each transformer has a nameplate rating of 1200 MVA based on 25 degree C ambient temperature.

The temperature adjusted continuous rating and short-term (20 minute) ratings based on detailed equipment studies are listed in the following Tables 1 and 2 (for tap position 2),

CAUTION: These ratings are not SOLs, as they differ from facility ratings in SOO 5T-14. These values are used in Attachment 1 Table 1.1.3, to provide estimates of overloads, for situational awareness purposes. They are not used for determining load shedding or line tripping in this SOO, as the values differ from ratings documented in SOO 5T-14.

Table 1: Temperature Adjusted Continuous Rating

Ambient temperature	-10 ºC	0 ºC	10 ºC	20 ºC	30 ºC
Temperature adjusted continuous rating (MVA)	1650	1590	1515	1440	1365
Estimated MW transfer based on 0.97 pf	1601	1542	1470	1397	1324

Table 2: Temperature Adjusted Short Term Emergency (20 minutes) Rating

Ambient temperature	-10 ºC	0 ºC	10 ºC	20 ºC	30 ºC
Temperature adjusted short term rating (MVA)	1884	1860	1830	1776	1716
Estimated MW transfer (0.97 pf)	1827	1804	1775	1723	1665

6.3 VIT Transformers (T5/T6/T9/10) Rating

See SOO 5T-14 Transformer Ratings for the normal and emergency rating information for VIT T5/T6/T9/T10.

These Transformer ratings are used in Attachment 4 and 5 processes, and not used by TSA-PM.

7.0 2L129 PROTECTION AND RECLOSING

7.1 Overvoltage Protection

The over voltage protection for the submarine cables of 2L129 is set as follows:

- 266 kV, alarm in 1 minute, trip in 14 minutes
- 280 kV, trip in 78 cycles (1.3 Seconds)

7.2 Overcurrent Protection

The tripping of 2L129 by its over current protection at VIT is the backup for the VI RAS. The overcurrent protection is set at 2500 A with 15 minutes delay.

7.3 Auto Reclosing

Single pole and three pole reclosing have been provided for 2L129. Three pole auto-reclosing must be disabled if TBY reactor 2RX1 is OOS.

8.0 TSA-PM IMPLEMENTATION

The EMS Transient Stability Analysis (TSA-PM) advanced application performs the following functions for all tables in Attachments 1 and 2:

- Arming the load shedding patterns.
- Arming the required generators to be shed and disarming generators on shed when generation shedding is not required.
- Monitors and initiates alarms if there is a limit violation.

The following alarms have been implemented in TSA-PM:

ALARM MESSAGE	REFERENCES
	Attachment 1: Pre-outage restriction tables
2L123 RATING VIOLATION	
2L128 RATING VIOLATION	
2L123 1/2HR RATING VIOLATION: 2L129CTG	
2L128 1/2HR RATING VIOLATION: 2L129CTG	
2L123 1/2HR RATING VIOLATION: 2L128CTG	
2L128 1/2HR RATING VIOLATION: 2L123CTG	
2L129 ARN CONTINUOUS RATING VIOLATION	
2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR30 CTG	
2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG	
2L129 ARN 1/2 HOUR RATING VIOLATION: 5L42 CTG	
2L129 ARN 1/2 HOUR RATING VIOLATION: 5L44 CTG	
2L129 ARN 1/2 HOUR RATING VIOLATION: DMR T1ORT2 CTG	
2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG	
5L29(5L31) EMERGENCY RATING VIOLATION	
DMR SVC MUST BE IN SERVICE	
VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY	Attachment 1: Pre-outage restriction tables
VI RMR VIOLATION: JOR G1 MUST BE ONLINE	
VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT	
VI RMR VIOLATION: 500KV DBL CTGS	
1L115/116 RADIALLY SUPPLIED FROM JPT, CONSULT OPS PLANNING	
VI RMR VIOLATION:PVO AUTO VAR MUST BE I/S	
VI LOAD EXCEEDS MAXIMUM LIMITS	
VIT PST RUN BACK LIMIT VIOLATION: 2L123OR128 CTG	
BOTH VI LOAD SHED PANELS ARE DISABLED (LS_230)	Attachment 2: Table 2.1, Table 2.2 and Table 2.3
BOTH VI LOAD SHED PANELS ARE DISABLED (LS_500)	
BOTH VI LOAD SHED PANELS ARE DISABLED (LS_500_1)	
CLM2VI500 - INSUFFICIENT SHEDDING	
LS_230: INSUFFICIENT LOAD SHED	
LS_500_1: INSUFFICIENT LOAD SHED	
LS_500_2: INSUFFICIENT LOAD SHED	
LS_500_2: OVER LOAD SHED	
VI WINTER RMR VIOLATION: SVI VOLTAGE INSTABILITY	Section 5.4

9.0 REVISION HISTORY

Revised By	Revision Date	Summary of Revision
PH/GW	28 October 2020	• Section 3.8.- Added a pre-outage restriction to protect 1L117 due to a reduced rating on 1L117.
PH/GW/YLC	05 February 2021	• Section 5.4: Added pre-outage restriction to prevent low voltage in SVI and thermal overload when SVI load exceeds 350MW and JOR not available. • All Attachments: 2L129 continuous rating is changed from 590 MW to 609 MW In all Attachments • Attachment 1: The continuous rating of 2L129 is 616 MVA calculated by 1.732 * 1.506 KA * 236 kV. • Attachment 2: Table 2.1 Note 2 and Table 2.2 Note 2, load shed initiation and cessation levels are updated. • Attachment 3: Table 3.1: Half Hour Emergency Rating of 2L129 is updated.
Po Hu	15 June 2021	• Updated 5L51_MW_Rating and 5L52_MW_Rating in Attachment 2, Table 2.3 in order to be consistent with those used in SOO 7T-18; • Removed Diagram 3.1: 5L51 or 5L52 - MW /Amp Ratings vs Ambient Temperature at ING in Attachment 3.
Bob Cielen/ YanLing Cong/ Yingwei Huang/ Derek Clayton	26 November 2021	• Section 3.9 revised for changes in PSVR stations from 12 to 8 and expected drop of 25 MW. • Section 5.2.1 revised for formatting; and note added to describe differences in RAS setting and the present circuit ratings. • Attachment 1: ▪ Updated 5L29 and 5L31 ratings ▪ Tables 1.1.2, 1.2.2, 1.2.14: removed notes on 5L29/5L31 RAS settings (information already in 7T-40) ▪ updated Attachment 2, Table 2.3, revised reference for 5L51/52 temperature ratings. • Attachment 3: Removed PAL APP from Table 3.2 (as this load is decommissioned). Added forecasted summer and winter peak loads, and revised loadshed block information (for identifying included loads). Added capture of the EMS display for the VI Load Shed RAS.
Po Hu, Mari Wood	22 April 2022	• Section 1.0 – updated EFM customer name. • Section 6.2 – transformer ratings reference SOO added. Note added to confirm these ratings are not SOL as they are not based on SOO 5T-14. • Section 6.3 revised to remove ratings table and add the reference to 5T-14. • Attachment 1: 2L128 continuous and 0.5 hour over ratings for summer and winter seasons are updated. • Attachment 2: Note 4 of Table 2.2, VI load shedding supervision level for loss of 2L129 and 2L123 is updated.

ATTACHMENT 1 - Pre-outage Restrictions

Notes for all the tables in Attachment 1:

- The continuous rating of 2L129 is 616 MVA calculated by 1.732 * 1.506 KA * 236 kV.
- Both summer and winter continuous ratings of JOR T1 are 91 MVA. JOR T2 has the same summer and winter continuous ratings as JOR T1. If one of JOR T1 and T2 is OOS, the remaining one would be thermally overloaded with high JOR generation output. If TSAPM alarm: "VIOLATION_JOR T1 THERMAL" or "VIOLATION_JOR T2 THERMAL", JOR generation shall be reduced.
- Refer to Table 3.1 in Attachment 3 for the 2L129 ambient temperature dependent half an hour rating "2L129_0.5hr_Rating"
- NVI GEN = (PUN+ASH+SCA+LDR+JHN+ICG) plant MW, Other IPP generation is not included.
- Central & North VI generation = C&N VI Gen = PUN, ASH, SCA, LDR, JHN and ICG total plant MW. Other IPP generation is not included.
- Avoid radial supply to QLC, PVL or LTZ from JPT when VI load is above 1800MW.
- If it cannot be avoided, please consult TDSO Operations Planning.

Definitions:

- "VI Load" = VI AC transfers + VI generation
  - "VI Load" captures the AC source injection dependencies that impact VAR support.

- "C&SVI Load = 2L129 ARN + (2L123 + 2L128) DMR – (1L115 + 1L116) JPT + JOR MW
  - "C&SVI Load" captures the AC source Injection dependencies that impact VAR support.

- "VIT VAR Injection" = total VIT Var supporting capability available or on-line, which includes:
  - VIT Synchronous Condensers, total 250 MVAR (which includes SC2 50 MVAR, SC3 100 MVAR, SC4 100 MVAR),
  - VIT HF2 total 94.7 MVAR (which includes 5HF2/ 7HF2/11HF2/13HF2 with 21.6/12.0/15.4/11.1 MVAR and VIT HP2 34.6 MVAR),
  - The maximum VIT Var supporting capability is 344.7 MVAR.

Continuous Ratings for Transmission Lines:
The continuous ratings for relevant VI Transmission circuit elements are listed on the following tables. Refer to SOO 5T-10 as the source of the Amp ratings information.

The continuous MW ratings for 138 kV lines are calculated by: 1.732 * Rating in KA * 138 kV * 0.99 pf
The continuous MW ratings for 230 kV lines are calculated by: 1.732 * Rating in KA * 236 kV * 0.99 pf
The continuous MW ratings for 500 kV lines are calculated by: 1.732 * Rating in KA * 520 kV * 0.99 pf

Circuit	Variable name used in GenShed Tables	Conductor Ratings (Amp)		MW Conductor Ratings	
		Summer (30 ºC)	Winter (0 ºC)	Summer (30 ºC)	Winter (0 ºC)
1L115	1L115_Rating	635	810	150.3 MW	191.7 MW
1L116	1L116_Rating	590	600	139.6 MW	142 MW
2L123	2L123_Rating	1636	2233	662.1 MW	903.6 MW
2L128	2L128_Rating	1858	2374	751.9 MW	960.7 MW
5L29	5L29_Rating	1321 without shore cooling 1410 with shore cooling	1410	1178 MW without shore cooling 1258 MW with shore cooling	1258 MW
5L31	5L31_Rating	1321 without shore cooling 1410 with shore cooling	1410	1178 MW without shore cooling 1258 MW with shore cooling	1258 MW

Over-Ratings for Transmission Lines:
The half an hour emergency MW ratings for 2L123 and 2L128 are calculated by: 1.732 * Rating in KA * 236 kV * 0.99 pf

Circuit	Variable name used in GenShed Tables	Conductor Ratings (Amp)		MW Conductor Ratings	
		Summer (30 ºC)	Winter (0 ºC)	Summer (30 ºC)	Winter (0 ºC)
2L123	2L123_0.5hr_Rating	1810	2233	732.5 MW	903.6 MW
2L128	2L128_0.5hr_Rating	2012	2485	814.2 MW	1005.6 MW
2L129	2L129_0.5hr_Rating	Refer to Attachment 3	Refer to Attachment 3	Refer to Attachment 3	Refer to Attachment 3

Continuous Ratings for Transformers:

Circuit	Variable name used in GenShed Tables	Conductor Ratings (Amp)		MVA Conductor Ratings	
		Summer (30 ºC)	Winter (0 ºC)	Summer (30 ºC)	Winter (0 ºC)
DMR T1	DMR T1_Rating	Refer to Section 6.2	Refer to Section 6.2	Refer to Section 6.2	Refer to Section 6.2
DMR T2	DMR T2_Rating	Refer to Section 6.2	Refer to Section 6.2	Refer to Section 6.2	Refer to Section 6.2

1.1 Pre-Outage Restrictions – with VIT PST in Service

In all scenarios (Table 1.1.1 to Table 1.1.13) with VIT PST in service, limit: 2L129 ARN <= 609 MW.

If TSA-PM alarms “2L129 ARN CONTINUOUS RATING VIOLATION”, the BCHCC Operator must reduce the transfer below the limit by:
- Adjusting the tap of the VIT phase shifter transformer, and/or
- Bringing JOR online if it is available and increasing the output, and/or
- Bringing more generation online in North and Central VI Areas.

Table 1.1.1 Pre-Outage Restrictions – VI Supply System Normal with VIT PST in Service

Notes: VI Supply System Normal means that 5L29, 5L31, 5L30, 5L32, at least one of 5L42 and 5L45, all major equipment in VI shall be in service.

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies, the most limiting contingency is 2L129).

JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load:</td><td>≥ 2039</td><td>≥ 2098</td><td>≥ 2153</td><td>≥ 2214</td><td>≥ 2245</td><td>(2272~2281)</td></tr>
<tr><td>Or C&SVI MW load:</td><td>≥ 1356</td><td>≥ 1395</td><td>≥ 1432</td><td>≥ 1472</td><td>≥ 1493</td><td>(1511~1517)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥ 100</td><td>≥ 130</td><td>≥ 150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>
If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY” or “VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT”, then BCHCC Operator shall take the following actions:
• Bring JOR online if it is available and increasing the output, and/or
• Check status of 1L18, VIT SCs, VIT HF2

If VI Load or C&SVI Load exceeds the maximum limit in above table, TSA-PM will alarm “VI LOAD EXCEEDS MAXIMUM LIMITS”; then BCHCC Operator shall contact TDSO Operations Planning.</td></tr>
<tr><td>5L29 & 5L31,
or
5L30 & 5L32,
or
5L42 & 5L45,
or
DMR T1 & T2</td><td>Note: VI Dependable Generation = (JOR+PUN+ASH+SCA+LDR+JHN+ICG) MW

VI Reliability Must Run (VI RMR):
a. If VI Load > 2200 MW, then
• VI Dependable Generation shall be greater than 440 MW, and
• At least 3 VIT SCs shall be in service (to be updated).
b. If 1800 MW < VI Load <= 2200 MW, then
• VI dependable generation shall be greater than 330 MW, and
• At least 3 VIT SCs shall be in service (to be updated).
c. If 1400 MW < VI Load <= 1800 MW, then
• VI Dependable Generation shall be greater than 300 MW, and
• At least 2 VIT SCs shall be in service (to be updated).
d. If 1200 MW < VI Load <=1400 MW, then
• At least 2 VIT SCs shall be in service, and
• If 3 VI SCs are in service, VI Dependable Generation shall be greater than 50MW, or
• If 2 VI SCs are in service, VI Dependable Generation shall be greater than 80MW.
e. If VI Load <=1200 MW, then
• There is no requirement for VI Dependable Generation, and
• At least 2 VIT SCs shall be in service.
f. DMR SVC shall be in service.

If the above condition (a - e) violates, TSA-PM will alarm “VI RMR VIOLATION: 500KV DBL CTGS” and if condition f violates, TSA-PM will alarm “DMR SVC MUST BE IN SERVICE”, then the BCHCC Operator must reduce the transfer from LM to VI by:
• Bring JOR online if it is available and increasing the output, and/or
• Bring more generation online in north and Central VI areas, and/or
• The BCHCC Operator may need to check the VIT SC’s minimum units on-line or the status of DMR SVC.</td></tr>
<tr><td>5L29 or 5L31, or
5L30 or 5L32</td><td>No restriction.</td></tr>
<tr><td>2L123 or 2L128</td><td>If 0.5 * (1L115 + 1L116) DMR + 0.19 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating
Then limit:
2L129 ARN + 0.32 * 0.5 * (2L123 + 2L128) DMR +
0.34 * 0.19 * 2 * 0.5 * (2L123 + 2L128) DMR –
0.34 * (1L115 + 1L116) JPT < = 850
Else limit:
2L129 ARN + 0.32 * 0.5 * (2L123 + 2L128) DMR < = 850

If the above condition violates, TSA-PM will alarm “VIT PST RUN BACK LIMIT VIOLATION: 2L123OR128 CTG”, then the BCHCC Operator must reduce the transfer on 2L129 and the DMR-SAT 230 kV circuits until the conditions are met by:
• Adjust the tap of VIT transformer phase shifter to reduce 2L129 flow, and/or
• Bring JOR online if it is available and increase the output, and/or
• Bring more generation online in North and Central VI area.</td></tr>
<tr><td>DMR T2 or T1</td><td>No restriction.</td></tr>
<tr><td>5L45</td><td>No restriction.</td></tr>
<tr><td>1L115 (or
1L116)</td><td>Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW
Possibility of overload:
If 1L116 DMR (post-contingency) = 1L116 DMR + 0.39 * 1L115 DMR > 1L116_Rating
If 1L115 DMR (post-contingency) = 1L115 DMR + 0.39 * 1L116 DMR > 1L115_Rating</td></tr>
</table>

End of Table 1.1.1

Table 1.1.2 Pre-Outage Restrictions – (5L29 or 5L31) OOS with VIT PST in Service

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>
VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies; the most limiting contingency is 2L129).

JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load:</td><td>≥ 1942</td><td>≥ 1974</td><td>≥ 2021</td><td>≥ 2086</td><td>≥ 2125</td><td>(2156 ~2164)</td></tr>
<tr><td>Or C&SVI MW load:</td><td>≥ 1291</td><td>≥ 1313</td><td>≥ 1344</td><td>≥ 1387</td><td>≥ 1413</td><td>(1434 ~1439)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥ 100</td><td>≥ 130</td><td>≥ 150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>

If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY” or “VI RMR VIOLATION: NEED MORE VIT SUPPORT”, then BCHCC Operator shall take the following actions:
• Bring JOR online if it is available and increase the output, and/or
• Bring more generation online in North and Central VI areas, and/or
• Check status of 1L18, VIT SCs, VIT HF2

If VI load or C&SVI load exceeds the maximum limit in above table, TSA-PM will alarm “VI AC INJ EXCEEDS MAXIMUM LIMITS”; the BCHCC Operator shall contact TDSO Operations Planning.

Note:
1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is calculated as:
• 1L115 DMR + 0.094 * 2L129 ARN - 1L115_Rating and,
• 1L116 DMR + 0.094 * 2L129 ARN - 1L116_Rating
Note:
5L31 (or 5L29) may be loaded beyond its continuous rating upon loss of 2L129 when VI load is above 2000MW, but within the overload rating:
The estimated overload is calculated as:
• 5L31 + 1.07 * 2L129 ARN – 5L31_Rating or,
• 5L29 + 1.07 * 2L129 ARN – 5L29_Rating
</td></tr>
<tr><td>5L29 with 5L31 OOS,
or
5L31 with 5L29 OOS,
or
5L30 & 5L32, or
5L42 & 5L45, or
DMR T1 & T2</td><td>Same VI RMR as Table 1.1.1 for the contingency.</td></tr>
<tr><td>5L30 or 5L32</td><td>No restriction.</td></tr>
<tr><td>2L123 or 2L128</td><td>
If 0.5 * (1L115 + 1L116) DMR + 0.17 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating
Then limit:
2L129 ARN + 0.32 * 0.5 * (2L123 + 2L128) DMR +
0.33 * 0.17 * 2 * 0.5 * (2L123 + 2L128) DMR –
0.33 * (1L115 + 1L116) JPT < = 850
Else limit:
2L129 ARN + 0.32 * 0.5 * (2L123 + 2L128) DMR < = 850

If the above condition violates, TSA-PM will alarm “VIT PST RUN BACK LIMIT VIOLATION: 2L123OR128 CTG”, then the BCHCC Operator must reduce the transfer on 2L129 and the DMR-SAT 230 kV circuits until the conditions are met by:
• Adjusting the tap of VIT transformer phase shifter to reduce 2L129 flow, and/or
• Bring JOR online if it is available and increase the output, and/or
• Bring more generation online in North and Central VI areas.
</td></tr>
<tr><td>DMR T2 or T1</td><td>No restriction.</td></tr>
<tr><td>5L45</td><td>No restriction.</td></tr>
<tr><td>5L42</td><td>No restriction.</td></tr>
<tr><td>5L44</td><td>No restriction.</td></tr>
<tr><td>1L115 (or
1L116)</td><td>
Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW
The estimated overload is calculated as:
• 1L116 DMR + 0.38 * 1L115 DMR - 1L116_Rating or,
• 1L115 DMR + 0.38 * 1L115 DMR - 1L115_Rating
</td></tr>
</table>

End of Table 1.1.2

Table 1.1.3 Pre-Outage Restrictions − (DMR T1 or T2) OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.2 - (5L29 or 5L31) OOS with VIT PST in Service. Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is calculated as: • 1L115 DMR + 0.097* 2L129 ARN - 1L115_Rating • 1L116 DMR + 0.097 * 2L129 ARN - 1L116_Rating Note also that DMR T2 (or DMR T1) may be loaded beyond its continuous rating upon loss of 2L129 when VI load is above 2000MW. The estimated DMR T2 (or DMR T1) overload will be: • DMR T2 + 1.06 * 2L129 ARN - DMR T2_Rating or, • DMR T1 + 1.06 * 2L129 ARN - DMR T1_Rating.
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 with DMR T2 OOS, or DMR T2 with DMR T1 OOS	Same VI RMR as Table 1.1.1 for the contingency.
5L29 or 5L31, or 5L30 or 5L32	No restriction.
2L123 or 2L128	If 0.5 * (1L115 + 1L116) DMR + 0.17 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating Then limit: 2L129 ARN + 0.31 * 0.5 * (2L123 + 2L128) DMR + 0.32 * 0.17 * 2 * 0.5 * (2L123 + 2L128) DMR – 0.32 * (1L115 + 1L116) JPT < = 850 Else limit: 2L129 ARN + 0.31 * 0.5 * (2L123 + 2L128) DMR < = 850 If the above condition violates, TSA-PM will alarm “VIT PST RUN BACK LIMIT VIOLATION: 2L123OR128 CTG”, then the BCHCC Operator must reduce the transfer on 2L129 and the DMR-SAT 230 kV circuits until the conditions are met by: • Adjusting the tap of VIT transformer phase shifter to reduce 2L129 flow, and/or • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L42	No restriction.
5L44	No restriction.
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW The estimated overload is calculated as: • 1L116 DMR + 0.38 * 1L116 DMR - 1L116_Rating • 1L115 DMR + 0.38 * 1L115 DMR - 1L115_Rating

End of Table 1.1.3

Table 1.1.4 Pre–Outage Restrictions – (5L30 or 5L32) OOS with VIT PST in Service

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>
VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies, the most stringent one is 2L129 contingency).
JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load,</td><td>≥ 2040</td><td>≥ 2099</td><td>≥ 2131</td><td>≥ 2176</td><td>≥ 2199</td><td>(2213~2219)</td></tr>
<tr><td>Or C&SVI MW load,</td><td>≥ 1357</td><td>≥ 1396</td><td>≥ 1417</td><td>≥ 1447</td><td>≥ 1462</td><td>(1472~1476)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥ 100</td><td>≥ 130</td><td>≥ 150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>
If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY”, “VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT”, then BCHCC Operator shall take the following actions:
Bringing JOR online if it is available and increasing the output, and/or
Checking status of 1L18, VIT SCs, VIT HFs
If VI load or C&SVI load exceeds the maximum limit in above table, TSA-PM will alarm “VI LOAD EXCEEDS MAXIMUM LIMITS”, then BCHCC Operator shall contact TDSO Operations Planning.
Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is:
1L115 DMR + 0.094 * 2L129 ARN - 1L115_Rating
1L116 DMR + 0.094 * 2L129 ARN - 1L116_Rating
</td></tr>
<tr><td>5L29 & 5L31, or
5L42 & 5L45, or
DMR T2 & T1, or
5L30 with 5L32 OOS, or
5L32 with 5L30 OOS</td><td>Same VI RMR as Table 1.1.1 for the contingency</td></tr>
<tr><td>5L29 or 5L31</td><td>No restriction.</td></tr>
<tr><td>2L123 or 2L128</td><td>
If 0.5 * (1L115 + 1L116) DMR + 0.17 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating
Then limit:
2L129 ARN + 0.31 * 0.5 * (2L123 + 2L128) DMR +
0.35 * 0.17 * 2 * 0.5 * (2L123 + 2L128) DMR –
0.35 * (1L115 + 1L116) JPT < = 850
Else limit:
2L129 ARN + 0.31 * 0.5 * (2L123 + 2L128) DMR < = 850
If the above condition violates, TSA-PM will alarm “VIT PST RUN BACK LIMIT VIOLATION: 2L123OR128 CTG”, then the BCHCC Operator must reduce the transfer on 2L129 and the DMR-SAT 230 kV circuits until the conditions are met by:
Adjusting the tap of VIT transformer phase shifter to reduce 2L129 flow, and/or
Bring JOR online if it is available and increase the output, and/or
Bring more generation online in North and Central VI areas.
</td></tr>
<tr><td>DMR T2 or T1</td><td>No restriction.</td></tr>
<tr><td>5L45</td><td>No restriction.</td></tr>
<tr><td>5L42</td><td>No restriction.</td></tr>
<tr><td>5L44</td><td>No restriction.</td></tr>
<tr><td>1L115 (or 1L116)</td><td>
Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is:
1L115 DMR + 0.39 * 2L129 ARN - 1L115_Rating
1L116 DMR + 0.39 * 2L129 ARN - 1L116_Rating
</td></tr>
</table>

End of Table 1.1.4

Table 1.1.5 Pre-Outage Restrictions – (2L123 or 2L128) OOS with VIT PST in Service

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies, the most stringent one is 2L129 contingency):

JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load,</td><td>≥ 1663</td><td>≥ 1690</td><td>≥ 1743</td><td>≥ 1833</td><td>≥ 1897</td><td>(1953~1968)</td></tr>
<tr><td>or C&SVI MW load,</td><td>≥ 1106</td><td>≥ 1124</td><td>≥ 1159</td><td>≥ 1219</td><td>≥ 1262</td><td>(1299~1309)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥100</td><td>≥130</td><td>≥150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>

If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY” or “VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT”, then BCHCC Operator shall take the following actions:

• Bring JOR online if it is available and increase the output, and/or
• Check status of 1L18, VIT SCs, VIT HF2

If VI load or C&SVI load exceeds the maximum limits in above table, TSA-PM will alarm “VI LOAD EXCEEDS MAXIMUM LIMITS”; then BCHCC Operator shall contact TDSO Operations Planning.

Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is:
• 1L115 DMR + 0.17 * 2L129 ARN - 1L115_Rating
• 1L116 DMR + 0.17 * 2L129 ARN - 1L116_Rating

Only JOR and the remaining DMR-SAT 230 kV circuit are left to carry the area load South of DMR.</td></tr>
<tr><td>5L29 & 5L31, or
5L30 & 5L32, or
5L42 & 5L45, or
DMR T1 & T2</td><td>Same VI RMR as Table 1.1.1 for the contingency</td></tr>
<tr><td>5L29 or 5L31</td><td>No restriction</td></tr>
<tr><td>5L30 or 5L32</td><td>No restriction</td></tr>
<tr><td>DMR T1 or T2</td><td>No restriction</td></tr>
<tr><td>2L128 (or 2L123)</td><td>Loss of the remaining DMR-SAT 230 kV line will invoke shedding VI load South of DMR. Refer to Table 2.2.</td></tr>
<tr><td>5L42</td><td>No restriction</td></tr>
<tr><td>5L44</td><td>No restriction</td></tr>
<tr><td>1L115 (or
1L116)</td><td>Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is:
• 1L115 DMR + 0.44 * 2L129 ARN - 1L115_Rating
• 1L116 DMR + 0.44 * 2L129 ARN - 1L116_Rating</td></tr>
<tr><td>HWW T1 or T2</td><td>Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is:
• 1L115 DMR + 0.22 * 2L129 ARN - 1L115_Rating
• 1L116 DMR + 0.22 * 2L129 ARN - 1L116_Rating</td></tr>
</table>

End of Table 1.1.5

Table 1.1.6 Pre-Outage Restrictions – Both Sections of 1L115 and 1L116 Opened between JPT and LTZ with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.1 – System Normal for the contingency
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.1.1 for the contingency
5L29 or 5L31, or 5L30 or 5L32	No restriction.
2L123 or 2L128	No restriction.
DMR T1 or T2	No restriction.
5L42	No restriction.
5L44	No restriction.
5L45	No restriction.

End of Table 1.1.6

Table 1.1.7 Pre-Outage Restrictions – (any segment of 1L115 or any segment of 1L116) OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.1 – System Normal for the contingency Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ by 1CB3 if 1L115 was OOS, or open-ended at LTZ by 1CB1 if 1L116 was OOS) by overload protection upon loss of 2L129 when VI load is above 2000MW. The estimated overload is: • 1L115 DMR + 0.14 * 2L129 ARN - 1L115_Rating • 1L116 DMR + 0.14 * 2L129 ARN - 1L116_Rating
5L29 with 5L31 OOS, or 5L31 with 5L29 OOS, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.1.1 for the contingency
5L29 or 5L31, or 5L30 or 5L32	No restriction.
2L123 or 2L128	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ by 1CB3 if 1L115 was OOS, or open-ended at LTZ by 1CB1 if 1L116 was OOS) by overload protection upon loss of 2L123 (or 2L128). 1L115 LTZ designated the MW flow for PVL-LTZ section of 1L115 measured at LTZ. It is a signed quantity; negative implied going into LTZ. Same for 1L116 LTZ. The estimated overload is: • 1L116 DMR + 0.24 * 2L123 DMR (or 2L128 DMR) - 1L116_Rating • 1L115 DMR + 0.24 * 2L123 DMR (or 2L128 DMR) - 1L115_Rating • If 1L115 DMR (or 1L116 DMR if 1L115 was OOS) + 0.24 * 0.5 * (2L123 + 2L128) DMR > 1L115_Rating Then limit: 2L129 ARN + 0.34 * 0.5 * (2L123 + 2L128) DMR + 0.24 * 0.24 * 0.5 * (2L123 + 2L128) DMR – 0.24 * 1L115 LTZ (or 1L116 LTZ if 1L115 was OOS) < = 850 Else limit: 2L129 ARN + 0.34 * 0.5 * (2L123 + 2L128) DMR < = 850 If the above condition is violated, TSA-PM will alarm “VIOLATION_VIT PST RUN BACK LIMIT 2L123OR128 CTG”, then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115 (or 1L116) by : • Bring JOR online if it is available and increase the output.
DMR T2 or T1	No restriction.
5L45	No restriction.
5L42	No restriction.
5L44	No restriction.
HWW T1 or T2	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ; open LTZ 1CB3 if 1L115 was OOS, open LTZ 1CB1 if 1L116 was OOS) by overload protection upon loss of HWW T1 (or HWW T2) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.19 * HWW T1 (or HWW T2) > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.19 * HWW T1 (or HWW T2) > 1L115_Rating

End of Table 1.1.7

Table 1.1.8 Pre-Outage Restrictions – DMR SVC and VAR Master OOS with VIT PST in Service

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies, the most stringent one is 2L129 contingency):

JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load,</td><td>≥ 1858</td><td>≥ 1890</td><td>≥ 1935</td><td>≥ 2009</td><td>≥ 2060</td><td>(2093 ~2099)</td></tr>
<tr><td>Or C&SVI MW load,</td><td>≥ 1236</td><td>≥ 1257</td><td>≥ 1287</td><td>≥ 1336</td><td>≥ 1370</td><td>(1392 ~1396)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥ 100</td><td>≥ 130</td><td>≥ 150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>
If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY”, or “VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT”, then BCHCC Operator shall take the following actions:
• Bringing JOR online if it is available and increasing the output, and/or
• Checking status of 1L18, VIT SCs, VIT HF2

If VI load or C&SVI load exceeds the maximum limit in above table, TSA-PM will alarm “VI LOAD EXCEEDS MAXIMUM LIMITS”, then BCHCC Operator shall contact TDSO Operations Planning.</td></tr>
<tr><td>Other contingencies</td><td>The same as System Normal in Table 1.1.1.</td></tr>
</table>

End of Table 1.1.8

Table 1.1.9 Pre-Outage Restrictions – 2L126 (or 2L170, or one GTP Capacitor) OOS with VIT PST in Service

<table>
<tr><th>CONTINGENCY</th><th>PRE-OUTAGE RESTRICTIONS</th></tr>
<tr><td>2L129</td><td>VI Reliability Must Run (VI RMR) is required for voltage stability (required for JOR/2L129/2L123/2L128 contingencies, the most stringent one is 2L129 contingency):

JOR Gen and VIT VAR RMR Requirements
<table>
<tr><td>If VI MW load,</td><td>≥ 1953</td><td>≥ 2008</td><td>≥ 2066</td><td>≥ 2153</td><td>≥ 2208</td><td>(2254~2257)</td></tr>
<tr><td>Or C&SVI MW load,</td><td>≥ 1299</td><td>≥ 1335</td><td>≥ 1374</td><td>≥ 1432</td><td>≥ 1468</td><td>(1499~1501)</td></tr>
<tr><td>then Jordan MW output must be:</td><td>on line</td><td>≥ 50</td><td>≥100</td><td>≥130</td><td>≥150</td><td>170</td></tr>
<tr><td>and available VIT MVAR must be:</td><td colspan="2">≥ 195</td><td>≥ 245</td><td>≥ 295</td><td colspan="2">= 345</td></tr>
</table>
If the above condition violates, TSA-PM will alarm “VI RMR VIOLATION: JOR MW < XX VI VOLTAGE STABILITY” or “VI RMR VIOLATION: NEED MORE VIT VAR SUPPORT”, then BCHCC Operator shall take the following actions:

• Bring JOR online if it is available and increase the output, and/or
• Check status of 1L18, VIT SCs, VIT HF2

If VI Load or C&SVI Load exceeds the maximum limit in above table, TSA-PM will alarm “VI LOAD EXCEEDS MAXIMUM LIMITS”; then BCHCC Operator shall contact TDSO Operations Planning.</td></tr>
<tr><td>Other contingencies</td><td>The same as System Normal in Table 1.1.1.</td></tr>
</table>

End of Table 1.1.9

Table 1.1.10 Pre-Outage Restrictions – one of (2L142, 2L143, 2L145, 2L146 or 5L42) OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.4 - (5L30 or 5L32) OOS with VIT PST in Service
Other contingencies	The same as System Normal in Table 1.1.1.

End of Table 1.1.10

Table 1.1.11 Pre-Outage Restrictions – one of any capacitor at (PVO, ESQ, CLD, HSY, SNY) OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.4 - 5L30 OOS, for the contingency.
Other contingencies	The same as System Normal in Table 1.1.1

Note:

"one of any capacitor at (PVO, ESQ, CLD, HSY, SNY) OOS" means one of the following capacitors OOS:

Station	Capacitor designation	MVAR
HSY	12CX1	14.4
	12CX2	10.8
	12CX4	14.1
ESQ	12CX1	14.4
	12CX11	21.6
	12CX12	12
SNY	25CX1	5.4
	25CX2	9.6
PVO	1CX1, 1CX2	2×51.5
	1CX3	51.0
CLD	25CX2	12
	25CX3,4	9.6

End of Table 1.1.11

Table 1.1.12 Pre-Outage Restrictions – 5L44, 5L45, 2L144, 1L12, DMR T4 or T5 OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.1 - system normal, for the contingency.
Other contingencies	The same as System Normal in Table 1.1.1

End of Table 1.1.12

Table 1.1.13 Pre-Outage Restrictions – one of (1L10, 1L11 or 1L14) OOS with VIT PST in Service

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.4 - 5L30 OOS, for the contingency.
Other contingencies	The same as System Normal in Table 1.1.1

End of Table 1.1.13

1.2 Pre-Outage Restrictions – without VIT PST

Table 1.2.1 Pre-Outage Restrictions – VI Supply System Normal without PST
Notes: VI Supply System Normal means that 5L29,5L31, 5L30, 5L32, at least one of 5L44 and 5L45, all major equipment in VI shall be in service.

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Bringing JOR online if it is available and increasing the output. • Bringing more generation online in North and Central VI areas. The effectiveness of the above means to reduce 2L129 flow are reflected in the coefficients of the following formula: *2L129 ARN = K1*VIload – K2*JOR Gen – K3*NVI GEN – K4*(5L51+5L52)ING - K0* Where: K1 = 0.41, K2 = 0.62, K3 = 0.26, K4 = 0.04, and K0 = 122
2L129	VI Reliability Must Run (VI RMR) requirements are the same as Table 1.1.1 - System Normal Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by over-load protection upon loss of 2L129 when VI load is above 2000MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.10 * 2L129 ARN > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.10 * 2L129 ARN > 1L116_Rating
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.1.1 for the contingency.
5L29, or 5L31	Limit: 2L129 ARN + 0.5 * 0.086 * (5L29+5L31) *MSA* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29 and 5L31 until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L30, or 5L32	Limit: 2L129 ARN + 0.5 * 0.13 * (5L30+5L32) CKY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30 and 5L32 until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
2L123 or 2L128	Note that 1L115 & 1L116 may be tripped *(open-ended at JPT)* by over-load protection upon loss of 2L123 or 2L128. • If 0.5 * (1L115 + 1L116) DMR + 0.15 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating Then limit: 2L129 ARN + 0.37 * 0.5 * (2L123 + 2L128) DMR + 0.38 * 0.15 * 2 * 0.5 * (2L123 + 2L128) DMR – 0.38 * (1L115 + 1L116) JPT < = 2L129_0.5hr_Rating Else limit: 2L129 ARN + 0.37 * 0.5 * (2L123 + 2L128) DMR < = 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG ", then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115/1L116 by : • Bringing JOR online if it is available and increasing the output.
DMR T1 or T2	Limit: 2L129 *ARN* + 0.5 * 0.17 * (DMR T1 + T2) *MW* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: DMR T1ORT2 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and DMR transformers until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L42	Limit: 2L129 *ARN* + 0.13 * 5L42 *KLY* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2 HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L42 until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L44	Limit: 2L129 ARN + 0.2 * (5L44 ING + 2L53 MAN + 2L27 ING) ≤ 2L129_0.5hr_Rating. If the above condition violates, TSA-PM will alarm "2L129ARN 1/2HOUR RATING VIOLATION: 5L44 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L44 until the condition is met by : Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.37 * 1L115 DMR > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.37 * 1L116 DMR > 1L115_Rating

End of Table 1.2.1

Table 1.2.2 **Pre-Outage Restrictions – 5L29 or 5L31 OOS without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas. The effectiveness of the above means to reduce 2L129 flow are reflected in the coefficients of the following formula: 2L129 ARN = K1*VI load – K2*JOR GEN – K3*NVI GEN – K4*(5L51+5L52) ING - K0 Where: K1 = 0.46, K2 = 0.65, K3 = 0.295, K4 = 0.036 and K0 = 186
2L129	VI Reliability Must Run (VI RMR) requirements are the same as Table 1.1.2 - 5L29 or 5L31 OOS Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by over-load protection upon loss of 2L129 when VI load is above 2000 MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.12 * 2L129 ARN > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.12 * 2L129 ARN > 1L116_Rating Note: 5L31 (or 5L29) may be loaded beyond its continuous rating upon loss of 2L129 when VI load is above 2000MW For estimating 5L31 (or 5L29) post-contingency flow: 5L31 MSA (post-contingency) = 5L31 + 1.07 * 2L129 ARN 5L29 MSA (post-contingency) = 5L29 + 1.07 * 2L129 ARN
5L29 with 5L31 OOS, or 5L31 with 5L29 OOS, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.2.1 for the contingency.
5L30, or 5L32	Limit: 2L129 ARN + 0.5 * 0.12 * (5L30+5L32) CKY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30 and 5L32 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
2L123 or 2L128	Note that 1L115 & 1L116 may be tripped *(open-ended at JPT)* by over-load protection upon loss of 2L123 or 2L128. • If 0.5 * (1L115 + 1L116) DMR + 0.15 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating Then limit: 2L129 ARN + 0.36 * 0.5 * (2L123 + 2L128) DMR + 0.38 * 0.15 * 2 * 0.5 * (2L123 + 2L128) DMR – 0.38 * (1L115 + 1L116) JPT < = 2L129_0.5hr_Rating Else limit: 2L129 ARN + 0.36 * 0.5 * (2L123 + 2L128) DMR < = 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG", then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115/1L116 by : • Bringing JOR online if it is available and increasing the output.
DMR T1 or T2	Same as Table 1.2.1 for the contingency
5L42	Same as Table 1.2.1
5L44	Same as Table 1.2.1
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.37 * 1L115 DMR > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.37 * 1L116 DMR > 1L115_Rating

End of Table 1.2.2

Table 1.2.3 **Pre-Outage Restrictions − DMR T1 or T2 OOS without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas. The effectiveness of the above means to reduce 2L129 flow are reflected in the coefficients of the following formula: *2L129 ARN = K1*VIload – K2*JOR Gen – K3*NVI GEN – K4*(5L51+5L52) ING – K0* where K1 = 0.49, K2 = 0.68, K3 = 0.28, K4 = 0.026, and K0 = 214
2L129	VI Reliability Must Run (VI RMR) requirements are the same as Table 1.1.3 - DMR T1 or T2 OOS Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by over-load protection upon loss of 2L129 when VI load is above 2000MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.098 * 2L129 ARN > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.098 * 2L129 ARN > 1L116_Rating Note also that DMR T2 (or DMR T1) may be loaded beyond its continuous rating upon loss of 2L129 when VI load is above 2000MW For estimating DMR T2 (or DMR T1) post-contingency flow: DMR T2 (post-contingency) = DMR T2 + 1.05 * 2L129 ARN DMR T1 (post-contingency) = DMR T1 + 1.05 * 2L129 ARN
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 with DMR T2 OOS, or DMR T2 with DMR T1 OOS	Same VI RMR as Table 1.2.1 for the contingency.
5L29, or 5L31	Limit: 2L129 *ARN* + 0.5 * 0.088 * (5L29+5L31) *MSA* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29 and 5L31 until the condition is met by • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L30, or 5L32	Limit: 2L129 *ARN* + 0.5 * 0.12 * (5L30+5L32) *CKY* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30 and 5L32 until the condition is met by • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
2L123 or 2L128	Note that 1L115 & 1L116 may be tripped *(open-ended at JPT)* by over-load protection upon loss of 2L123 or 2L128. • If 0.5 * (1L115 + 1L116) DMR + 0.16 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating Then limit: 2L129 ARN + 0.34 * 0.5 * (2L123 + 2L128) DMR + 0.36 * 0.16 * 2 * 0.5 * (2L123 + 2L128) DMR – 0.36 * (1L115 + 1L116) JPT < = 2L129_0.5hr_Rating Else limit: 2L129 ARN + 0.34 * 0.5 * (2L123 + 2L128) DMR < = 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG ", then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115/1L116 by : • Bringing JOR online if it is available and increasing the output.
5L42	Limit: 2L129 *ARN* + 0.13 * 5L42 *KLY* =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L42 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L44	Same as Table 1.2.1

End of Table 1.2.3

Table 1.2.4 **Pre-Outage Restrictions – 5L30 or 5L32 OOS without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas. The effectiveness of the above means to reduce 2L129 flow are reflected in the co-efficients of the following formula: *2L129 ARN = K1*VI load – K2*JOR Gen – K3*NVI GEN – K4*(5L51+5L52)ING - K0* Where: K1 = 0.48, K2 = 0.66, K3 = 0.29, K4=0.03, K0= 222
2L129	VI Reliability Must Run (VI RMR) requirements are the same as Table 1.1.4 – 5L30 or 5L32 OOS Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by over-load protection upon loss of 2L129 when VI load is above 2000MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.098 * 2L129 ARN > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.098 * 2L129 ARN > 1L116_Rating
5L29 & 5L31, or 5L42 & 5L45, or DMR T1 & T2 5L30 with 5L32 OOS 5L32 with 5L30 OOS	Same VI RMR as Table 1.2.1 for the contingency.
5L29 or 5L31	Limit: 2L129 ARN + 0.5 * 0.097 * (5L29+5L31) MSA =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29 and 5L31 until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
2L123 or 2L128	Note that 1L115 & 1L116 may be tripped *(open-ended at JPT)* by over-load protection upon loss of 2L123 or 2L128. • If 0.5 * (1L115 + 1L116) DMR + 0.16 * 0.5 * (2L123 + 2L128) DMR > 1L116_Rating Then limit: 2L129 ARN + 0.35 * 0.5 * (2L123 + 2L128) DMR + 0.37 * 0.16 * 2 * 0.5 * (2L123 + 2L128) DMR – 0.37 * (1L115 + 1L116) JPT < = 2L129_0.5hr_Rating Else limit: 2L129 ARN + 0.35 * 0.5 * (2L123 + 2L128) DMR < = 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 1/2HOUR RATING VIOLATION: 2L123OR128 CTG ", then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115/1L116 by : • Bringing JOR online if it is available and increasing the output.
DMR T1 or T2	Limit: 2L129 *ARN* + 0.5 * 0.16 * (DMR T1 + T2) MW =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: DMR T1ORT2 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and DMR transformers until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L42	Limit: 2L129 ARN + 0.13 * 5L42 KLY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L42 until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L44	Same as Table 1.2.1.
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.38* 1L115 DMR > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.38 * 1L116 DMR > 1L115_Rating

End of Table 1.2.4

Table 1.2.5 **Pre-Outage Restrictions – 2L123 or 2L128 OOS without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS

Without any contingency	Limit: 2L129 ARN ≤ 609 MW
	
	If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by:
	• Bring JOR online if it is available and increase the output, and/or
	• Bring more generation online in North and Central VI areas.
	
	The effectiveness of the above means to reduce 2L129 flow are reflected in the coefficients of the following formula:
	
	If both ends of 1L115 & 1L116 are connected, then
	2L129 ARN = K1*VI Load – K2*JOR Gen – K3*NVI Gen – K4*(5L51+5L52) ING – K0
	Where K1 = 0.47, K2 = 0.67, K3 = 0.21, K4 = 0.04, K0 = 212
	
	If 1L115 and 1L116 between LTZ and JPT are open, then
	2L129 ARN = K1*VI Load – K2*JOR Gen – K3*NVI Gen – K4*(5L51+5L52) ING – K0
	Where K1 = 0.53, K2 = 0.72, K3 = 0.15, K4 = 0.04, K0 = 212

2L129	VI Reliability Must Run (VI RMR) requirements are the same as Table 1.1.5 – 2L123 or 2L128 OOS ** Note: Avoid scheduling 2L123 or 2L128 outage for periods when VI load equal or exceed 1800 MW as loss of 2L129 would overload the remaining DMR-SAT 230 kV line (2L129 contingency would likely cause 1L115/1L116 O/L; open-ending 1L115 & 1L116 at JPT by O/L protection would dump the pre-contingency 1L115 & 1L116 flows from LTZ to JPT onto the remaining DMR-SAT 230 kV line.) There may not be enough resources to alleviate the O/L and there is no load dropping scheme similar to that for loss of the parallel DMR-SAT 230 kV line with 2L123 or 2L128 already opened. Note: 1L115 & 1L116 may be tripped (open-ended at JPT) by over-load protection upon loss of 2L129 when VI load is above 2000MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.18 * 2L129 ARN > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.18 * 2L129 ARN > 1L116_Rating Only JOR/the remaining DMR-SAT 230 kV circuit left to carry the area load South of DMR.
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same as System Normal Table 1.2.1
5L29 or 5L31	Limit: 2L129 ARN +0.5 * 0.077 * (5L29 + 5L31) MSA =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29/31 until the condition is met by • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L30 or 5L32	Limit: 2L129 ARN + 0.5 * 0.095 * (5L30 + 5L32) CKY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30/32 until the condition is met by • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
2L128 (or 2L123)	Loss of the remaining DMR-SAT 230 kV line will invoke shedding VI load South of DMR. Refer to Table 2.2.
DMR T1 or T2	Limit: 2L129 ARN + 0.5 * 0.15 * (DMR T1 + T2) MW =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: DMR T1ORT2 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and DMR transformers until the condition is met by : • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
5L42	Limit: 2L129 ARN + 0.12 * 5L42 KLY =< 2L129_0.5hr_Rating If 1L115 and 1L116 between LTZ and JPT are open, then Limit: 2L129 ARN + 0.098 * 5L42 KLY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L42 until the conditions are met by • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
5L44	Same as Table 1.2.1
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by over-load protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.43 * 1L115 DMR > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.43 * 1L116 DMR > 1L115_Rating
HWW T1 or T2	Note: 1L116 & 1L115 may be tripped (open-ended at JPT) by over-load protection upon loss of HWW T1 (or HWW T2) when VI load is above 2000MW Possibility of overload: If 1L115 DMR (post-contingency) = 1L115 DMR + 0.22 * HWW T1 (or HWW T2) > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.22 * HWW T1 (or HWW T2) > 1L116_Rating

End of Table 1.2.5

Table 1.2.6 **Pre-Outage Restrictions – Both Sections of 1L115 and 1L116 Opened between JPT and LTZ without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas. The effectiveness of the above means to reduce 2L129 flow are reflected in the coefficients of the following formula: 2L129 ARN = K1*VI Load – K2*JOR GEN – K3*NVI GEN – K4*(5L51+5L52)ING – K0 where K1 = 0.46, K2 = 0.64, K3 = 0.2, K4 = 0.026, and K0 = 213
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.1-System Normal for the contingency Limit: • 2L123 DMR + 0.53 * 2L129 ARN =< 2L123_0.5hr_Rating • 2L128 DMR + 0.53 * 2L129 ARN =< 2L128_0.5hr_Rating If the limit requirement violates, TSA-PM will alarm "2L123 1/2HR RATING VIOLATION: 2L129 CTG" or "2L128 1/2HR RATING VIOLATION: 2L129 CTG ", then the BCHCC Operator must reduce the transfer on the 2L129 and 2L123 if 2L128 is OOS, or 2L128 if 2L123 is OOS by: • Bringing JOR online if it is available and increasing the output After loss of 2L129 and if TSA-PM alarms "2L123 RATING VIOLATION" or "2L128 RATING VIOLATION", the BCHCC Operator shall take the same actions as described above to reduce the flow on 2L123 or 2L128 from DMR to SAT within its continuous rating in half an hour.
5L29 & 5L31, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.2.1 for the contingency
5L29 or 5L31	Limit: 2L129 ARN + 0.5 * 0.084 * (5L29+5L31) MSA =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29 and 5L31 until the condition is met by: • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L30 or 5L32	Limit: 2L129 ARN + 0.5 * 0.12 * (5L30+5L32) CKY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30 and 5L32 until the condition is met by: • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
2L123 or 2L128	Limit: 2L129ARN +0.5 * 0.45 * (2L123 +2L128) DMR ≤ 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG", then the BCHCC Operator must reduce the transfer on 2L123/2L128 by : • Bringing JOR online if it is available and increasing the output, and /or
DMR T1 or T2	Limit: 2L129 ARN + 0.5 * 0.17 * (DMR T1 + T2) MW =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: DMR T1ORT2 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and DMR transformers until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L42	Limit: 2L129 ARN + 0.13 * 5L42 KLY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L42 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L44	Same as Table 1.2.1

End of Table 1.2.6

Table 1.2.7 **Pre-Outage Restrictions – (any segment of 1L115 or any segment of 1L116) OOS without VIT PST**

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	Limit: 2L129 ARN ≤ 609 MW If TSA-PM alarms "2L129 ARN CONTINUOUS RATING VIOLATION", the BCHCC Operator must reduce the transfer below the limit by: • Adjusting the tap of the VIT phase shifter transformer, and /or • Bringing JOR online if it is available and increasing the output, and/or • Bringing more generation online in North and Central VI areas.
2L129	JOR Gen and VIT VAR RMR Requirements are the same as Table 1.1.1 – System Normal for the contingency Note: 1L116 (or 1L115) may be tripped(open-ended at LTZ; open LTZ 1CB3 if 1L115 was OOS, open LTZ 1CB1 if 1L116 was OOS) by overload protection upon loss of 2L129 when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.14 * 2L129 ARN > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.14 * 2L129 ARN > 1L115_Rating
5L29 with 5L31 OOS, or 5L31 with 5L29 OOS, or 5L30 & 5L32, or 5L42 & 5L45, or DMR T1 & T2	Same VI RMR as Table 1.2.1 for the contingency.
5L29, or 5L31	Limit: 2L129 *ARN* + 0.5 * 0.086 * (5L29+5L31) MSA =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L29OR31 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L29 and 5L31 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas. • Monitor the loading of the parallel 500 kV line
5L30, or 5L32	Limit: 2L129 *ARN* + 0.5 * 0.12 * (5L30+5L32) CKY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L30OR32 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and 5L30 and 5L32 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
2L123 or 2L128	Note that 1L115 (or 1L116) may be tripped (open-ended at LTZ; open LTZ 1CB3 if 1L115 was OOS, open LTZ 1CB1 if 1L116 was OOS) by overload protection upon loss of 2L123 or 2L128. 1L115 LTZ designated the MW flow for PVL-LTZ section of 1L115 measured at LTZ. It is a signed quantity; negative implied going into LTZ. Same for 1L116 LTZ. • If 1L115 DMR (or 1L116 DMR if 1L115 was OOS) + 0.21 * 0.5 * (2L123 + 2L128) DMR > 1L115_Rating Then limit: 2L129 ARN + 0.40 * 0.5 * (2L123 + 2L128) DMR + 0.28 * 0.21 * 0.5 * (2L123 + 2L128) DMR – 0.28 * 1L115 LTZ (or 1L116 LTZ if 1L115 was OOS) < = 2L129_0.5hr_Rating Else limit: 2L129 ARN + 0.40 * 0.5 * (2L123 + 2L128) DMR < = 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 2L123OR128 CTG ", then the BCHCC Operator must reduce the transfer on the 2L123/2L128 and 1L115 (or 1L116) by : • Bringing JOR online if it is available and increasing the output.
DMR T2 or T1	Limit: 2L129 *ARN* + 0.5 * 0.17 * (DMR T1 + T2) MW =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: DMR T1ORT2 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and DMR transformers until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L45	No restriction.
5L42	Limit: 2L129 ARN + 0.13 * 5L42 KLY =< 2L129_0.5hr_Rating If the above condition violates, TSA-PM will alarm "2L129 ARN 1/2HOUR RATING VIOLATION: 5L42 CTG", then the BCHCC Operator must reduce the transfer on the 2L129 and/or 5L42 until the condition is met by : • Bring JOR online if it is available and increase the output, and/or • Bring more generation online in North and Central VI areas.
5L44	Same as Table 1.2.1
HWW T1 or T2	Note: 1L115 (or 1L116) may be tripped (open-ended at LTZ; open LTZ 1CB3 if 1L115 was OOS, open LTZ 1CB1 if 1L116 was OOS) by overload protection upon loss of HWW T1 (or HWW T2) when VI load is above 2000MW Possibility of overload If 1L115 DMR (post-contingency) = 1L115 DMR + 0.19 * HWW T1 (or HWW T2) > 1L115_Rating If 1L116 DMR (post-contingency) = 1L116 DMR + 0.19 * HWW T1 (or HWW T2) > 1L116_Rating

Table 1.2.8 Pre-Outage Restrictions – DMR SVC and VAR Master OOS without VIT PST

The same as Table 1.1.8

Table 1.2.9 Pre-Outage Restrictions – 2L126 (or 2L170, or one GTP Capacitor) OOS without VIT PST

The same as Table 1.1.9

Table 1.2.10 Pre-Outage Restrictions – one of (2L142, 2L143, 2L145, 2L146 or 5L42) OOS without VIT PST

The same as Table 1.1.10

Table 1.2.11 Pre-Outage Restrictions –one of any capacitor at (PVO, ESQ, CLD, HSY, SNY) OOS[Note] without VIT PST

The RMR requirements and the Note are the same as Table 1.1.11

Table 1.2.12 Pre-Outage Restrictions – one of (5L44, 5L45, 2L144, 1L12, DMR T4 or T5) OOS without VIT PST

The same as Table 1.1.12

Table 1.2.13 Pre-Outage Restrictions – one of (1L10, 1L11 or 1L14) OOS without VIT PST

The same as Table 1.1.13

Table 1.2.14 Pre-Outage Restrictions– 2L129 OOS without VIT PST

CONTINGENCY	PRE-OUTAGE RESTRICTIONS
Without any contingency	JOR Gen and VIT VAR RMR Requirements are the same Table 1.1.5 - 2L123 or 2L128 OOS
5L29 or 5L31	Limit • (5L29+5L31) MSA ≤1450 MW If TSA-PM alarms “5L29 (5L31) Emergency Rating VIOLATION”, the BCHCC Operator must reduce the transfer below the limit by Increasing VI generation.
1L115 (or 1L116)	Note: 1L116 (or 1L115) may be tripped (open-ended at LTZ) by overload protection upon loss of 1L115 (or 1L116) when VI load is above 2000MW Possibility of overload: If 1L116 DMR (post-contingency) = 1L116 DMR + 0.39 * 1L115 DMR > 1L116_Rating If 1L115 DMR (post-contingency) = 1L115 DMR + 0.39 * 1L116 DMR > 1L115_Rating

End of Table 1.2.14

ATTACHMENT 2 - Load Shedding and Generation Shedding Requirements - with or without 2L129 in Service

Notes for all the tables in Attachment 2:
Definitions:
AA = (5L29 + 5L31) MSA + 2L129 ARN – 1150 MW
BB = (5L29 + 5L31) MSA + 2L129 ARN – 600 MW
If AA<0, then AA=0

Note 1: AA is for determining transfer exceedance for calculating generation shedding requirement to prevent transient voltage dip at the VIT bus.

Note 2: BB is for determining transfer exceedance for calculating load shedding requirement to prevent thermal overload on 2L129.

Note 3: "Loss of Northern Path of LM – VI" means the contingencies
- 5L29 and 5L31, or 5L29 with 5L31 OOS, or 5L31 with 5L29 OOS,
  OR
- 5L30 and 5L32, or 5L30 with 5L32 OOS, or 5L32 with 5L30 OOS,
  OR
- 5L42 and 5L45, or 5L42 with 5L45 OOS, or 5L45 with 5L42 OOS,
  OR
  DMR T1 and T2, or DMR T1 with DMR T2 OOS, or DMR T2 with DMR T1 OOS.

Table 2.1 Load Shedding Requirements for the 500 kV Contingencies Associated with VI Supply – with 2L129

Notes for all the contingencies in this Table 2.1:
Note 1: Up to 5 smaller blocks of loads should be shed iteratively, starting at 2 seconds after contingency, with appropriate time delay of 10 seconds, with each load block of about 150 MW (120MW~180MW) and the remaining load for the last block. All shedable load blocks shall be armed.
Note 2: Load shedding is supervised by the 2L129 current measured at VIT, the RAS will not initiate load shedding unless the line current exceeds 1672 A for summer season and 1810 A for winter season, and the RAS will continue shedding load until the current drops below 1506 A.
Note 3: Do not shed all loads in one zone, the following rule could be used as reference: 40%~70% of total load shed is at SVI, 10%~40% at each of CVI and NVI.
Note 4: If the available load shedding is not enough, an alarm shall sound.
Note 5: Tripping of 2L129 by its overload protection is used as a backup for VI RAS.
Note 6: Each of the contingencies in the following table will send a signal to VIT to block the PST tap changer until manually reset by BCHCC Operator.
Note 7: The required iterative load shedding amount (BB – AA) is used for under load shed checking only.

CONTINGENCY	Fast Load shedding amount (MW) (within 15 Cycles)	Iterative Load shedding amount with time delay (MW)	Locations of Load Shedding
Loss of northern path of LM -VI	2L129 in Service: AA	2L129 in Service: BB – AA	2L129 in Service: All existing loads listed in Table 3.2 of Attachment 3
	2L129 OOS: Existing VI U/F and U/V load shedding schemes and initiate TECMP if VI load is greater than 1861 MW.	2L129 OOS: Existing VI U/F and U/V load shedding schemes and initiate TECMP if VI load is greater than 1861 MW.	2L129 OOS: Existing VI U/F and U/V load shedding schemes.

Table 2.2 Load Shedding Requirements for Loss of Two of 2L123, 2L128 and 2L129

Notes for all the system conditions in Table 2.2:
Note 1: If load shedding is triggered, up to 3 or 4 smaller blocks of loads should be shed iteratively, starting at 1 second, with appropriate time delay 10 seconds, each consisting of almost 150 MW load (120MW~180MW) and the remaining load for the last block. All shedable load blocks shall be armed.
Note 2: Load shedding for loss of 2L123 and 2L128 is supervised by the 2L129 current measured at VIT, the RAS will not initiate load shedding unless the line current exceeds 1672 A for summer season and 1810 A for winter season, and the RAS will continue shedding load until the current drops below 1506 A.
Note 3: Load shedding for loss of 2L128 and 2L129 is supervised by the 2L123 current measured at DMR. During summer season, the RAS will not initiate load shedding unless the line current exceed 1637 A, and the RAS will continue shedding load until the current drops below 1555 A. During winter season, the RAS will not initiate load shedding unless the line current exceed 2034 A, and the RAS will continue shedding load until the current drops below 1932 A.
Note 4: Load shedding for loss of 2L123 and 2L129 is supervised by the 2L128 current measured at DMR. During summer season, the RAS will not initiate load shedding unless the line current exceed 2012 A, and the RAS will continue shedding load until the current drops below 1858 A. During winter season, the RAS will not initiate load shedding unless the line current exceed 2369 A, and the RAS will continue shedding load until the current drops below 2249 A.
Note 5: If the available load shedding is not enough, an alarm shall sound.
Note 6: Tripping of 2L129 by its overload protection is used as a backup for load shedding for loss of 2L123 and 2L128.
Note 7: Loss of both 2L123 and 2L128 including the single contingency with the parallel line O.O.S. will send a signal to block the PST tap changer until the OL signal disappears.
Note 8: The required iterative load shedding amount is used for under load shed checking only.

System Condition	Fast Load shedding amount (MW) (within 15 Cycles)	Iterative Load shedding amount with time delay (MW) (Note 8)	Locations of Load Shedding
System normal, or 5L29 OOS, or 5L31 OOS, or 5L30 OOS, or 5L32 OOS, or DMR T1 OOS, or DMR T2 OOS	None	LS for loss of 2L123 and 2L128 = 1.05*1.42*[(2L129 ARN - 550) + 0.7*(2L123+2L128) DMR]	Loads in CVI and SVI listed in Table 3.2 of Attachment 3 excludes QLC, PVL, LTZ.

2L123 OOS	None	LS for loss of 2L128 = 1.05*1.42*[(2L129 ARN - 550) + 0.7*2L128 DMR] If 1L115 DMR + 0.17 * 2L129 ARN > 1L115_Rating OR 1L116 DMR + 0.17 * 2L129 ARN > 1L116_Rating, then, LS for loss of 2L129 = 2L128 DMR + 1.07 * [2L129 ARN - (1L115 + 1L116) JPT] - 2L128_0.5hr_Rating Else, LS for loss of 2L129 = 2L128 DMR + 0.78 * 2L129 ARN - 2L128_0.5hr_Rating	Loads in CVI and SVI listed in Table 3.2 of Attachment 3 excludes QLC, PVL, LTZ.
2L128 OOS	None	LS for loss of 2L123 = 1.05*1.42*[(2L129 ARN - 550) + 0.7*2L123 DMR] If 1L115 DMR + 0.17 * 2L129 ARN > 1L115_Rating OR 1L116 DMR + 0.17 * 2L129 ARN > 1L116_Rating, then, LS for loss of 2L129 = 2L123 DMR + 1.07 * [2L129 ARN - (1L115 + 1L116) JPT] - 2L123_0.5hr_Rating Else, LS for loss of 2L129 = 2L123 DMR + 0.78 * 2L129 ARN - 2L123_0.5hr_Rating	Loads in CVI and SVI listed in Table 3.2 of Attachment 3 excludes QLC, PVL, LTZ.
2L129 OOS	None	If 1L115 DMR + 0.19 * 0.5 * (2L123+2L128) DMR > 1L115_Rating OR 1L116 DMR + 0.19 * 0.5 * (2L123+2L128) DMR > 1L116_Rating, then, LS for loss of 2L128 = 2L123 DMR + 1.04 * [2L128 DMR - (1L115 + 1L116) JPT] - 2L123_0.5hr_Rating LS for loss of 2L123 = 2L128 DMR + 1.04 * [2L123 DMR - (1L115 + 1L116) JPT] - 2L128_0.5hr_Rating Else, LS for loss of 2L128 = 2L123 DMR + 0.73 * 2L128 DMR - 2L123_0.5hr_Rating LS for loss of 2L123 = 2L128 DMR + 0.73 * 2L123 DMR - 2L128_0.5hr_Rating	Loads in CVI and SVI listed in Table 3.2 of Attachment 3 excludes QLC, PVL, LTZ.
Both Sections between JPT and LTZ on 1L115 and 1L116 OOS	None	LS for loss of 2L123 and 2L128 = (2L123 + 2L128) DMR + 2L129 ARN – 600	Loads in CVI and SVI listed in Table 3.2 of Attachment 3 excludes QLC, PVL, LTZ.

End of Table 2.2

Table 2.3 **Generation Shedding Requirements – with or without 2L129**

In Table 2.3 formulas, 2000 MW refers to historical limitations that BPA accepts for impacts of transfer swings on their system. 3150 MW refers to the WECC Path 3 rating (normal maximum for path operation).

CONTINGENCY	GENERATION SHEDDING REQUIREMENTS
Loss of Northern Path of LM - VI	**All system conditions except for 5L51 O.O.S., or 5L52 O.O.S.** Shed at MCA/REV/GMS/PCN the greater of: • Y if (BC to US) + Y > 2000 MW, or • (BC to US) + Z – 3150 MW **5L51 O.O.S.** Shed at MCA/REV/GMS/PCN the greater of: • Y if (BC to US) + Y > 2000 MW, or • (BC to US) + Z – 5L52_30Minute_MW_Rating_EX **5L52 O.O.S.** Shed at MCA/REV/GMS/PCN the greater of: • Y if (BC to US) + Y > 2000 MW, or • (BC to US) + Z – 5L51_30Minute_MW_Rating_EX Where: Y = AA if 2L129 is in service, or Y = (5L29 +5L31) MSA if 2L129 is OOS Z = BB if 2L129 is in service, or Z = (5L29 + 5L31) MSA if 2L129 is OOS If generation shedding is required, a minimum of the following generator units shall remain on-line post-shedding: • 2 MCA Units, AND • 2 REV units, AND • At GMS/PCN: • 4 equivalent GMS units. Two PCN units can be treated as one equivalent GMS unit. (Same as the requirement in Section 5.3.5 in SOO 7T-13) Please refer to SOO 7T-18 Attachment 1 for 5L51_30Minute_MW_Rating_EX and 5L52_30Minute_MW_Rating_EX respectively.

End of Table 2.3

ATTACHMENT 3 – Line Ratings and RAS Load Shedding Candidates

Table 3.1 Half Hour Emergency Rating of 2L129

Ambient Temperature at Ingledow (°C)	**Half Hour Emergency Rating (A)**	**Half Hour Emergency Rating (MW)** (calculated by: 1.732 * Rating in KA * 236 kV * 0.99 pf)
-20	**1921**	**777.4**
-10	**1885**	**762.8**
0	**1848**	**747.8**
10	**1810**	**732.4**
20	**1754**	**709.8**
30	**1672**	**676.6**
40	**1669**	**675.4**

Table 3.2 **The VI RAS Load Shedding Candidates[Note1]**

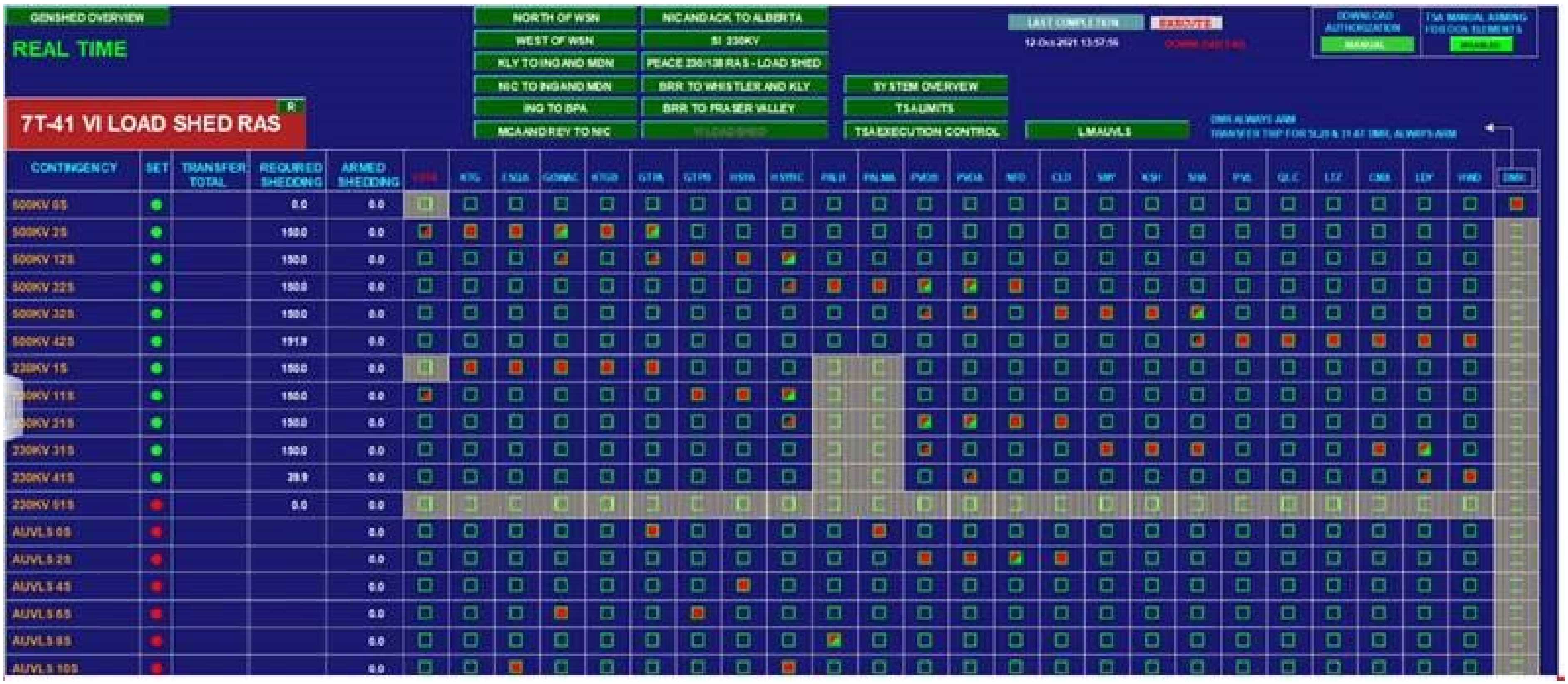
Substation Load Blocks [Note 5]	Load Shed Actions [Note 4]	MW Load (Summer)	MW Load (Winter)	Area
CFT-A	CFT 6 Grinders (Trip CBs)	80	80	CVI
KTG-A	25 kV feeders: KTG 25CB111-115, 121-123)	29.5	75.4	SVI
ESQ-A	12 kV feeders: ESQ 12CB7, 10, 21, 40, 51-58, 72	38.9	79.0	SVI
GOW-A&C	25 kV feeders (50 series): GOW 25CB1, 2, 10	48.2	82.1	SVI
KTG-B	Shed KTG 60 kV (SNY Load): KTG 60CB1, 2, 3, 4	25.7	71.4	SVI
GTP-A	25 kV feeders (40 series): GTP 25CB11, 13	20.7	56.5	SVI
GTP-B	25 kV feeders (50, 60 series): GTP 25CB12, 14, 21, 22	46	79.1	SVI
HSY-A	12 kV feeders (60, 300, 400 series & 12kV Capacitors): HSY 12CB4, 32, 31, 38, 33, 36	46.1	80.6	SVI
HSY-B&C	12 and 25 kV feeders (50,70,80, 100, 200 series): HSY 12CB4, 37, 34, 35, 25CB1, 2, 10	70.4	133.4	SVI
PAL-B	25 kV feeders (all): PAL 25CB11, 12	40.8	59.9	CVI
PVO-B	PVO capacitors: PVO 1CB25, 26, 27	-	-	CVI
PVO-A	25 kV feeders except 25F51 (hospital) and including LCW Station: PVO 25CB52-57, 60CB3	42.5	61.6	CVI
NFD	All feeders except 25F54 (hospital): NFD 25CB50-53, 55-56, 60-66	58.9	94.6	CVI
CLD	25 kV feeders: CLD 25CB51-58, 61-63, 71-78, 81-83, 23, 24	77.3	138.0	SVI
SNY [Note2]	25 kV Feeders excluding SNY 25F54 & 65 (BC Ferries, airport): SNY 25CB22, 53, 55,62-64, 66	22.5	62.5	SVI
KSH	25 kV Feeders: KSH 25CB2, 3	35.4	58.3	CVI
SHA	25 kV Feeders : SHA 25CB1, 2	23.9	48.1	CVI
QLC	25 kV Feeders excluding QLC 25F52 (medical clinic): QLC 25CB51, 53, 61, 62	21.2	42.6	CVI
LTZ	25 kV Feeders: LTZ 25CB111-114, 121-124	43.9	66.2	CVI
CMX	25kV Feeders excluding 25F31, 25F32 and 25F36: CMX 25CB33, 34, 35, 37, 51, 52	42.5	80.1	NVI
LDY	25 kV Feeders excluding LDY25F53 & 65 (medical clinic, BC Ferries): LDY 25CB51, 52, 55, 63, 64	29.3	52.4	CVI
HWD	25 kV Feeders excluding HWD 25F51 (Duke Point Ferry), HWD 25F38 (health clinic on Gabriola Island), and HWD 25F36 (Nanaimo Airport): HWD 25CB31-35, 37, 52	32.6	54.5	CVI
	Total Eligible Load [Note3]	853.8	1493.8	

Note 1: Based on 2021 Vancouver Island Load Forecast F22 Winter/Summer Ref Values Uncompensated Station Peak with DSM.
Note 2: SNY Block pro-rated as 7/8 of station forecast load.
Note 3: Total Eligible Load excludes SNY as it is previously counted under KTG-B block
Note 4: Refer to 2T-34 Appendix 2 “RAS General Description” Section 5.14 “Action Outputs” table for source information.
Note 5: station blocks ordered as displayed in EMS 7T-41 VI Load Shed RAS display.

Figure 3.3 EMS RAS Display

The figure below is an example of the layout for the 7T-41 Load Shed RAS display. This is for information only. The display capture does not prescribe settings and should not be used for operating purposes.

Note: PAL-MA load block is not used (load removed).



ATTACHMENT 4 – Vancouver Load Supply Capability

Attachment 4 is a high level reference for load supply capability. The tables here can be viewed as a simplified version of Attachment 5. It contains fewer study scenarios, and does not consider load ratios (i.e. load distribution on the Island). See Section 3.7 of the main body for applicability and use of this attachment.

Notes for all the charts in Attachment 4:

- Definitions
  - "VI load" = VI AC transfers + VI generation
    - "VI Load" captures the AC source injection dependencies that impact VAR support.
  - "C&SVI Load" = 2L129 ARN + (2L123 + 2L128) DMR – (1L115 + 1L116) JPT + JOR MW
    - "C&SVI Load" captures the AC source Injection dependencies that impact VAR support
  - Load Ratio = (C&SVI Load)/(VI load)
  - "VIT VAR" = total VIT VAR supporting capability available or on-line, includes
    - VIT Synchronous Condensers, total 250 MVAR, including SC2 50 MVAR, SC3 100 MVAR, SC4 100 MVAR
    - VIT HF2 total 94.7 MVAR, including 5HF2/7HF2/11HF2/13HF2 with 21.6/12.0/15.4/11.1 MVAR and HP2 34.6 MVAR
    - The maximum VIT Var supporting capability is 344.7 MVAR

- The priority sequence to serve Vancouver Island load are assumed as follows:
  - Central & North VI generation (C&N VI Gen)
  - Jordan generation

- If 2L129 contingency results in 1L115 & 1L116 tripped open at JPT by its O/L protection, and in turn O/L VIT T5 & T6, the BCHCC Operator may need to manually shed some load in Central and South VI area.

- For all the tables in Attachment 4, the half-hour emergency rating of 231 MVA at 0ºC ambient temperature is used for VIT T5 or T6.

- For all the tables in Attachment 4, the continuous rating of 185 MVA at 0ºC ambient temperature is used for 1L115 or 1L116.

- The charts below were developed solely from voltage stability perspective. The applied contingency is 2L129, which is the most impacting contingency. It is applicable to both scenarios of VIT PST in or out of service.

- In the tables, the result are calculated from the BenchMark case, where "Load Ratio" = 66.5%. Therefore, a modification factor f is used for different "Load Ratio". Where

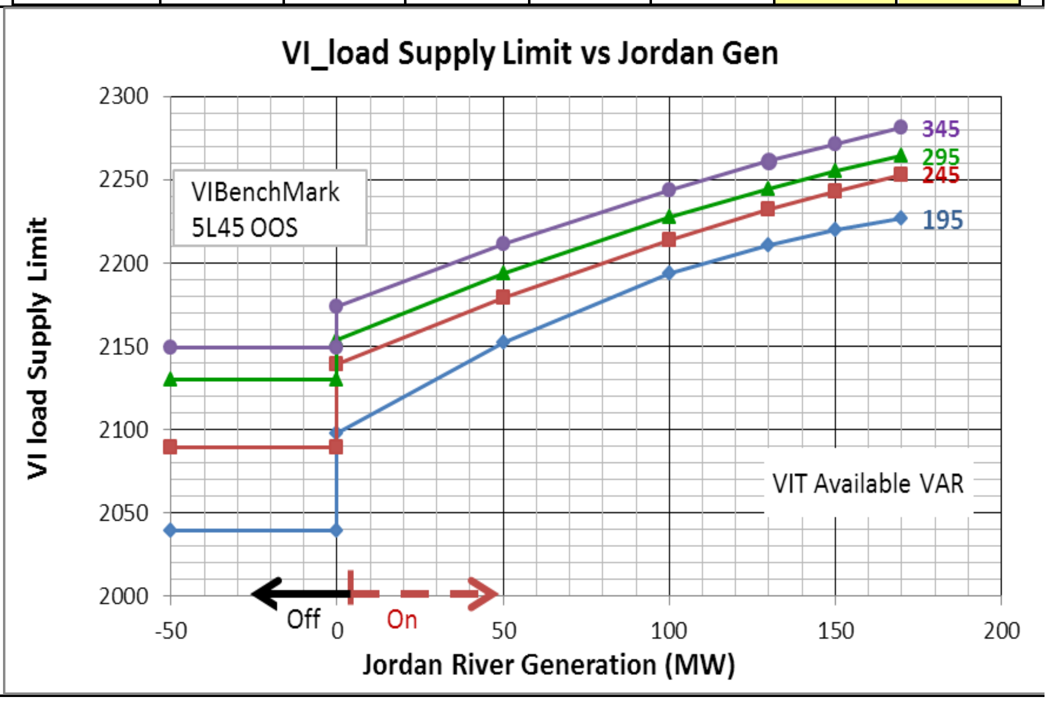
  $$f = 0.665 / (\text{Load Ratio}),$$

  That means if the "Load Ratio" > 0.665, then the VI load supply capability will be reduced.

A4.1 System Normal, or one of (1L12, 2L144, 5L44, 5L45, DMR T4 or T5, VIT T5 or T9) OOS

Table A4 -1 VI Load Supply Capability in MW

VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	2039	2098	2153	2193	2211	2220	2227
245	2089	2139	2179	2214	2232	2243	2253
295	2130	2154	2194	2227	2245	2255	2264
345	2149	2174	2211	2244	2261	2272	2281

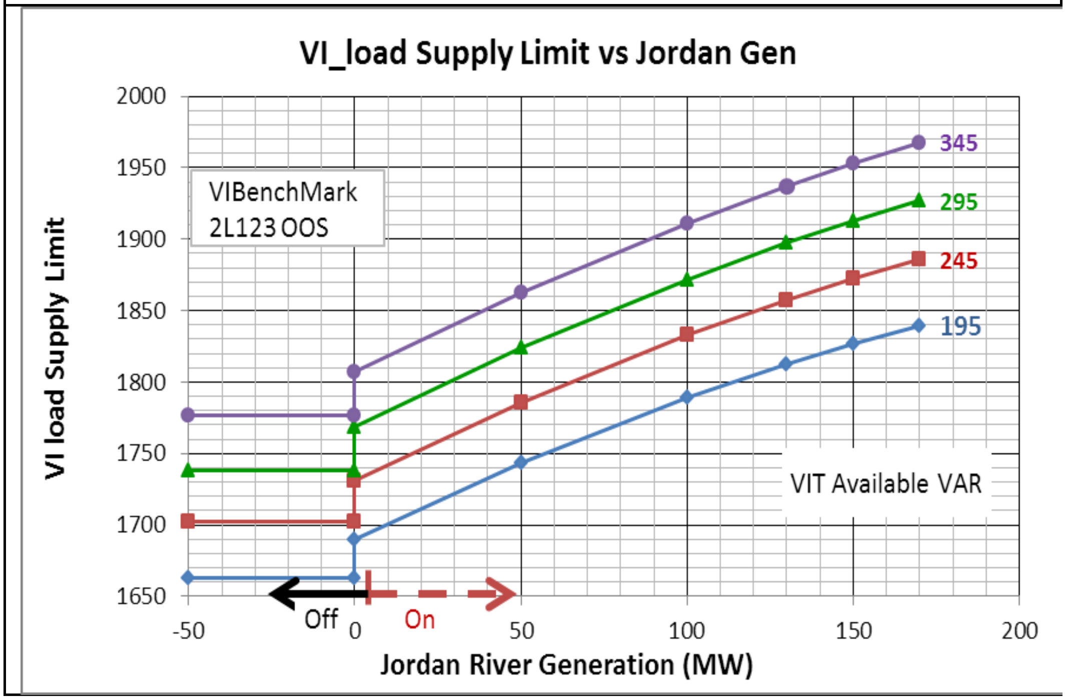


Note: The highlighted numbers in the table are used in Attachment 1.

A4.2 2L123 or 2L128 OOS

Table A4 - 2 VI Load Supply Capability in MW

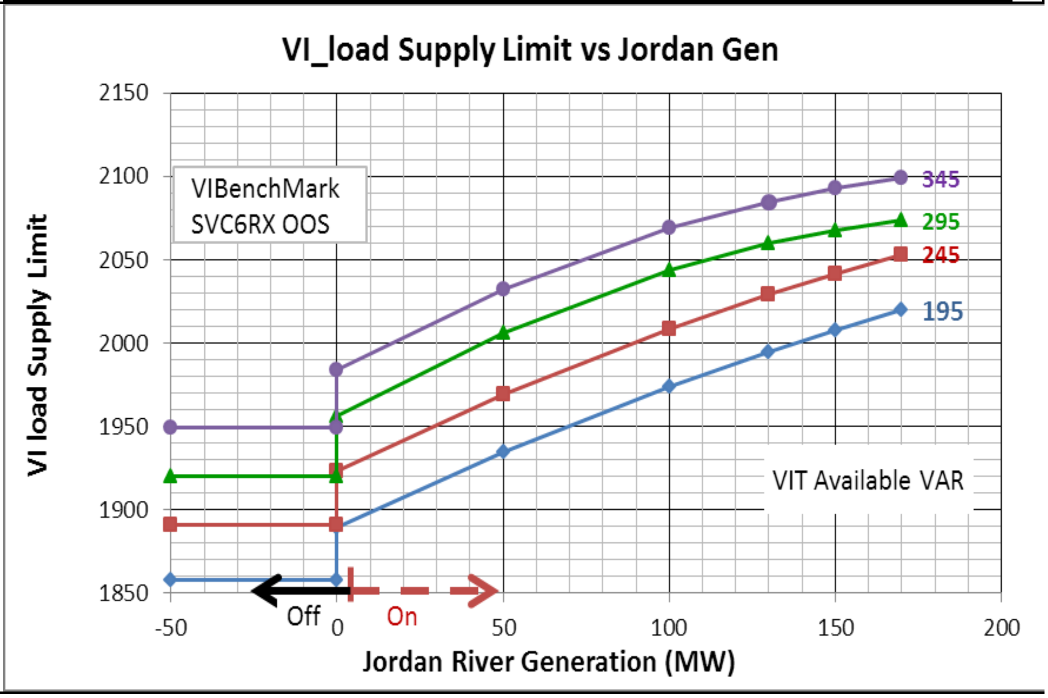
VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	1663	1690	1743	1789	1812	1827	1839
245	1702	1731	1786	1833	1857	1872	1886
295	1739	1769	1824	1872	1897	1913	1927
345	1776	1808	1863	1911	1937	1953	1968



A4.3 DMR SVC and VARMaster OOS (With 6 5RXs on line)

Table A4 - 3 VI Load Supply Capability in MW

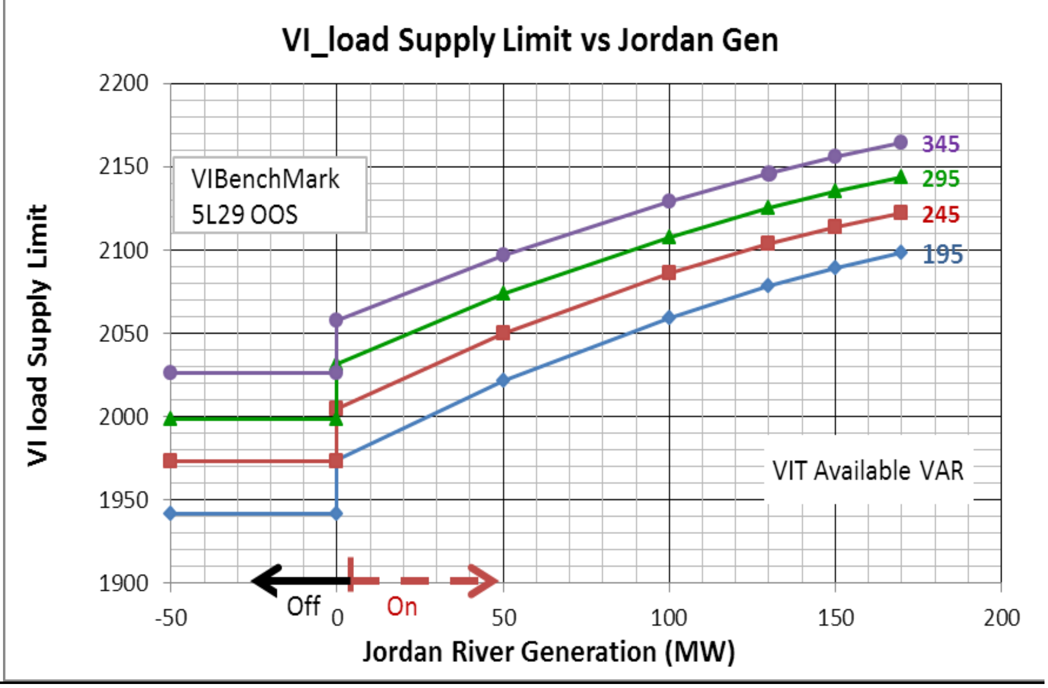
VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	1858	1890	1935	1974	1995	2008	2020
245	1891	1923	1969	2009	2029	2042	2053
295	1920	1956	2007	2044	2060	2068	2074
345	1950	1984	2032	2069	2085	2093	2099



A4.4 One of (5L29, 5L31, DMR T1, DMR T2) OOS

Table A4 - 4 VI Load Supply Capability in MW

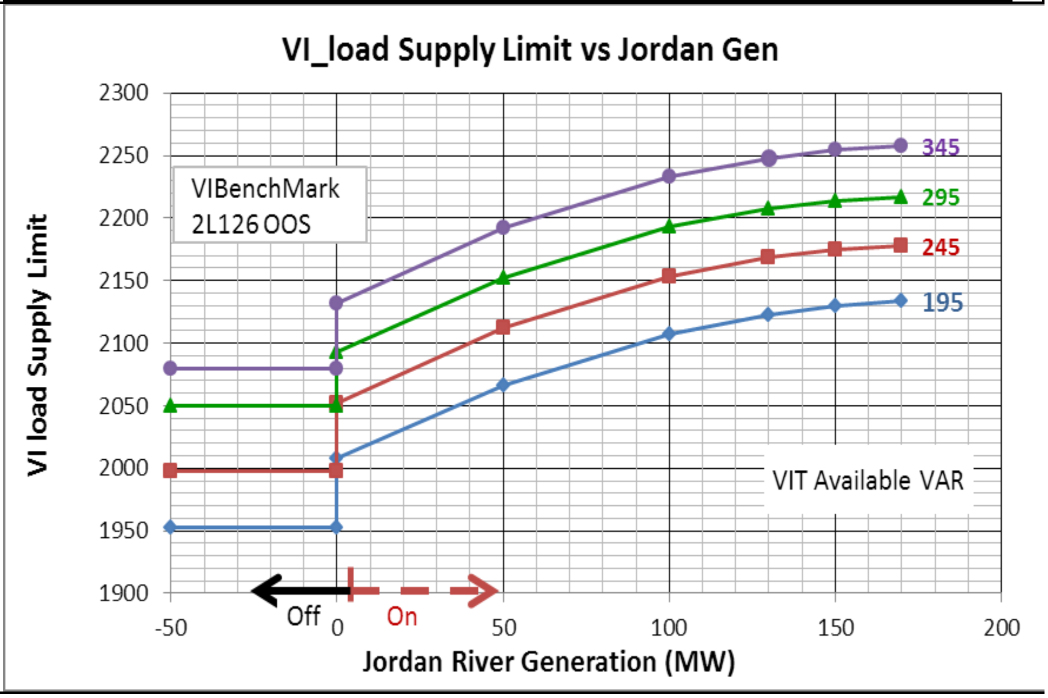
VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	1942	1974	2021	2060	2078	2089	2098
245	1974	2005	2050	2086	2104	2114	2122
295	1998	2032	2073	2108	2125	2135	2144
345	2026	2058	2097	2129	2146	2156	2164



A4.5 One of (2L126, 2L170, GTP Capacitor) OOS

Table A4 - 5 VI Load Supply Capability in MW

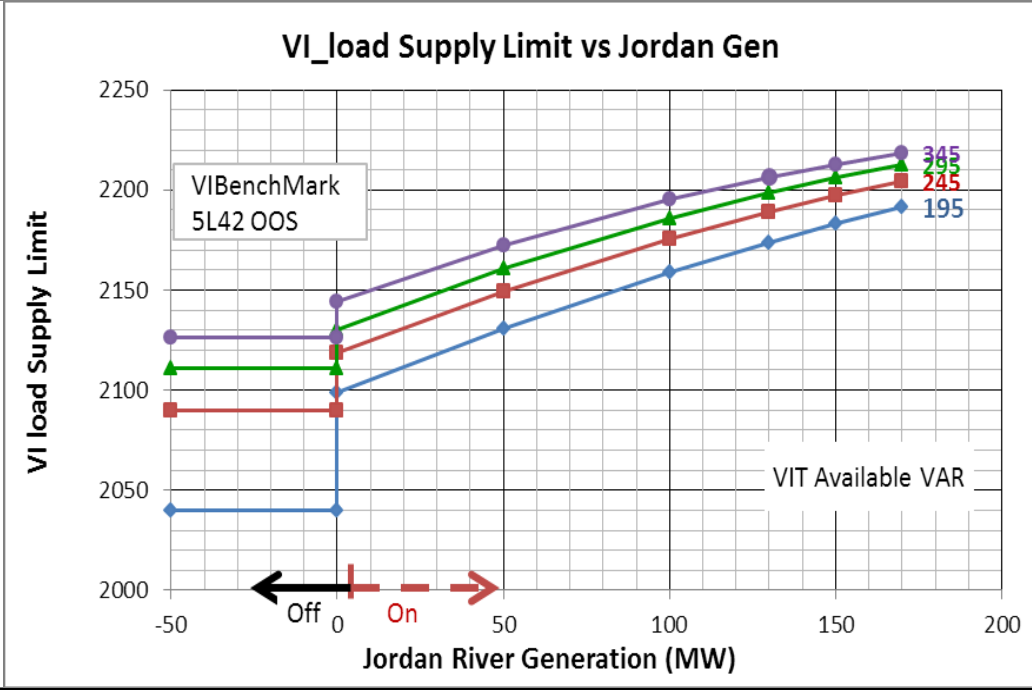
VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	1953	2008	2066	2107	2123	2130	2134
245	1998	2052	2112	2153	2168	2175	2178
295	2050	2092	2152	2193	2208	2214	2217
345	2079	2131	2192	2233	2248	2254	2257



A4.6 One of (1L10,1L11,1L14,2L142,2L143,2L145,2L146,5L30,5L32,5L42) OOS or one of (PVO, ESQ, CLD, HSY, SNY) Capacitor OOS

Table A4 - 6 VI Load Supply Capability in MW

VIT (MVAR)	Jordan Gen (MW)						
	off	0	50	100	130	150	170
195	2040	2099	2131	2159	2174	2183	2192
245	2090	2119	2150	2176	2189	2197	2204
295	2111	2130	2161	2186	2199	2206	2213
345	2126	2144	2172	2195	2207	2213	2219



Note: See [Note 1] in Attachment 1.1 Table 1.1.11 for “one of any cap of (PVO, ESQ, CLD, HSY, SNY)” designations

ATTACHMENT 5 – Vancouver Island Load Supply Capability (Alternate)

This attachment can be used as reference for VI load supply. See Section 3.7 for applicability.

This attachment has been developed for implementation with an Artificial Intelligence model (Artificial Neural Network algorithm). The Attachment contains the full VI load supply capability results, which cover more scenarios than in Attachment 4. Attachment 5 can be considered as a more comprehensive version of Attachment 4.

Notes for all the charts in Attachment 5:

- Definitions
  - "VI load" = VI AC transfers + VI generation
    - "VI Load" captures the AC source injection dependencies that impact VAR support.
  - "C&SVI Load" = 2L129 ARN + (2L123 + 2L128) DMR – (1L115 + 1L116) JPT + JOR MW
    - "C&SVI Load" captures the AC source Injection dependencies that impact VAR support.
  - Load Ratio = (C&SVI Load)/(VI load)
  - "VIT VAR" = total VIT VAR supporting capability available or on-line, includes
    - VIT Synchronous Condensers, total 250 MVAR, including SC2 50 MVAR, SC3 100 MVAR, SC4 100 MVAR
    - VIT HF2 total 94.7 MVAR: including 5HF2/7HF2/11HF2/13HF2 with 21.6/12.0/15.4/11.1 MVAR and HP2 34.6 MVAR
    - The maximum VIT Var supporting capability is 344.7 MVAR

- The priority sequence to serve Vancouver Island load are assumed as follows:
  - Central & North VI generation (C&N VI Gen)
  - Jordan generation

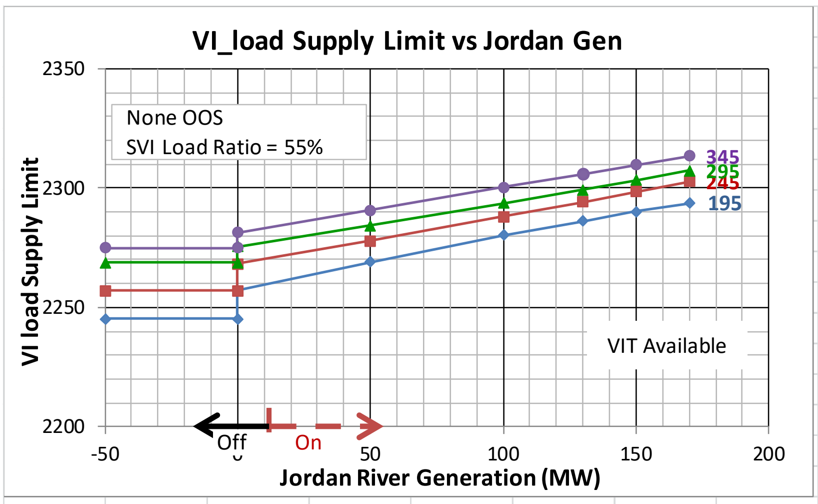
- If 2L129 contingency results in 1L115 & 1L116 tripped open at JPT by its O/L protection, and in turn O/L VIT T5 & T6, the BCHCC Operator may need to manually shed some load in Central and South VI area.

- For all the tables in Attachment 5, the half-hour emergency rating of 231 MVA at 0ºC ambient temperature is used for VIT T5 or T6.

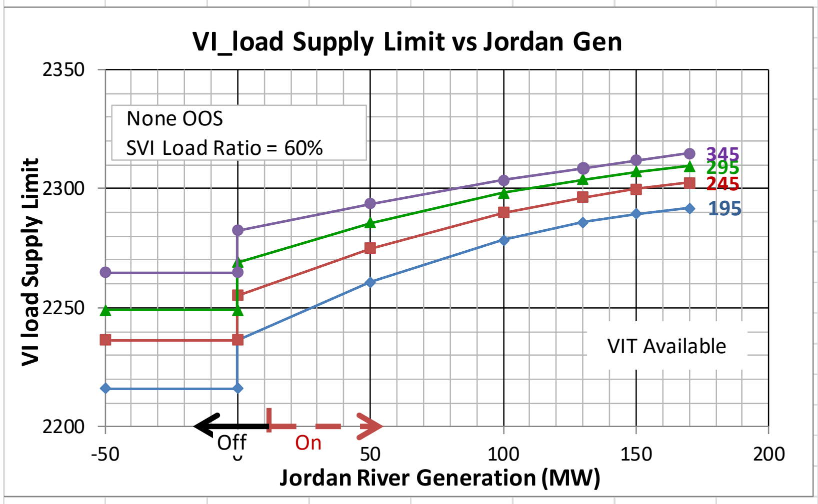
- For all the tables in Attachment 5, the continuous rating of 185 MVA at 0ºC ambient temperature is used for 1L115 or 1L116.

- The charts below were developed solely from voltage stability perspective. The applied contingency is 2L129, which is the most impacting contingency.

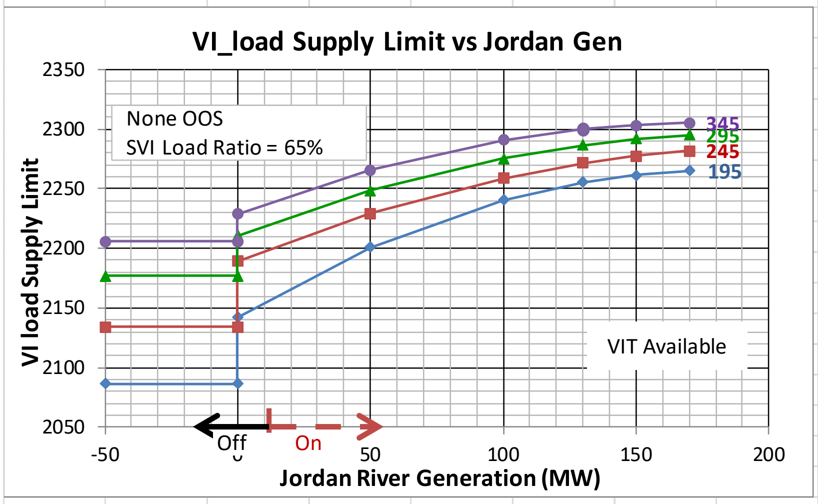
A5.1 System Normal



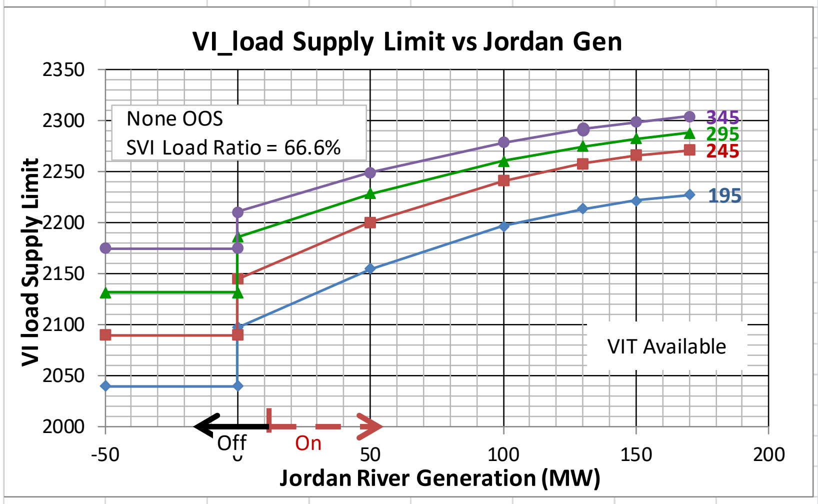
OOS:	None						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2245	2257	2269	2280	2286	2290	2294
245	2257	2268	2278	2288	2294	2298	2303
295	2269	2275	2284	2294	2299	2303	2307
345	2275	2281	2291	2300	2306	2310	2313



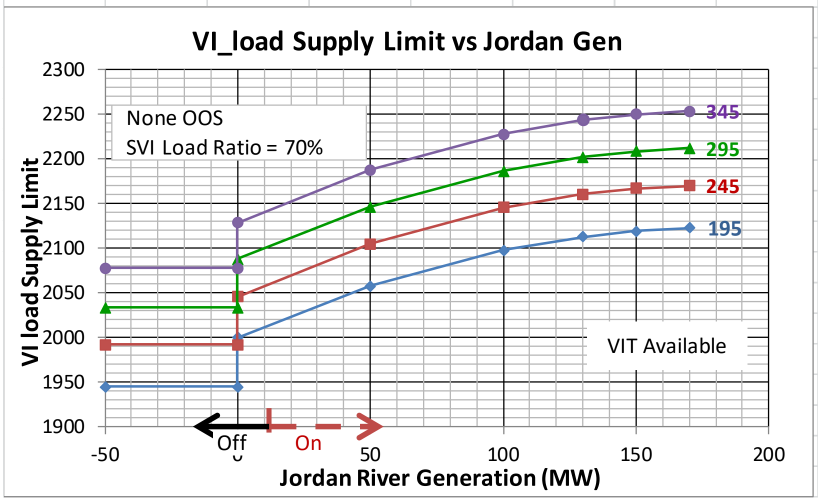
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2216	2236	2261	2278	2286	2289	2292
245	2236	2255	2275	2290	2296	2300	2302
295	2249	2269	2286	2298	2304	2307	2309
345	2265	2282	2294	2303	2309	2312	2315



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2087	2142	2201	2241	2255	2262	2265
245	2134	2189	2230	2259	2271	2278	2282
295	2177	2211	2248	2276	2287	2292	2295
345	2206	2229	2266	2291	2300	2303	2305

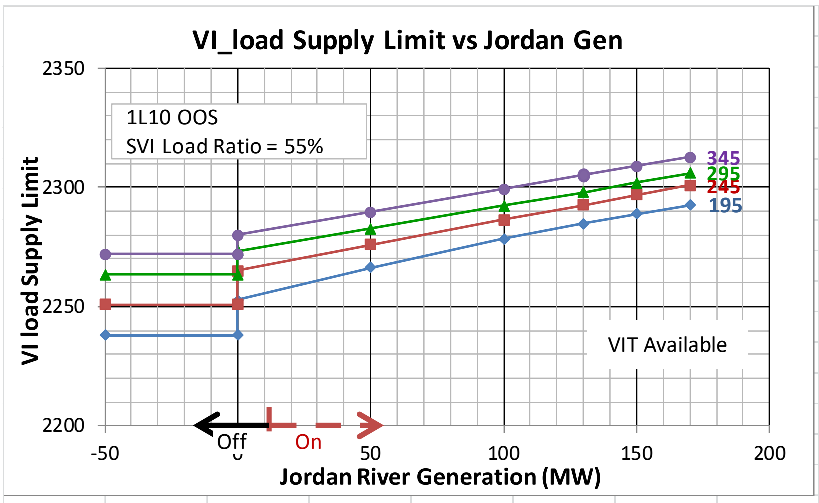


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2040	2097	2155	2197	2214	2222	2227
245	2090	2145	2201	2241	2258	2266	2271
295	2132	2186	2229	2261	2275	2282	2288
345	2175	2211	2249	2278	2292	2299	2304

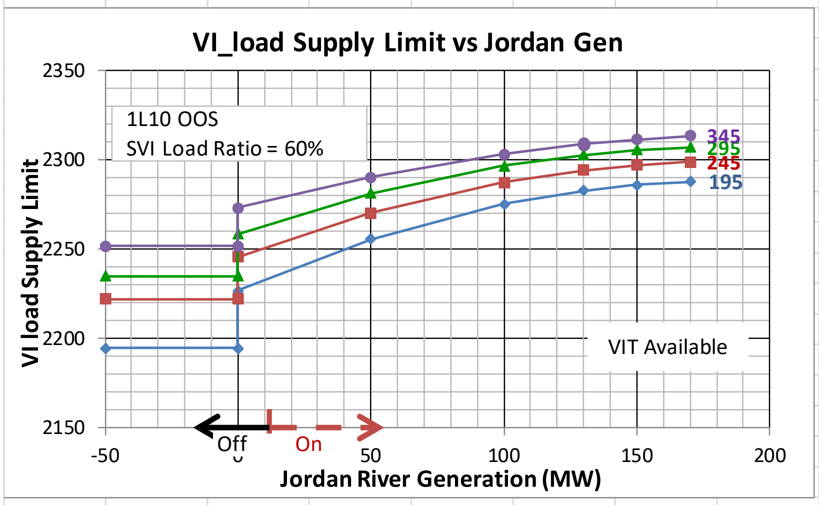


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1945	2000	2058	2098	2113	2119	2122
245	1992	2046	2105	2145	2160	2167	2170
295	2034	2088	2146	2187	2202	2208	2212
345	2078	2128	2187	2228	2243	2250	2254

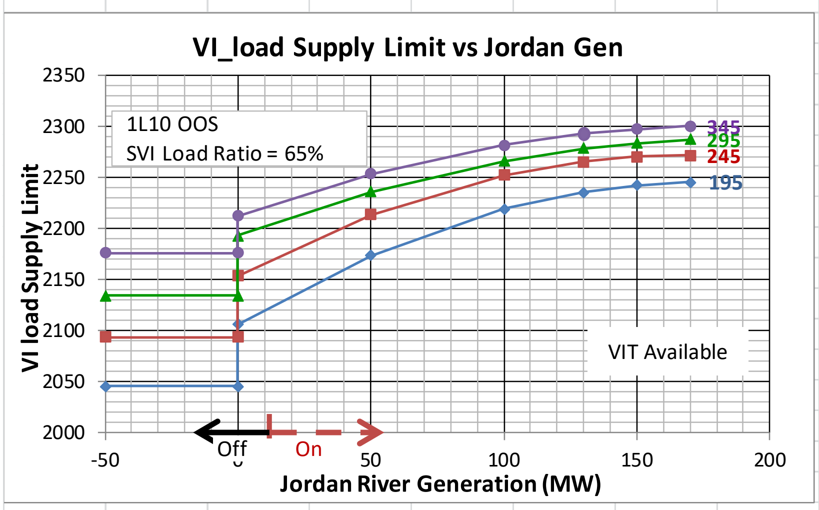
A5.2 1L10 OOS



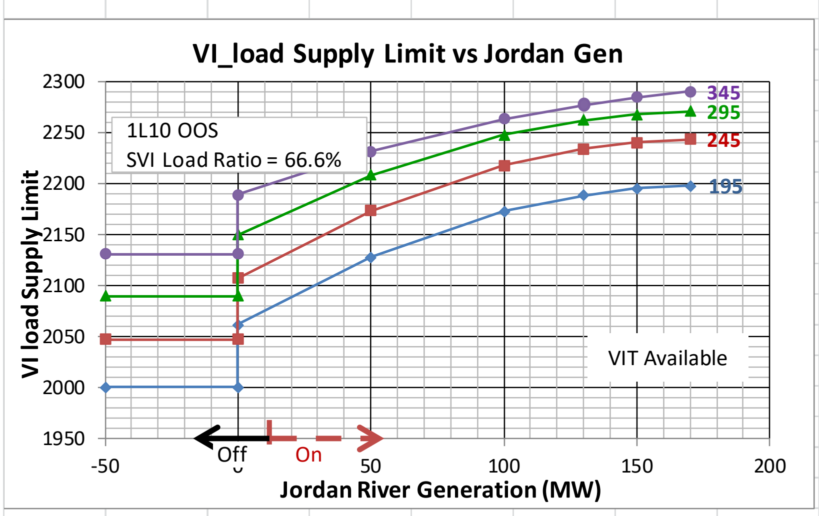
OOS:	1L10						
Load Ratio:	**55.0%**						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2238	2253	2266	2279	2285	2289	2293
245	2251	2265	2276	2287	2293	2297	2301
295	2264	2273	2283	2292	2298	2302	2306
345	2272	2280	2290	2299	2305	2309	2313



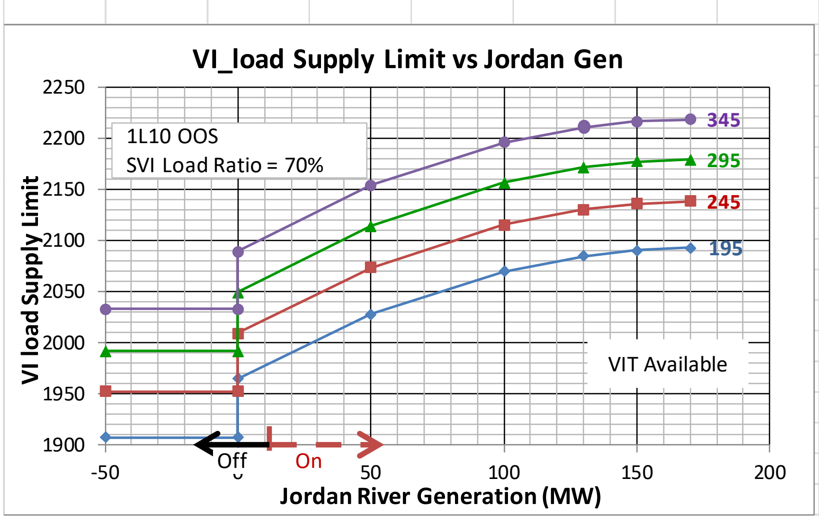
Load Ratio:	**60.0%**						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2195	2227	2256	2275	2283	2286	2288
245	2222	2246	2270	2287	2294	2297	2299
295	2235	2259	2281	2297	2303	2306	2307
345	2252	2273	2290	2303	2309	2312	2314



Load Ratio:	**65.0%**						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2046	2106	2174	2219	2236	2242	2245
245	2094	2154	2214	2253	2266	2270	2271
295	2134	2193	2236	2266	2278	2284	2287
345	2176	2213	2254	2282	2293	2297	2300

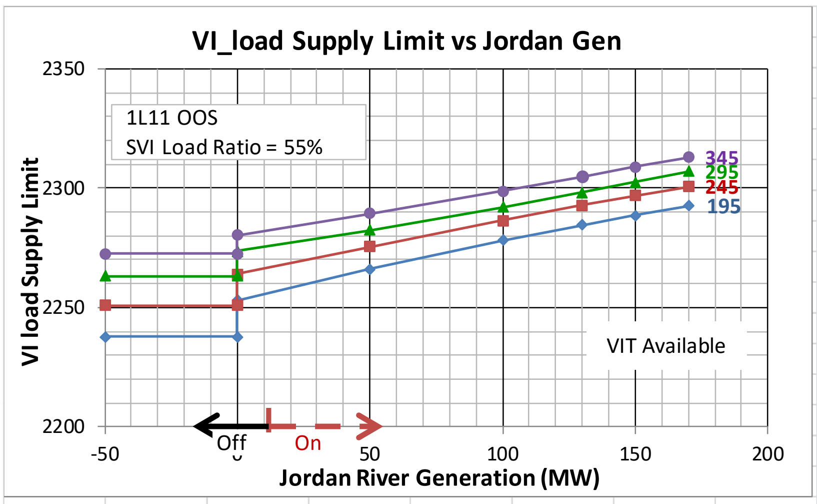


Load Ratio:	**66.6%**						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2001	2061	2128	2173	2189	2195	2198
245	2048	2107	2174	2218	2234	2240	2243
295	2090	2150	2208	2248	2262	2268	2271
345	2131	2189	2232	2264	2278	2285	2290



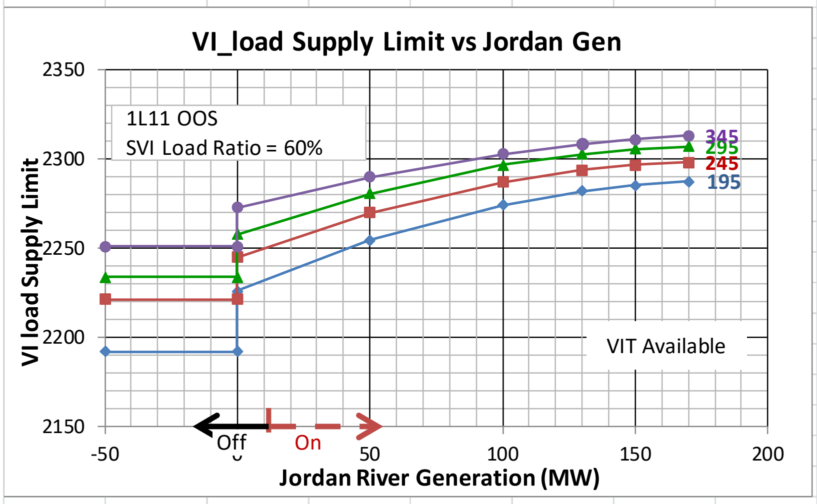
Load Ratio:	**70.0%**						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1908	1965	2028	2070	2085	2091	2093
245	1953	2009	2073	2116	2131	2136	2138
295	1992	2049	2114	2157	2172	2177	2179
345	2033	2090	2154	2196	2211	2217	2219

A5.3 1L11 OOS

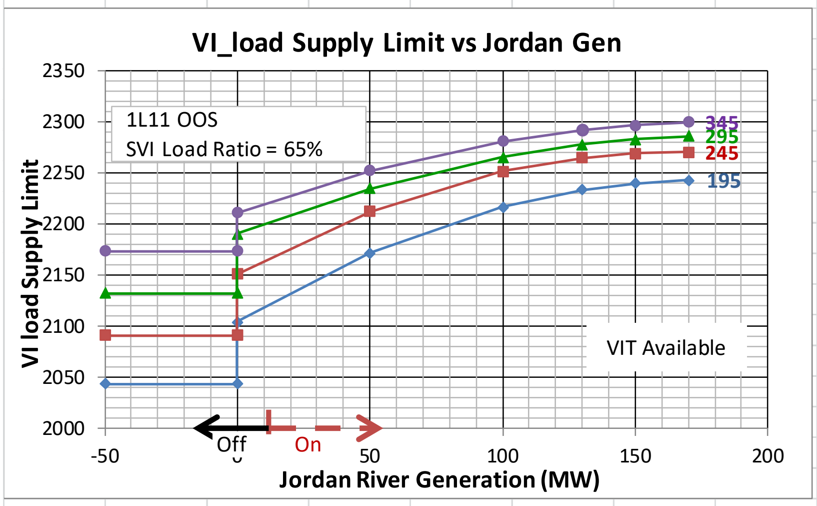


OOS: 1L11

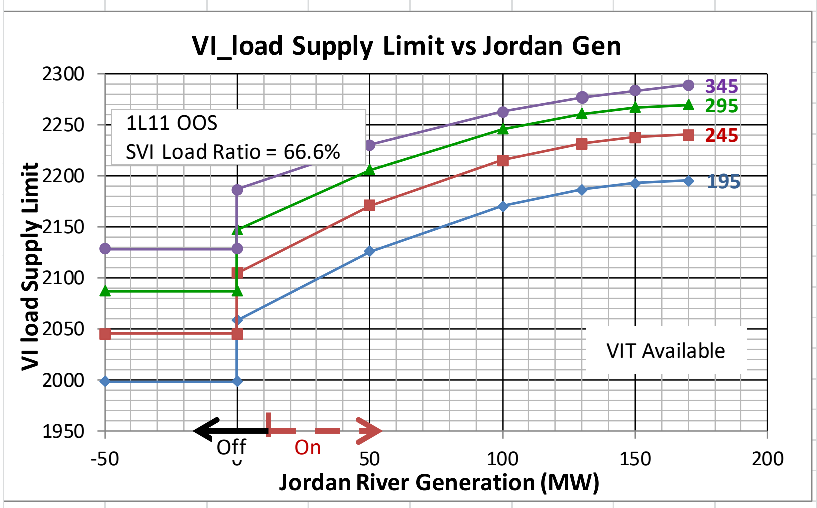
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2238	2253	2266	2278	2285	2289	2293
245	2251	2264	2276	2287	2293	2297	2301
295	2263	2274	2282	2292	2298	2303	2307
345	2272	2280	2289	2299	2305	2309	2313



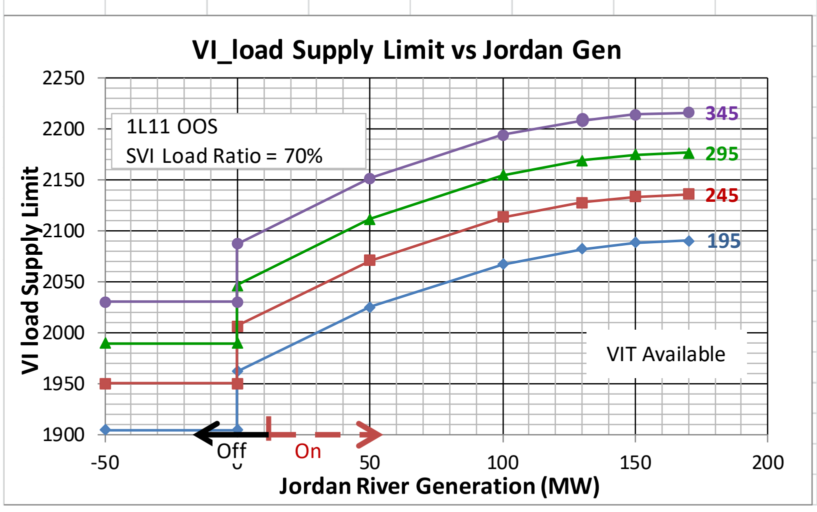
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2192	2226	2255	2274	2282	2285	2287
245	2221	2245	2270	2287	2294	2297	2298
295	2234	2258	2281	2297	2303	2305	2307
345	2251	2273	2290	2303	2308	2311	2313



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2044	2104	2172	2217	2233	2240	2243
245	2091	2151	2212	2252	2265	2270	2271
295	2132	2191	2235	2266	2278	2283	2286
345	2174	2211	2253	2281	2292	2297	2300

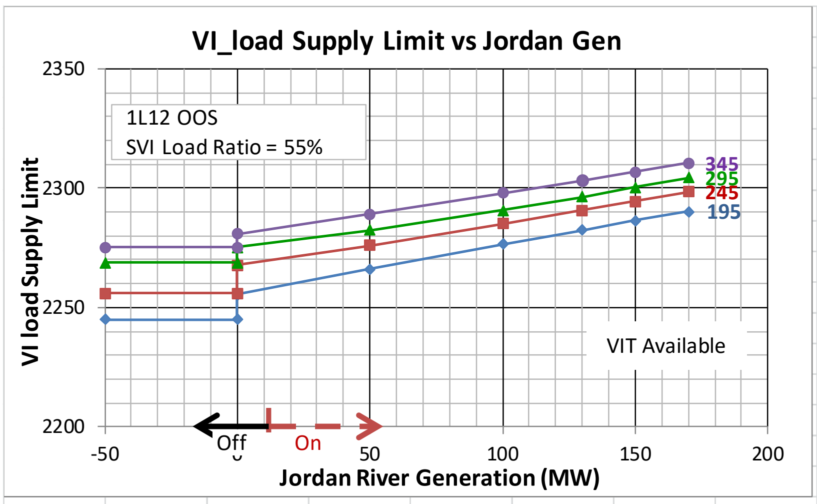


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1998	2059	2126	2171	2187	2193	2196
245	2045	2105	2171	2216	2232	2238	2241
295	2088	2147	2206	2246	2261	2267	2270
345	2129	2187	2230	2263	2277	2284	2289



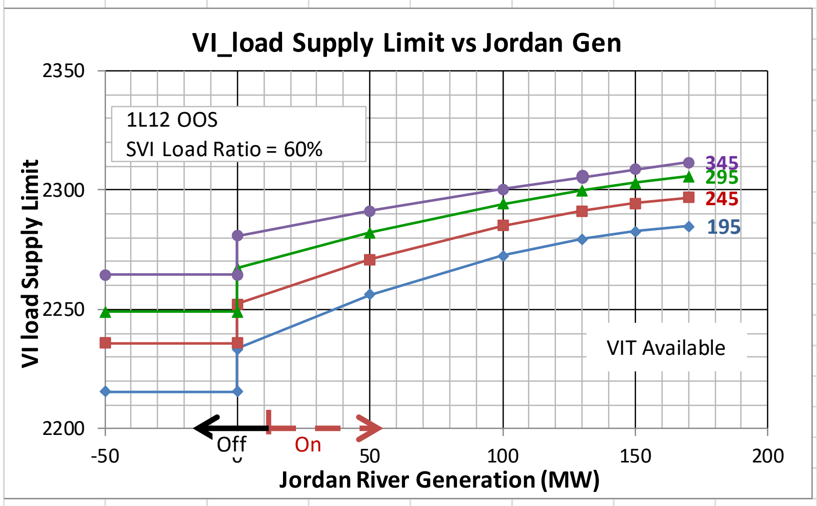
Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1905	1963	2026	2068	2083	2088	2091
245	1950	2007	2071	2113	2128	2134	2136
295	1990	2047	2112	2155	2169	2175	2177
345	2030	2087	2152	2194	2209	2214	2216

A5.4 1L12 OOS



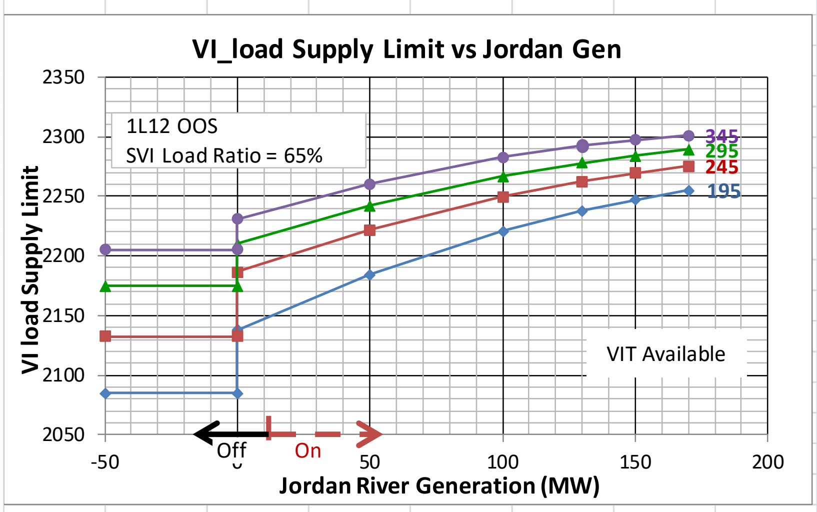
OOS:	1L12					
Load Ratio:	55.0%					
VIT VAR						

	off	0	50	100	130	150	170
195	2245	2255	2266	2277	2283	2286	2290
245	2256	2268	2276	2285	2291	2295	2299
295	2269	2275	2282	2291	2296	2300	2304
345	2275	2281	2289	2298	2303	2307	2311



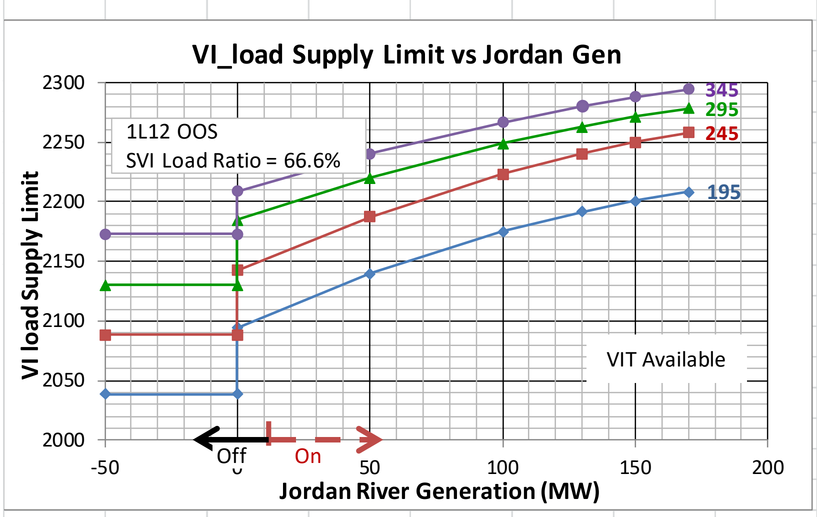
Load Ratio: 60.0%

VIT VAR	off	0	50	100	130	150	170
195	2216	2233	2256	2273	2279	2283	2285
245	2236	2252	2271	2285	2291	2294	2297
295	2249	2267	2282	2294	2300	2303	2306
345	2264	2281	2291	2301	2306	2309	2312



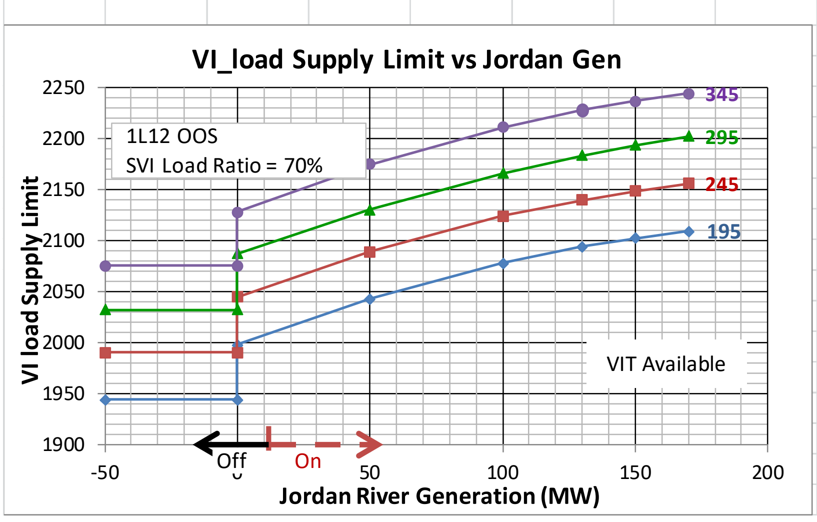
Load Ratio: 65.0%

VIT VAR	off	0	50	100	130	150	170
195	2085	2138	2184	2221	2238	2247	2255
245	2132	2186	2222	2250	2263	2270	2275
295	2175	2210	2242	2267	2278	2284	2289
345	2205	2231	2260	2283	2292	2297	2301



Load Ratio: 66.6%

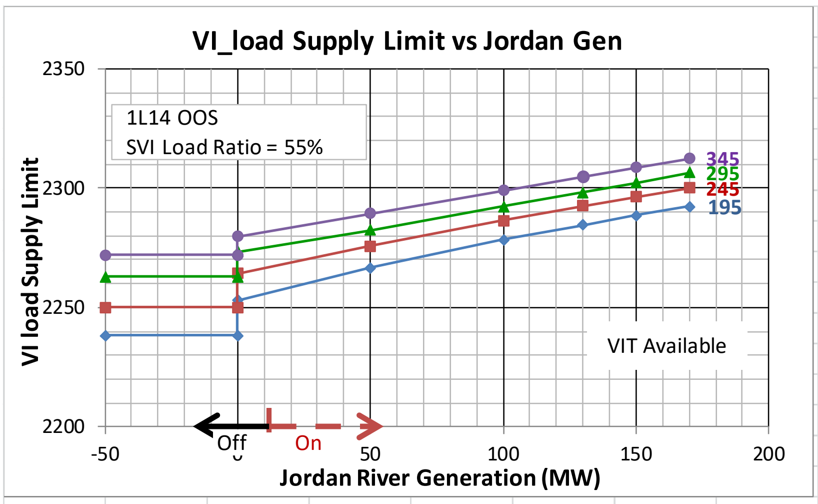
VIT VAR	off	0	50	100	130	150	170
195	2039	2094	2139	2175	2192	2201	2208
245	2088	2142	2187	2223	2241	2250	2258
295	2130	2185	2220	2249	2263	2271	2278
345	2173	2209	2241	2267	2280	2288	2295



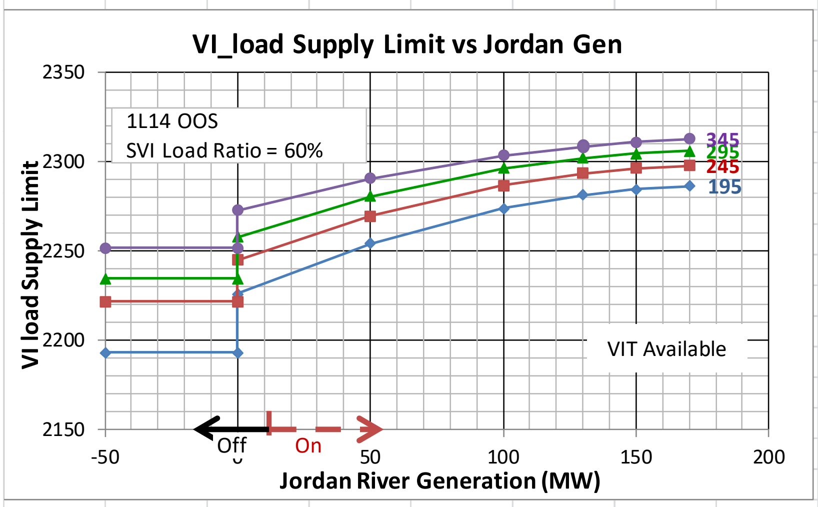
Load Ratio: 70.0%

VIT VAR	off	0	50	100	130	150	170
195	1944	1998	2043	2078	2094	2103	2109
245	1990	2045	2089	2124	2140	2149	2156
295	2032	2087	2131	2166	2183	2193	2202
345	2075	2128	2175	2211	2228	2237	2244

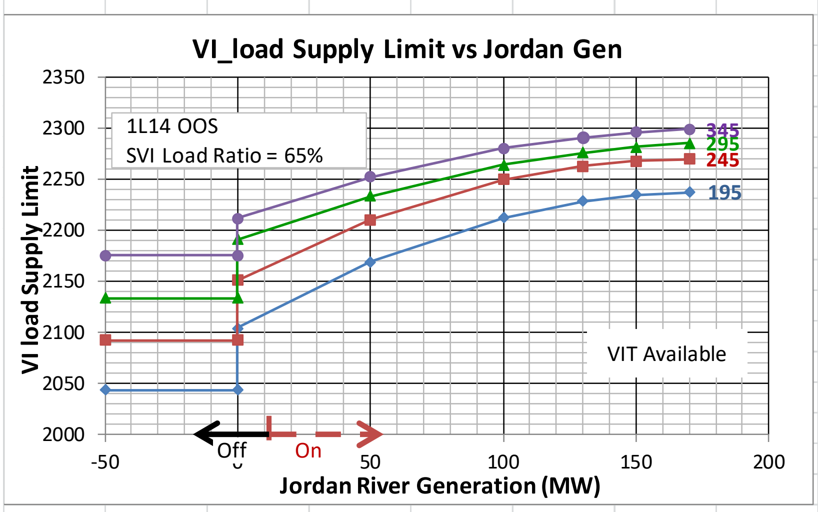
A5.5 1L14 OOS



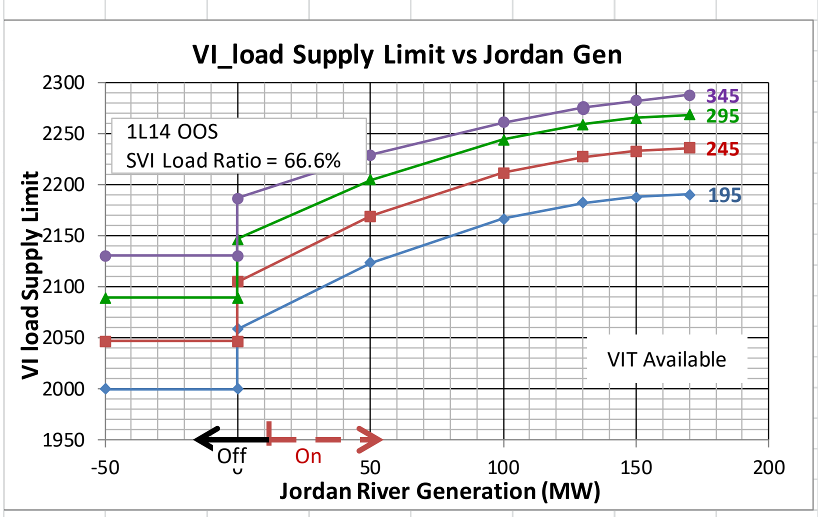
OOS:	1L14						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2238	2253	2267	2278	2285	2289	2292
245	2250	2264	2276	2286	2292	2296	2300
295	2263	2273	2283	2292	2298	2302	2306
345	2272	2280	2289	2299	2305	2309	2313



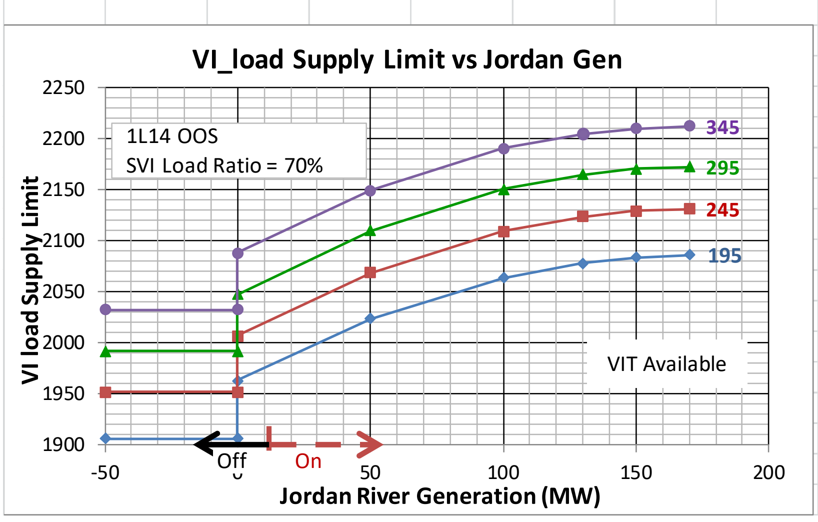
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2193	2226	2254	2274	2281	2285	2286
245	2222	2245	2270	2287	2293	2296	2298
295	2235	2258	2281	2296	2302	2305	2306
345	2252	2273	2291	2303	2309	2311	2313



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2044	2104	2169	2213	2228	2235	2237
245	2093	2151	2211	2250	2263	2268	2270
295	2134	2191	2234	2264	2276	2282	2285
345	2176	2212	2252	2280	2291	2296	2299

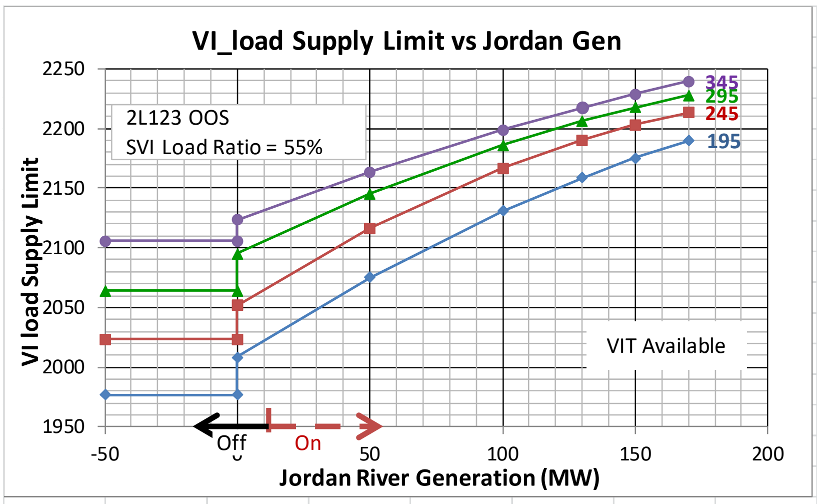


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2000	2058	2123	2167	2182	2188	2191
245	2047	2105	2169	2212	2227	2233	2236
295	2089	2147	2205	2244	2259	2265	2268
345	2130	2187	2229	2261	2275	2282	2288

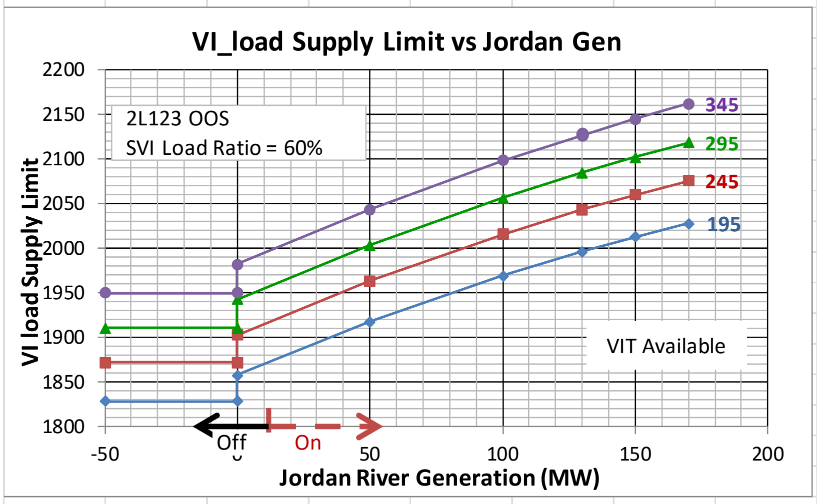


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1907	1963	2024	2064	2078	2084	2086
245	1952	2007	2069	2109	2124	2129	2131
295	1992	2047	2110	2151	2165	2170	2172
345	2033	2088	2150	2190	2205	2210	2212

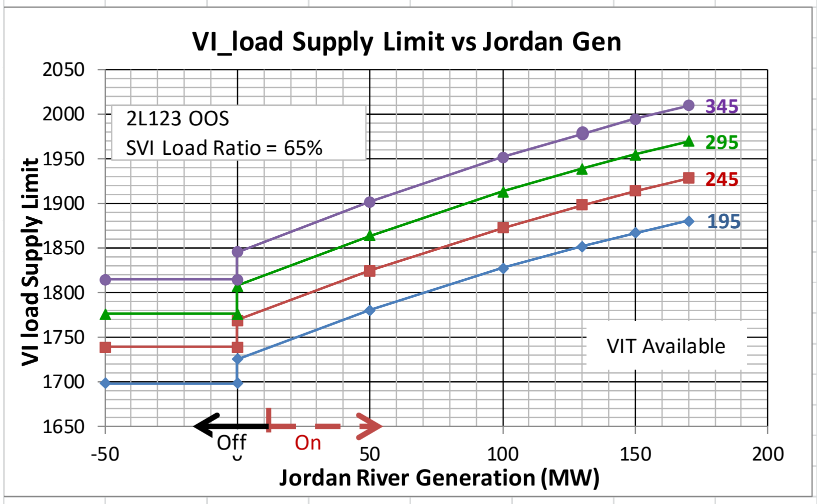
A5.6 2L123 or 2L128 OOS



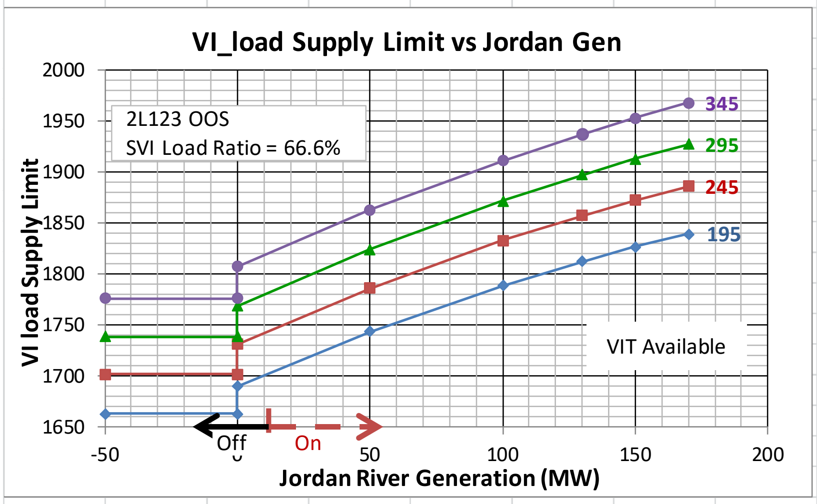
OOS:	2L123						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1977	2008	2075	2131	2159	2175	2190
245	2023	2052	2117	2167	2190	2203	2214
295	2064	2095	2145	2186	2206	2218	2228
345	2106	2124	2164	2199	2218	2229	2239



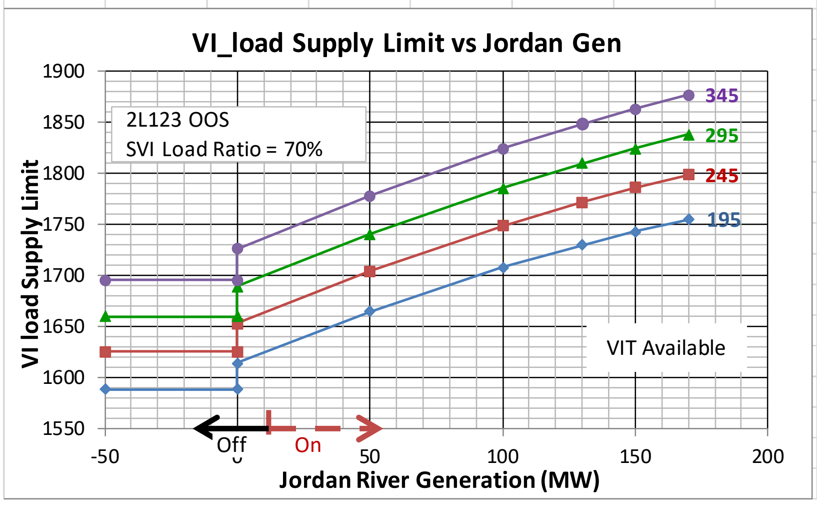
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1829	1858	1918	1969	1996	2013	2027
245	1872	1903	1963	2016	2043	2060	2075
295	1910	1943	2003	2057	2085	2102	2118
345	1950	1982	2044	2098	2127	2145	2162



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1699	1726	1781	1828	1852	1867	1880
245	1739	1769	1825	1873	1898	1914	1928
295	1776	1807	1864	1913	1939	1955	1970
345	1815	1845	1902	1952	1978	1995	2010

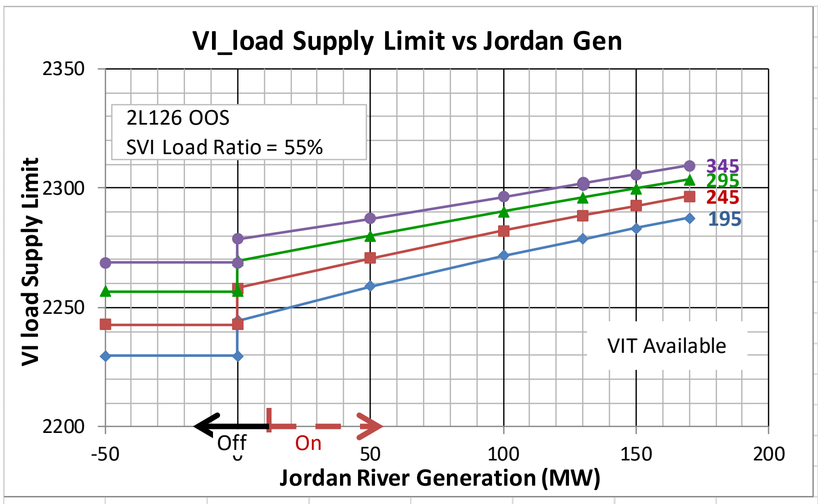


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1663	1690	1743	1789	1812	1827	1839
245	1702	1731	1786	1833	1857	1872	1886
295	1739	1769	1824	1872	1897	1913	1927
345	1776	1808	1863	1911	1937	1953	1968

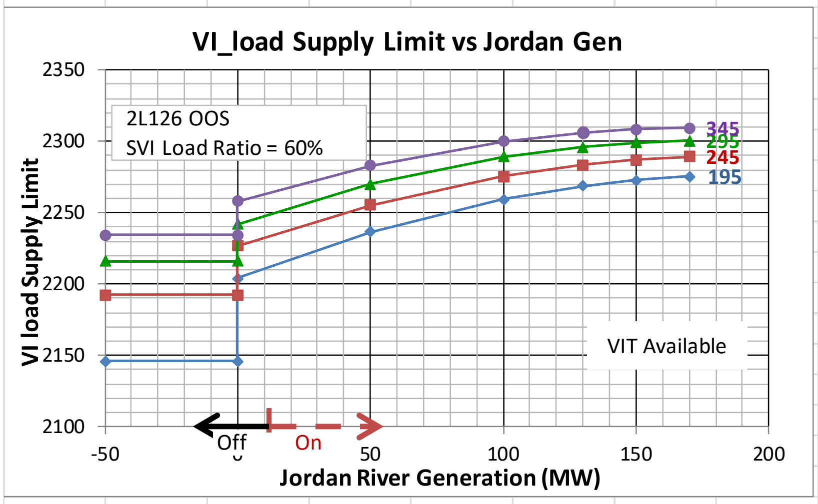


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1589	1614	1665	1708	1730	1743	1755
245	1626	1653	1704	1749	1772	1786	1799
295	1660	1689	1741	1786	1810	1824	1838
345	1696	1726	1778	1824	1848	1863	1877

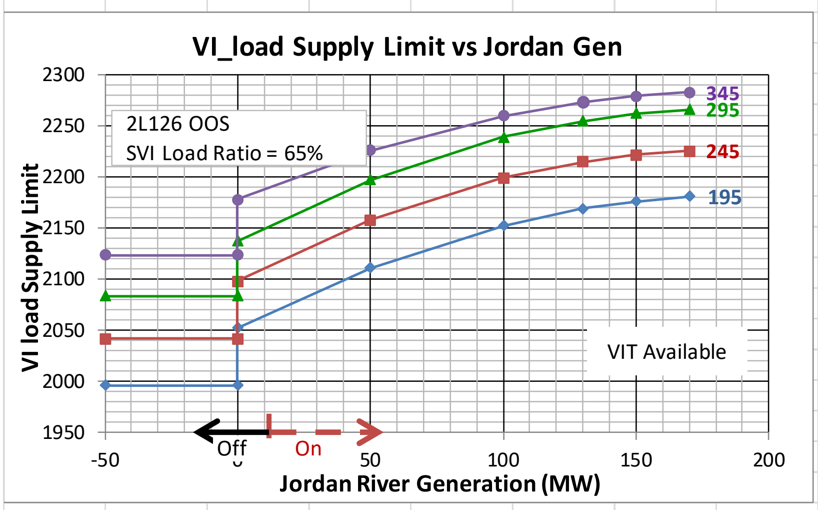
A5.7 2L126 or 2L170 OOS



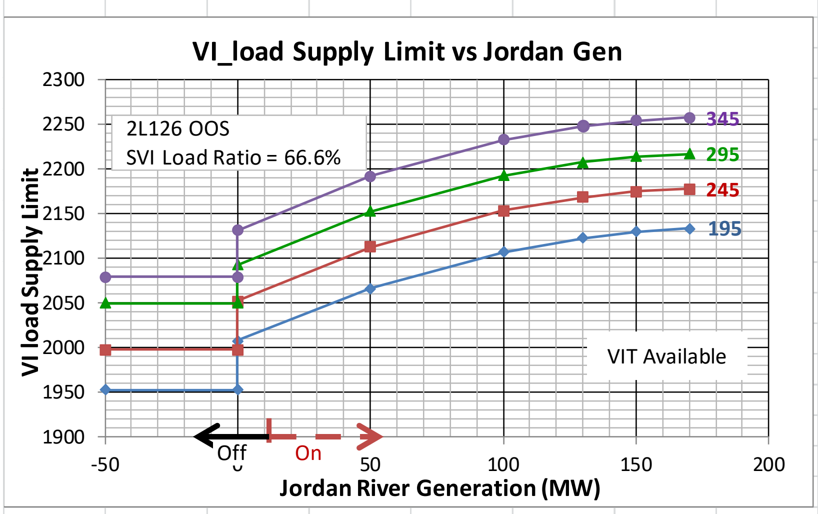
OOS:	2L126						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2230	2245	2259	2272	2279	2283	2287
245	2243	2258	2271	2282	2289	2293	2297
295	2257	2270	2280	2290	2296	2300	2304
345	2269	2279	2287	2296	2302	2306	2310



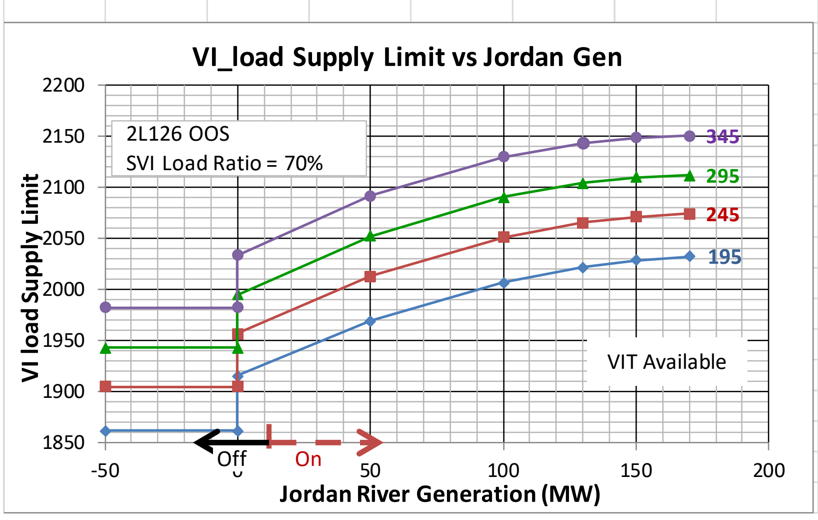
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2146	2204	2237	2259	2269	2273	2275
245	2192	2227	2255	2275	2283	2287	2289
295	2216	2242	2270	2289	2296	2299	2300
345	2234	2258	2283	2300	2306	2308	2309



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1996	2052	2111	2153	2169	2176	2181
245	2042	2098	2158	2199	2215	2222	2226
295	2084	2138	2198	2239	2255	2262	2266
345	2124	2178	2226	2260	2273	2279	2283

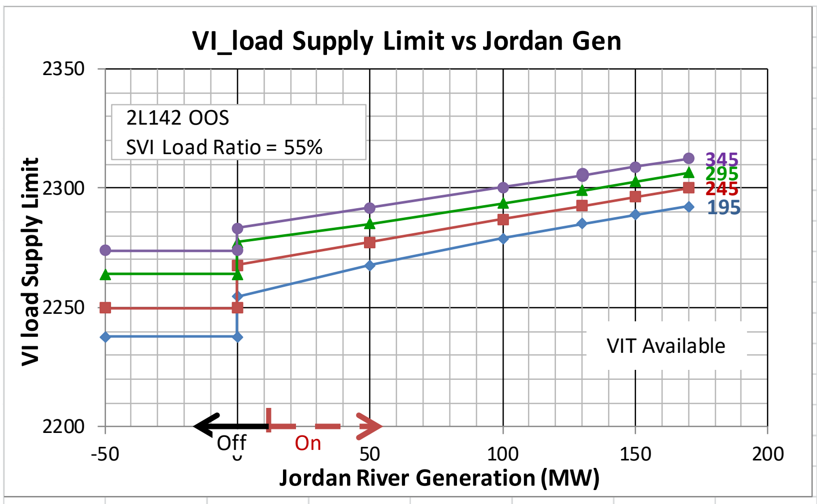


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1953	2008	2066	2107	2123	2130	2134
245	1998	2052	2112	2153	2168	2175	2178
295	2050	2092	2152	2193	2208	2214	2217
345	2079	2131	2192	2233	2248	2254	2257

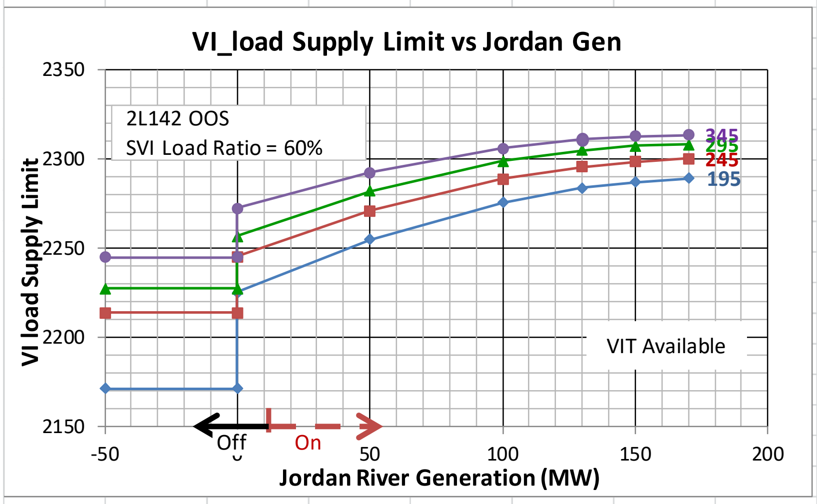


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1862	1915	1969	2007	2022	2028	2032
245	1905	1957	2013	2051	2065	2071	2074
295	1943	1995	2052	2090	2104	2110	2112
345	1983	2034	2091	2130	2143	2149	2151

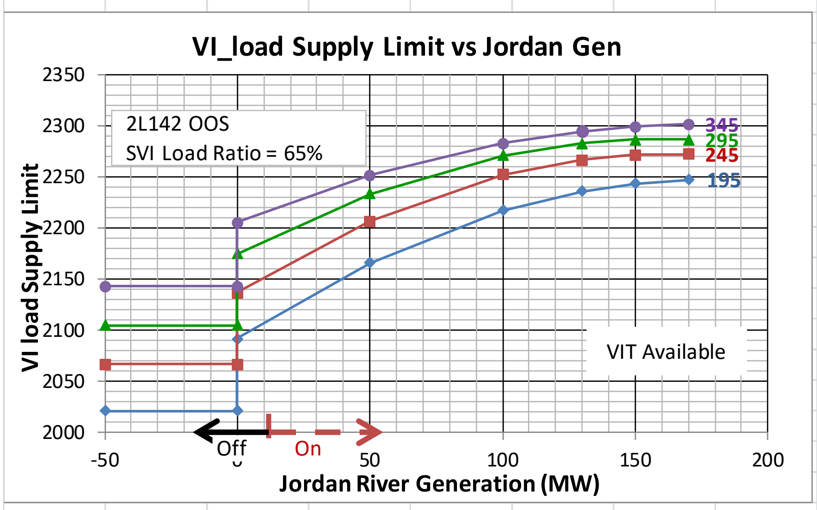
A5.8 2L142 OOS



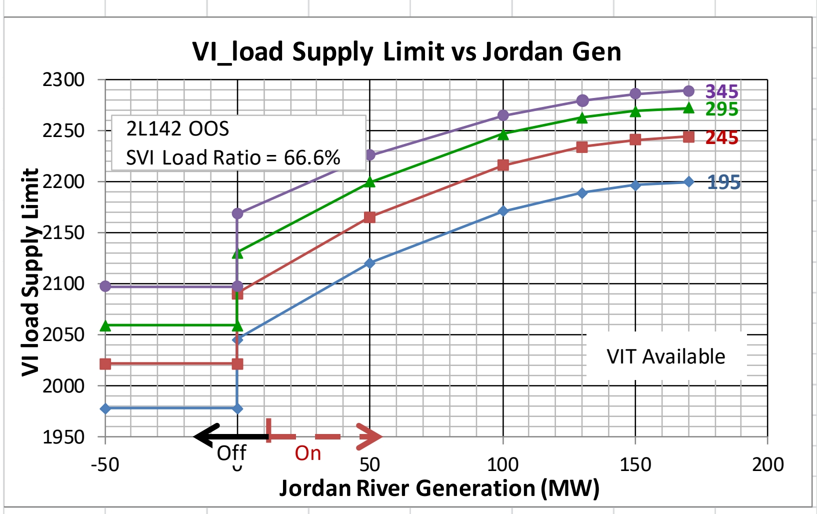
OOS:	2L142						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2238	2255	2268	2279	2285	2289	2292
245	2250	2268	2277	2287	2293	2296	2300
295	2264	2277	2285	2294	2299	2303	2307
345	2274	2283	2292	2300	2306	2309	2312



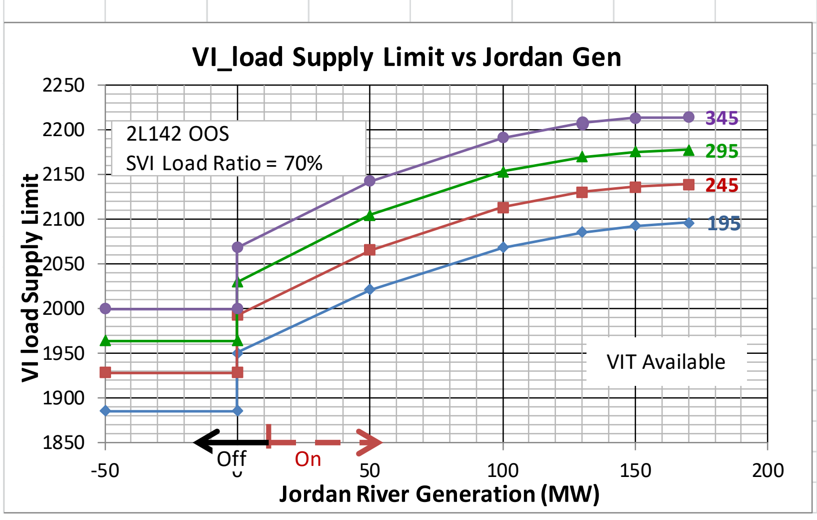
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2171	2225	2255	2276	2284	2287	2289
245	2214	2245	2271	2289	2295	2298	2300
295	2227	2257	2282	2299	2305	2307	2308
345	2245	2272	2292	2306	2311	2313	2314



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2021	2092	2166	2217	2236	2244	2248
245	2067	2137	2207	2252	2267	2272	2273
295	2105	2175	2234	2271	2283	2286	2287
345	2143	2205	2252	2283	2295	2299	2302

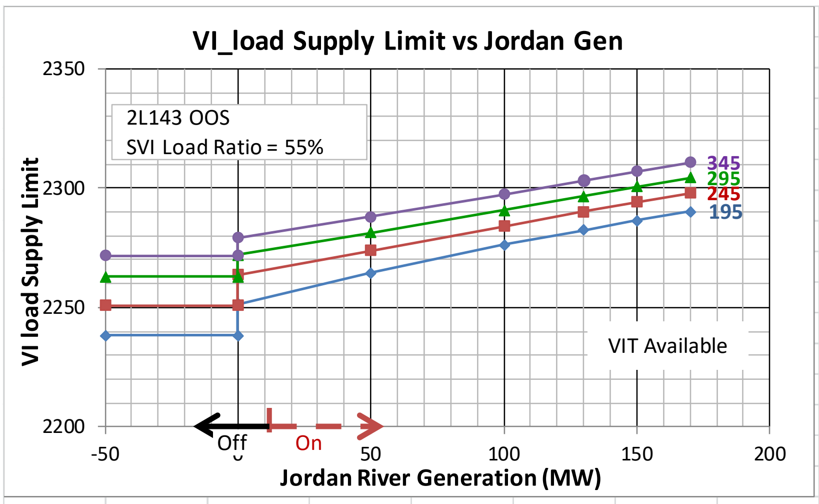


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1978	2045	2121	2171	2189	2197	2200
245	2022	2091	2166	2216	2234	2241	2244
295	2059	2130	2200	2246	2263	2269	2272
345	2098	2168	2226	2265	2280	2286	2289

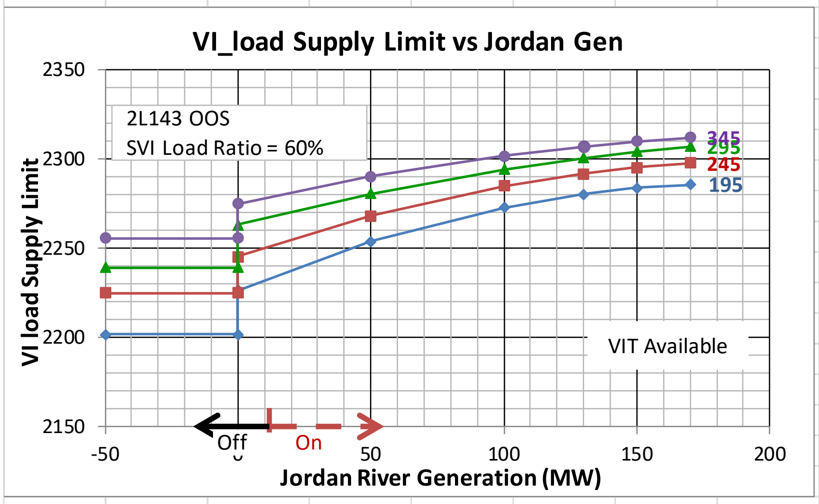


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1886	1951	2021	2068	2086	2093	2096
245	1928	1993	2065	2113	2130	2137	2139
295	1964	2030	2105	2153	2170	2176	2177
345	2000	2068	2143	2191	2208	2213	2214

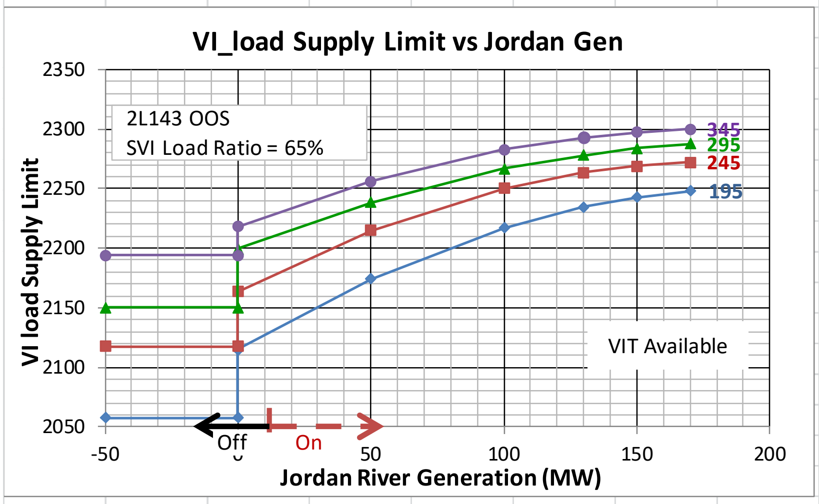
A5.9 2L143 OOS



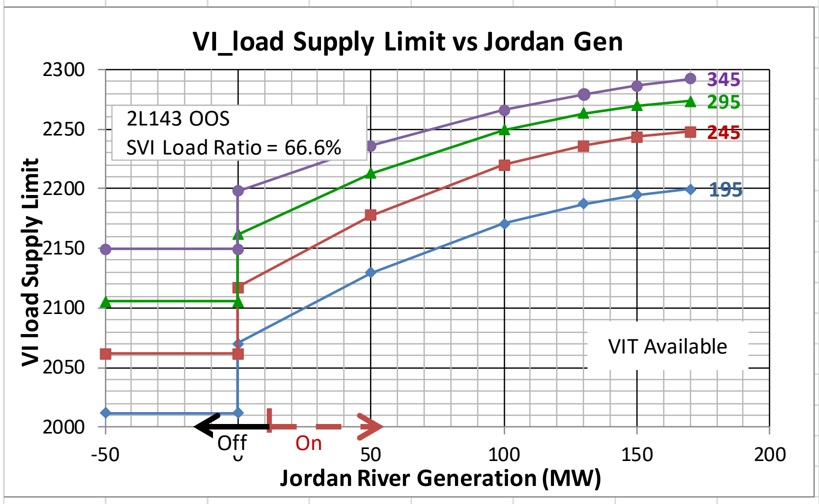
OOS:	2L143						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2238	2251	2264	2276	2283	2287	2290
245	2251	2264	2274	2284	2290	2294	2298
295	2263	2272	2281	2291	2297	2301	2304
345	2272	2279	2288	2297	2303	2307	2311



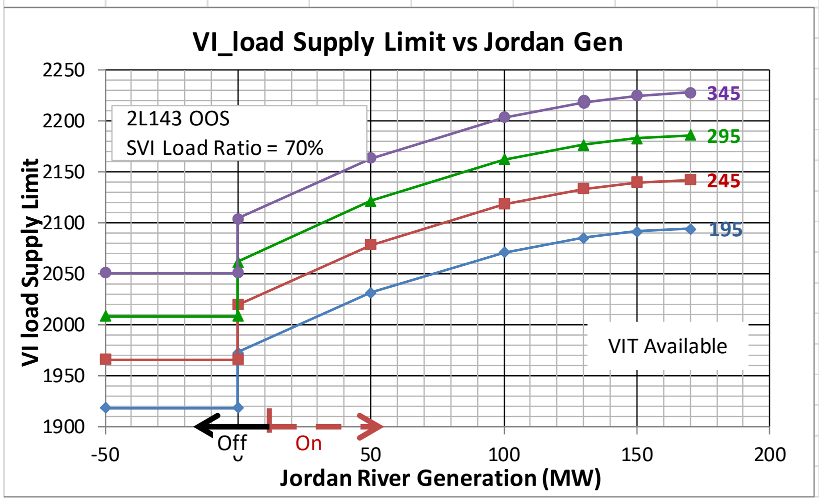
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2202	2226	2254	2273	2280	2284	2286
245	2225	2245	2268	2285	2292	2295	2298
295	2239	2263	2281	2294	2301	2304	2307
345	2256	2275	2290	2302	2307	2310	2312



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2058	2115	2174	2217	2234	2243	2248
245	2117	2164	2215	2250	2263	2269	2272
295	2150	2199	2238	2267	2278	2284	2288
345	2194	2218	2256	2283	2293	2298	2300

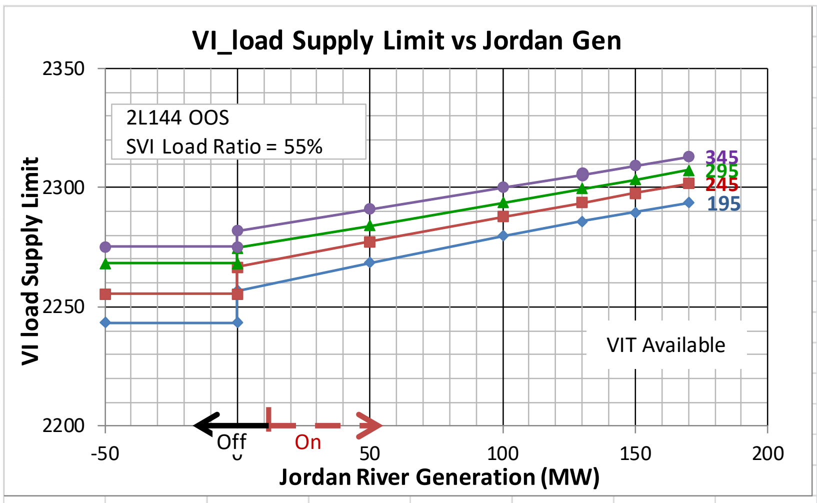


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2012	2070	2129	2171	2188	2195	2200
245	2062	2117	2178	2220	2236	2244	2248
295	2106	2162	2213	2249	2264	2270	2274
345	2149	2198	2236	2266	2279	2287	2292

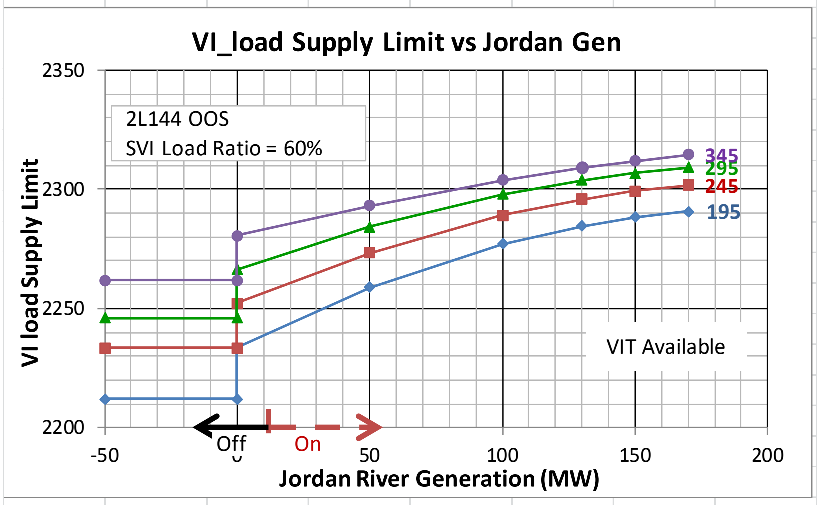


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1919	1973	2032	2071	2086	2092	2094
245	1966	2020	2079	2119	2134	2140	2142
295	2008	2062	2122	2162	2177	2183	2186
345	2051	2104	2163	2204	2219	2225	2228

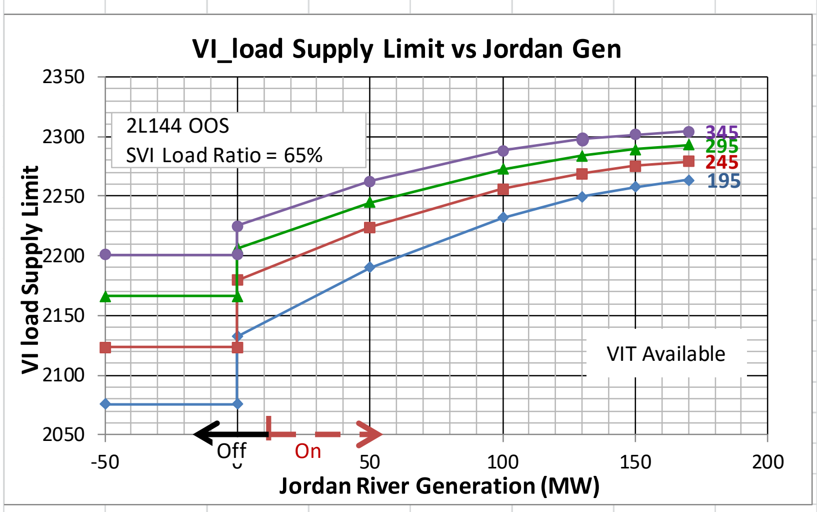
A5.10 2L144 OOS



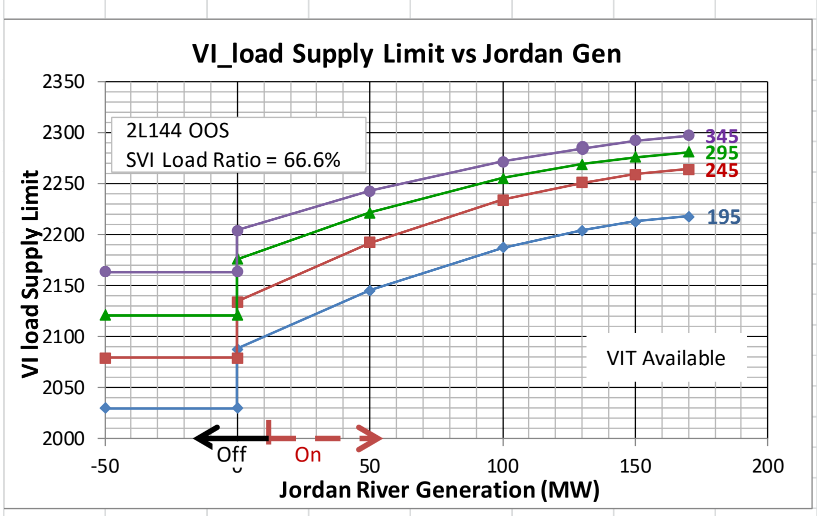
OOS:	2L144						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2243	2257	2269	2280	2286	2290	2294
245	2255	2267	2277	2288	2294	2298	2302
295	2268	2275	2284	2294	2300	2303	2307
345	2275	2282	2291	2300	2306	2309	2313



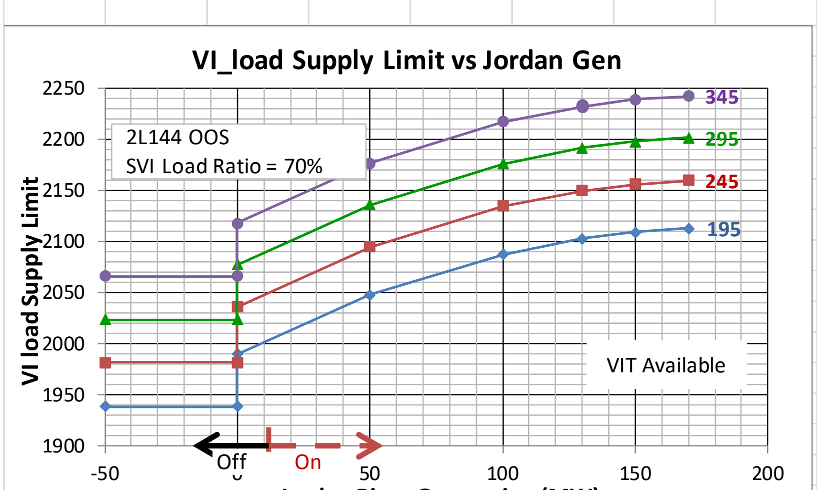
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2212	2233	2259	2277	2285	2288	2291
245	2233	2252	2273	2289	2296	2299	2302
295	2246	2266	2284	2298	2304	2307	2309
345	2262	2280	2293	2304	2309	2312	2315



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2076	2132	2190	2232	2250	2258	2264
245	2124	2180	2224	2256	2269	2275	2279
295	2166	2206	2245	2273	2284	2289	2293
345	2201	2225	2262	2288	2298	2302	2304

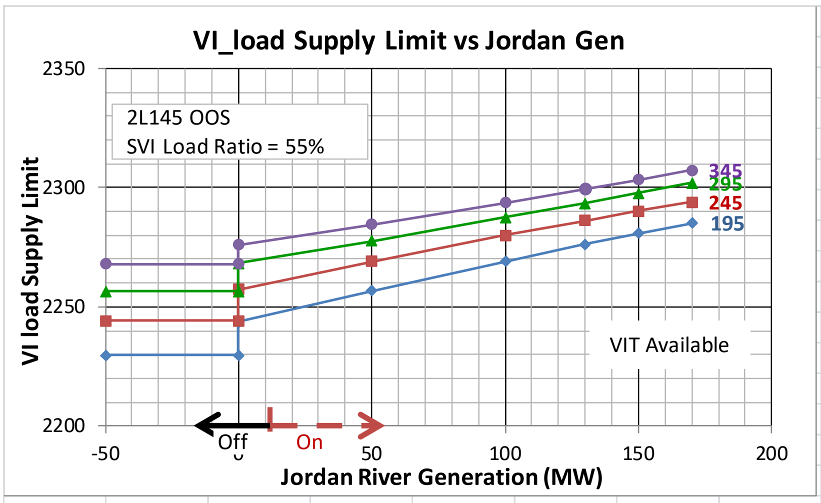


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2030	2088	2146	2187	2205	2213	2218
245	2079	2134	2192	2234	2251	2259	2264
295	2121	2176	2222	2255	2269	2276	2281
345	2164	2204	2243	2272	2285	2292	2298



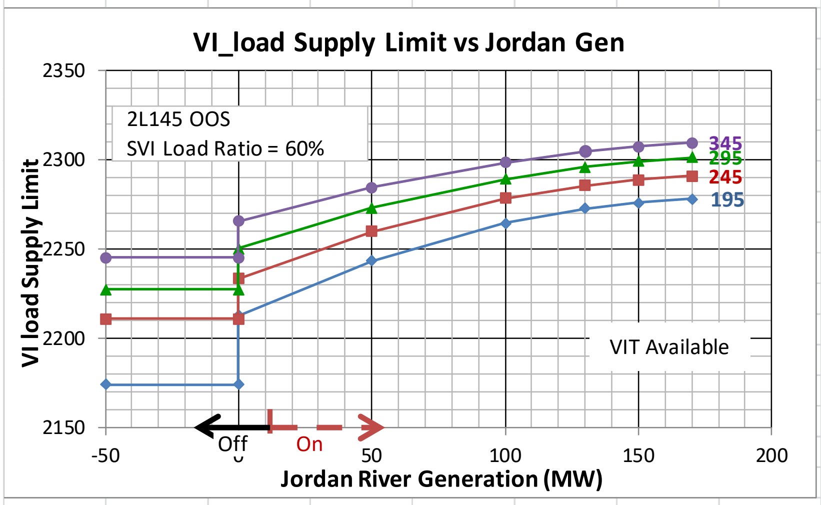
Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1939	1990	2048	2088	2103	2109	2113
245	1982	2036	2095	2135	2150	2156	2160
295	2024	2077	2136	2176	2192	2198	2201
345	2066	2118	2177	2217	2232	2239	2242

A5.11 2L145 OOS



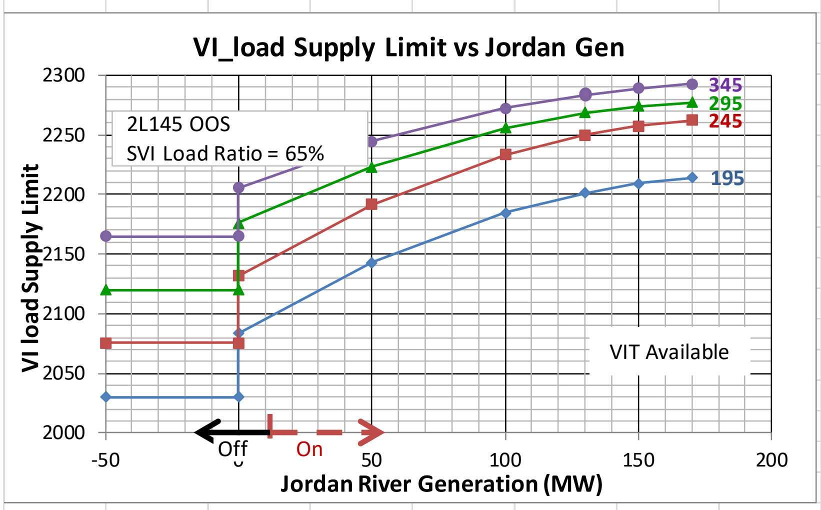
OOS: 2L145
Load Ratio: 55.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2230	2244	2257	2269	2276	2281	2285
245	2244	2257	2269	2280	2286	2290	2294
295	2256	2268	2278	2287	2294	2298	2302
345	2268	2276	2284	2294	2299	2303	2307



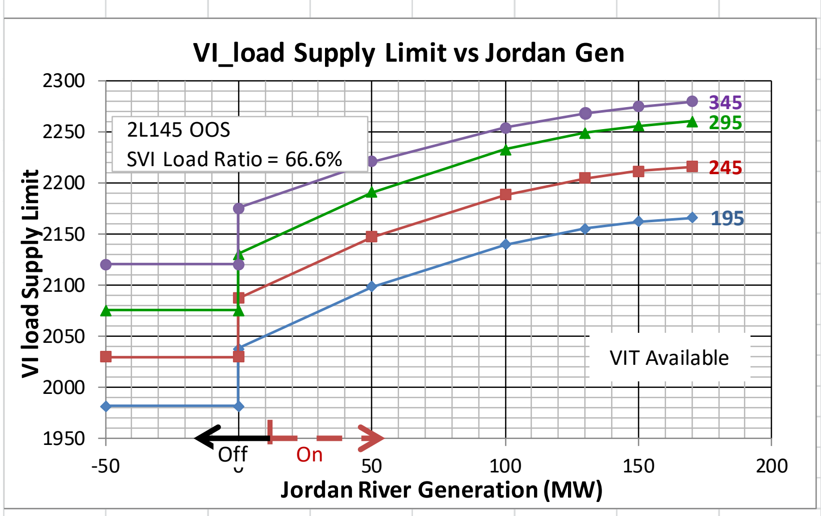
Load Ratio: 60.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2174	2213	2243	2265	2273	2276	2278
245	2211	2234	2260	2278	2286	2289	2291
295	2227	2250	2273	2289	2296	2299	2301
345	2245	2266	2285	2299	2305	2307	2310



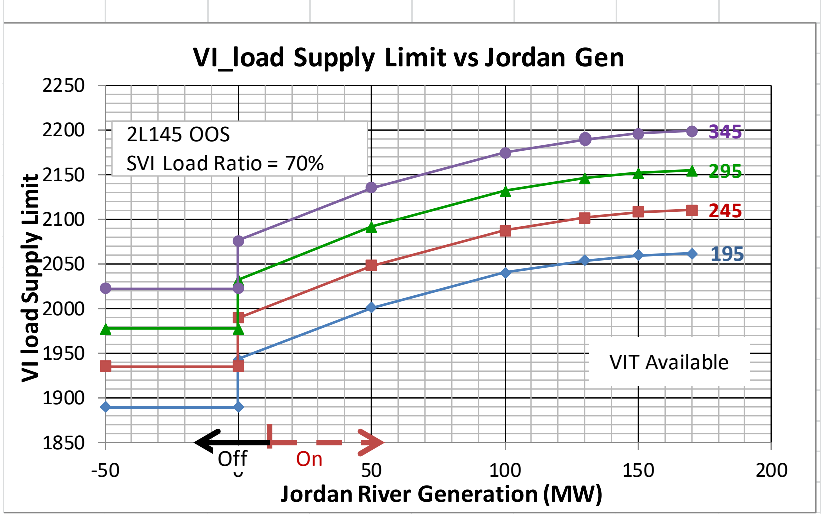
Load Ratio: 65.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2030	2083	2143	2185	2202	2209	2214
245	2076	2132	2191	2233	2250	2258	2263
295	2120	2176	2223	2256	2269	2274	2277
345	2165	2206	2245	2273	2284	2289	2293



Load Ratio: 66.6%

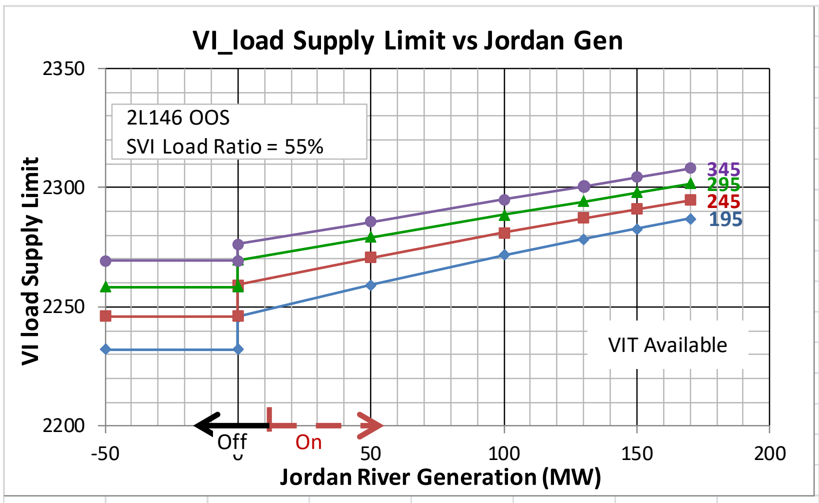
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1982	2038	2099	2140	2156	2162	2166
245	2030	2088	2147	2189	2205	2212	2216
295	2076	2131	2191	2233	2249	2256	2260
345	2120	2175	2221	2254	2268	2275	2280



Load Ratio: 70.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1890	1944	2002	2040	2054	2060	2062
245	1936	1990	2048	2088	2102	2108	2111
295	1978	2032	2092	2132	2146	2152	2155
345	2023	2077	2135	2175	2190	2196	2199

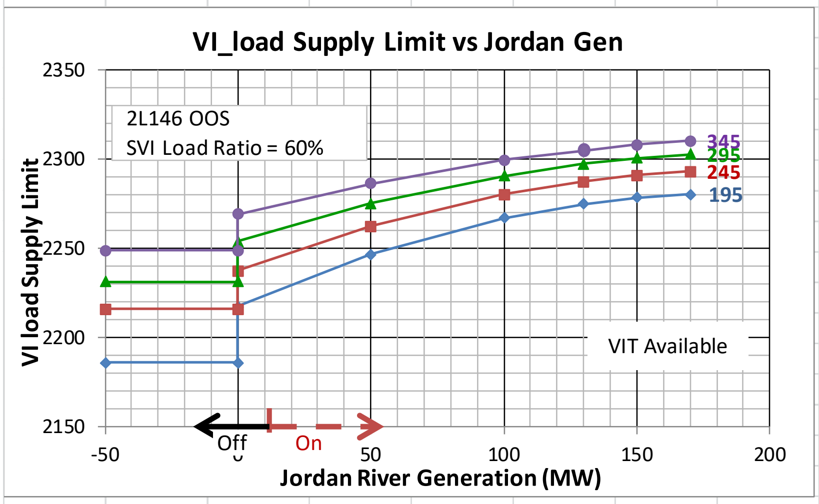
A5.12 2L146 OOS



OOS: 2L146

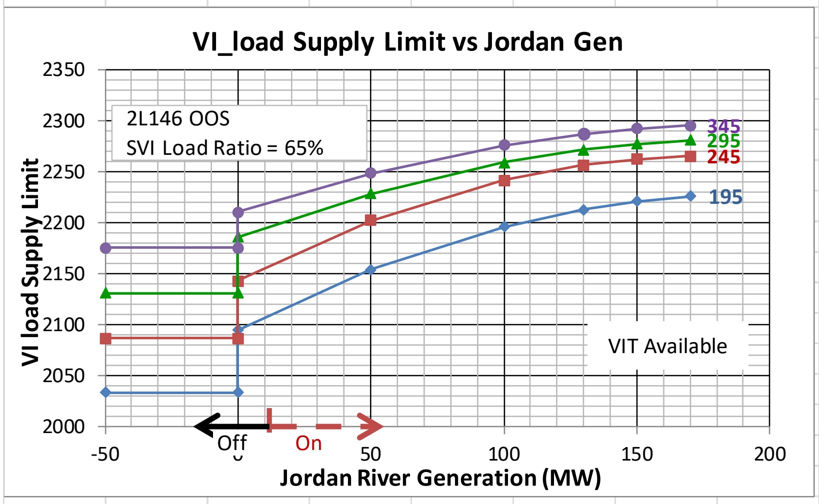
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2232	2246	2259	2272	2279	2283	2287
245	2246	2259	2271	2281	2287	2291	2295
295	2258	2270	2279	2289	2294	2298	2302
345	2269	2276	2286	2295	2301	2304	2308



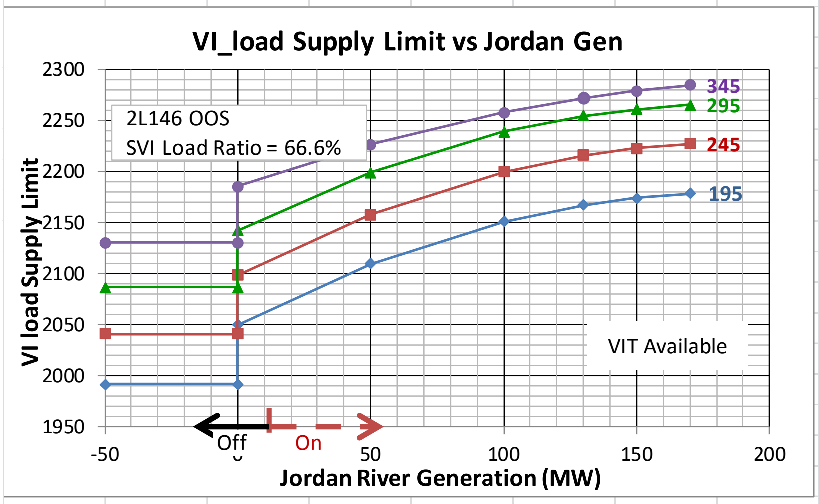
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2186	2217	2247	2267	2275	2278	2280
245	2216	2238	2262	2280	2287	2291	2293
295	2231	2254	2275	2291	2297	2301	2303
345	2249	2269	2286	2299	2305	2308	2310



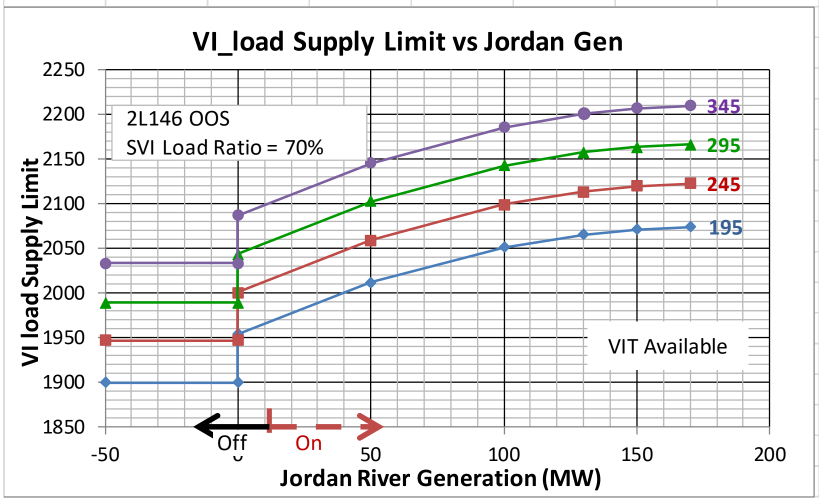
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2034	2095	2154	2196	2213	2221	2226
245	2087	2143	2202	2242	2257	2263	2265
295	2131	2186	2229	2259	2272	2277	2281
345	2176	2210	2249	2276	2287	2292	2295



Load Ratio: **66.6%**

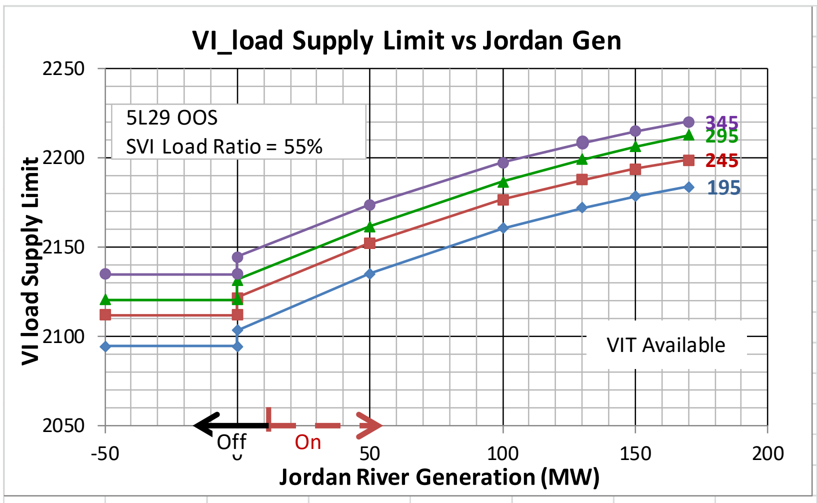
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1992	2050	2110	2151	2167	2174	2179
245	2041	2099	2158	2200	2216	2223	2227
295	2087	2142	2199	2239	2255	2261	2265
345	2131	2185	2227	2258	2272	2279	2285



Load Ratio: **70.0%**

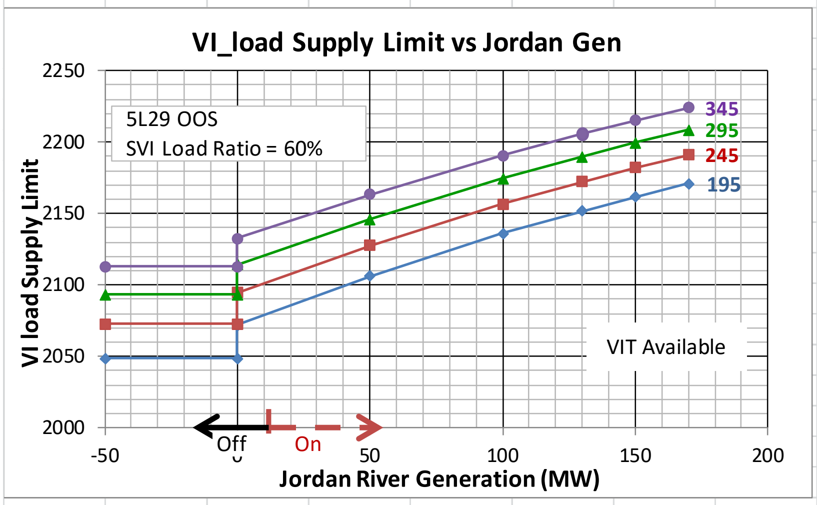
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1900	1954	2012	2051	2066	2071	2074
245	1947	2001	2059	2099	2114	2120	2123
295	1989	2043	2103	2143	2158	2164	2166
345	2033	2087	2146	2185	2200	2207	2210

A5.13 5L29 or 5L31 OOS



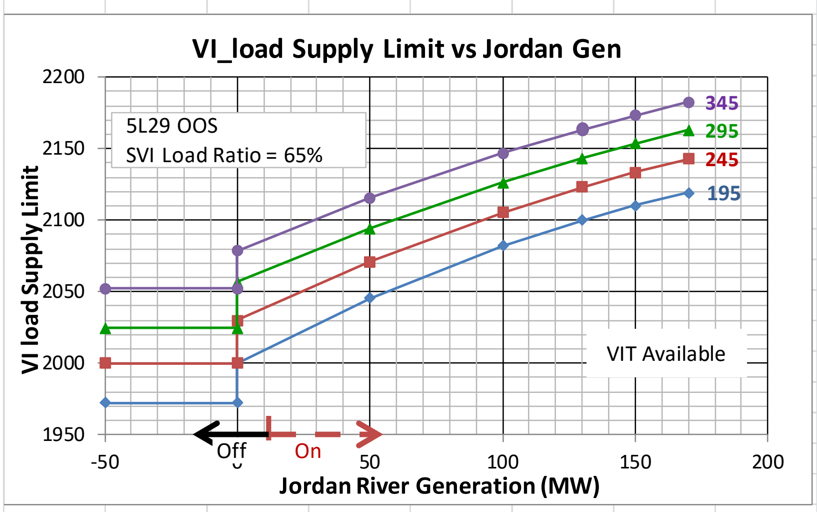
OOS: 5L29
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2095	2103	2135	2160	2172	2179	2184
245	2112	2122	2152	2177	2188	2194	2199
295	2121	2132	2162	2187	2199	2206	2213
345	2135	2144	2174	2197	2209	2215	2220



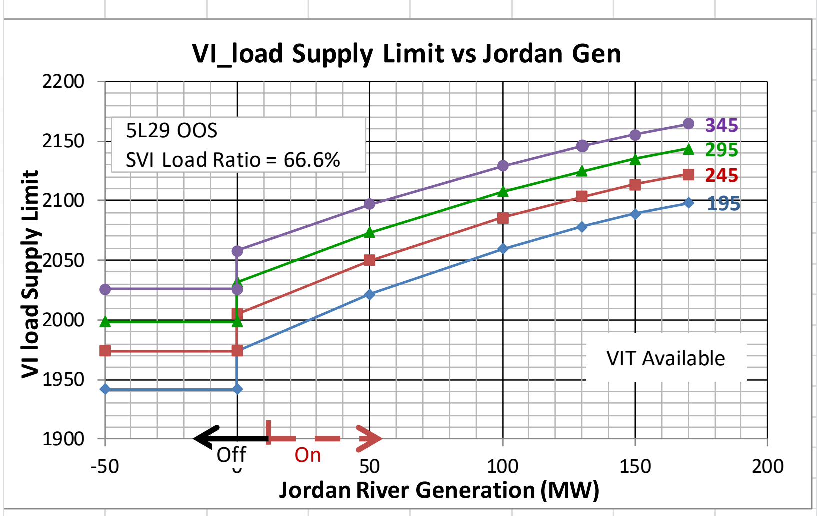
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2048	2072	2106	2136	2152	2162	2171
245	2073	2095	2127	2156	2172	2182	2191
295	2093	2114	2146	2174	2190	2199	2209
345	2113	2133	2163	2191	2206	2215	2224



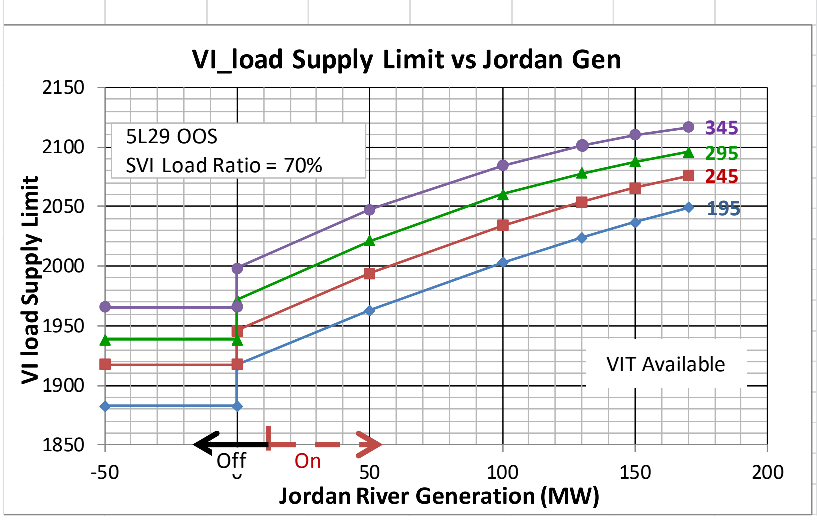
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1972	2000	2045	2082	2100	2110	2119
245	2000	2030	2071	2105	2123	2133	2143
295	2025	2057	2094	2126	2143	2153	2163
345	2052	2079	2115	2147	2163	2173	2182



Load Ratio: **66.6%**

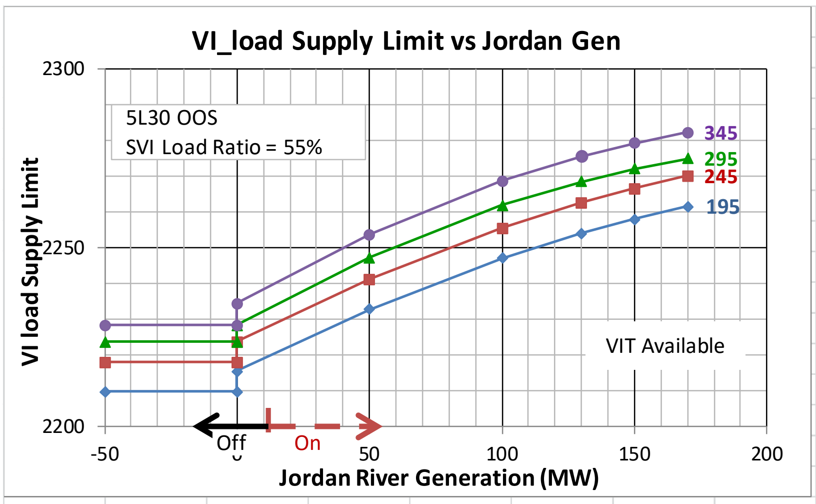
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1942	1974	2021	2060	2078	2089	2098
245	1974	2005	2050	2086	2104	2114	2122
295	1998	2032	2073	2108	2125	2135	2144
345	2026	2058	2097	2129	2146	2156	2164



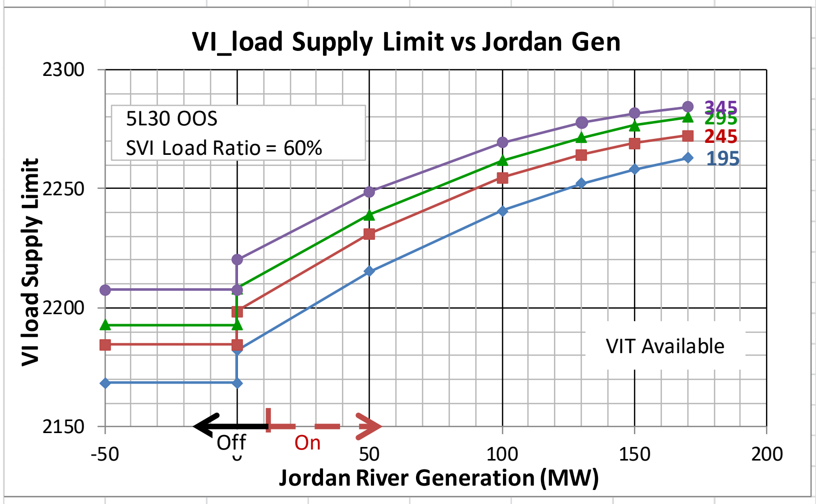
Load Ratio: **70.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1883	1917	1963	2003	2024	2037	2049
245	1917	1946	1994	2034	2054	2066	2076
295	1938	1971	2021	2060	2078	2088	2096
345	1966	1998	2047	2085	2101	2110	2117

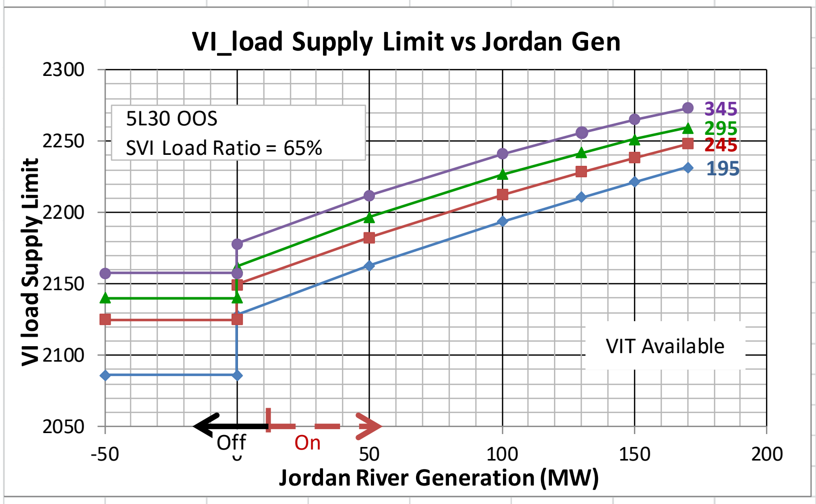
A5.14 5L30 or 5L32 OOS



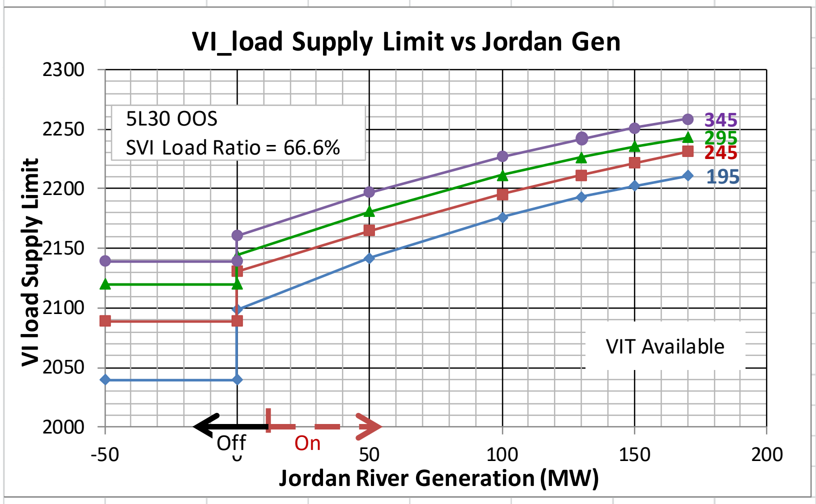
OOS:	5L30						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2210	2216	2233	2247	2254	2258	2262
245	2218	2224	2241	2256	2263	2267	2270
295	2224	2228	2247	2262	2269	2272	2275
345	2228	2234	2254	2269	2276	2279	2282



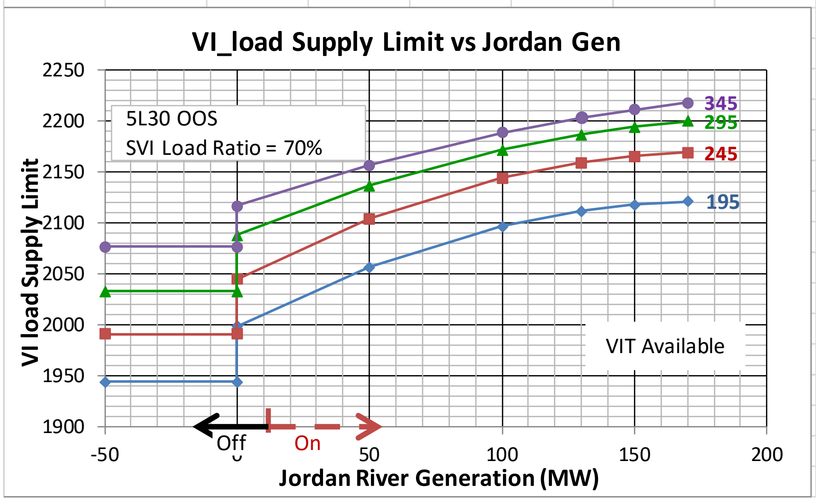
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2169	2182	2215	2241	2252	2258	2263
245	2184	2198	2231	2255	2264	2269	2272
295	2193	2208	2239	2262	2272	2277	2280
345	2208	2220	2249	2269	2278	2282	2284



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2086	2128	2163	2194	2211	2221	2231
245	2125	2150	2183	2212	2228	2238	2248
295	2140	2162	2197	2227	2242	2251	2259
345	2157	2178	2212	2241	2256	2265	2273

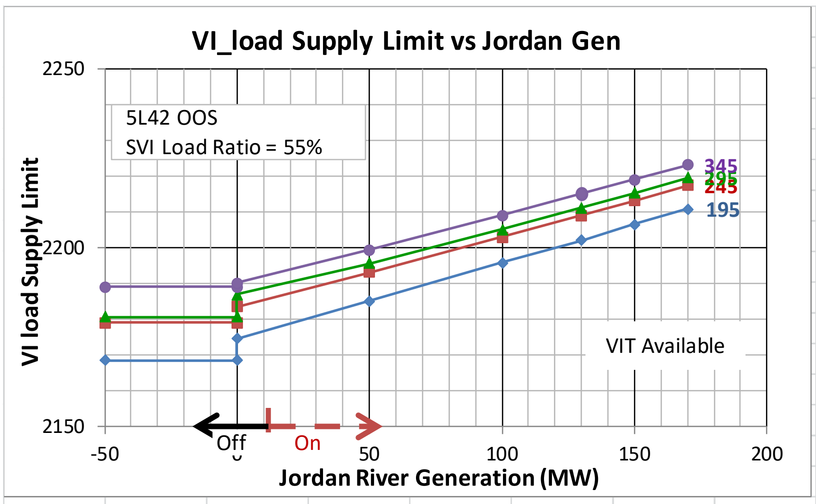


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2039	2099	2142	2176	2193	2203	2211
245	2089	2130	2165	2195	2212	2222	2231
295	2120	2144	2181	2211	2227	2235	2243
345	2139	2161	2197	2227	2242	2251	2259



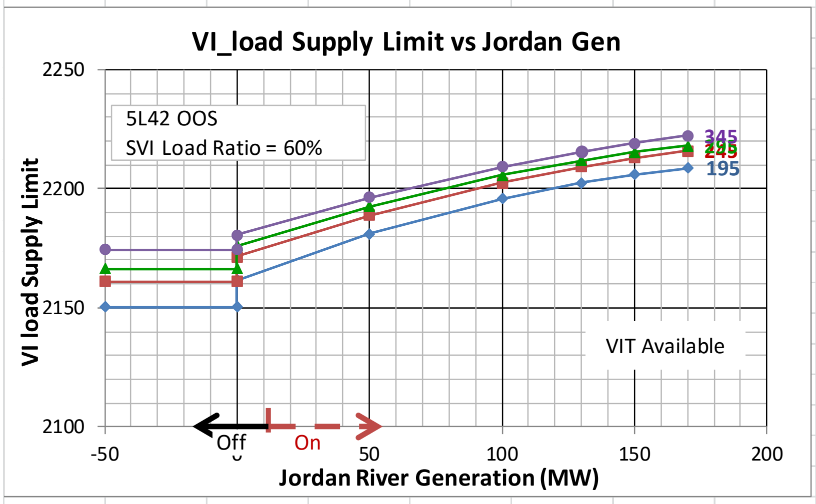
Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1944	1999	2057	2097	2112	2118	2121
245	1991	2045	2104	2144	2159	2166	2169
295	2033	2088	2136	2172	2187	2194	2200
345	2077	2117	2157	2188	2203	2211	2218

A5.15 5L42 OOS

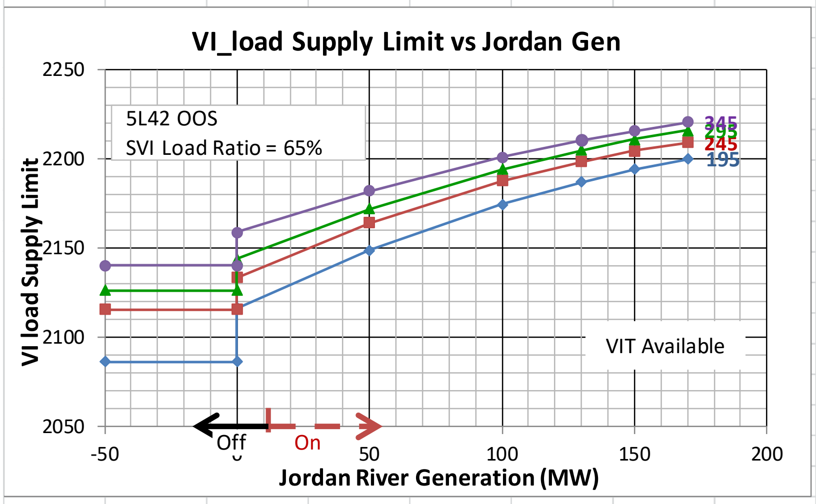


OOS: 5L42

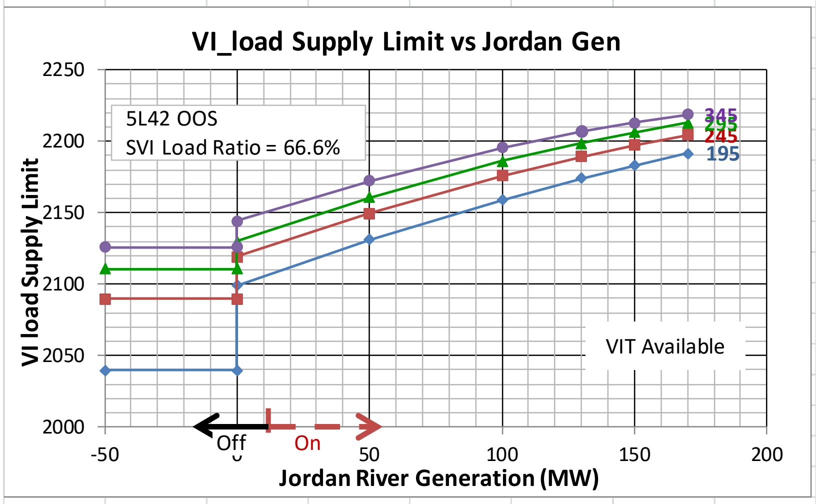
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2169	2175	2185	2196	2202	2207	2211
245	2179	2184	2193	2203	2209	2213	2217
295	2181	2187	2196	2205	2211	2215	2220
345	2189	2190	2199	2209	2215	2219	2223



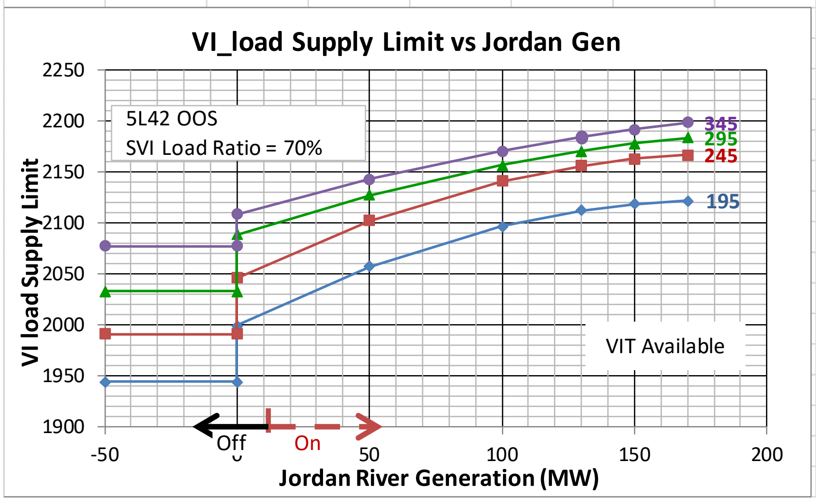
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2150	2162	2181	2196	2203	2206	2209
245	2161	2172	2189	2203	2209	2213	2216
295	2166	2176	2193	2206	2212	2215	2218
345	2174	2181	2196	2209	2215	2219	2222



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2087	2116	2149	2175	2187	2194	2200
245	2116	2134	2164	2188	2199	2204	2209
295	2126	2144	2172	2194	2205	2211	2216
345	2140	2159	2182	2201	2210	2216	2220

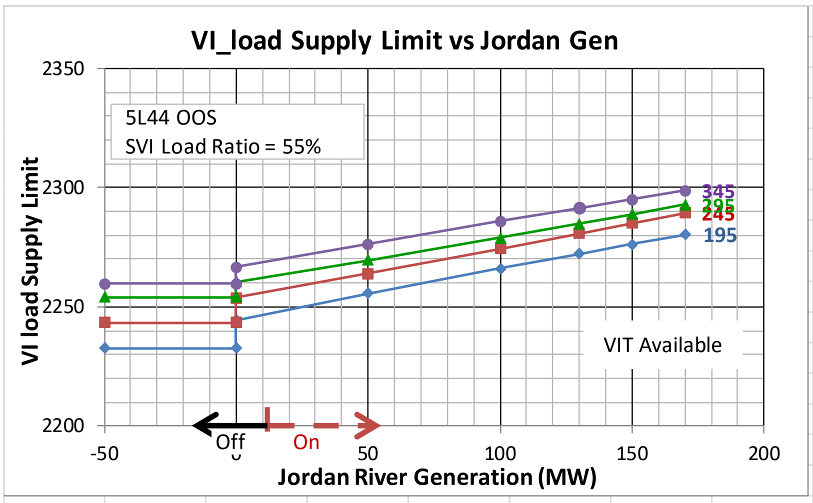


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2040	2099	2131	2159	2174	2183	2192
245	2090	2119	2150	2176	2189	2197	2204
295	2111	2130	2161	2186	2199	2206	2213
345	2126	2144	2172	2195	2207	2213	2219



Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1944	1999	2057	2097	2112	2118	2122
245	1991	2046	2102	2141	2156	2163	2167
295	2033	2088	2127	2157	2171	2178	2184
345	2077	2109	2143	2170	2184	2192	2198

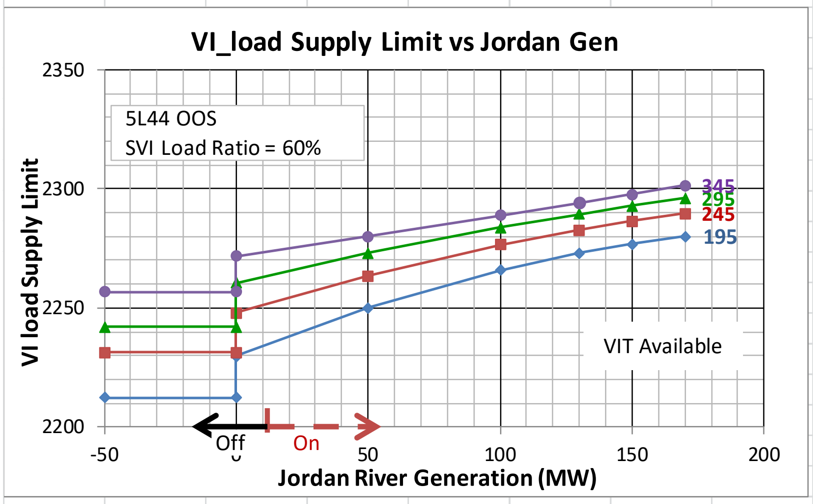
A5.16 5L44 OOS



OOS: 5L44

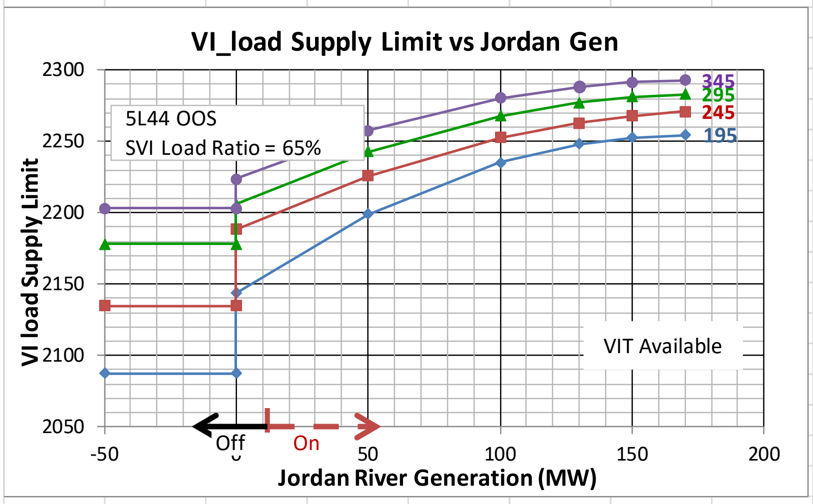
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2233	2245	2256	2266	2272	2276	2280
245	2243	2254	2264	2275	2281	2285	2289
295	2254	2260	2270	2279	2285	2289	2293
345	2260	2267	2276	2286	2291	2295	2299



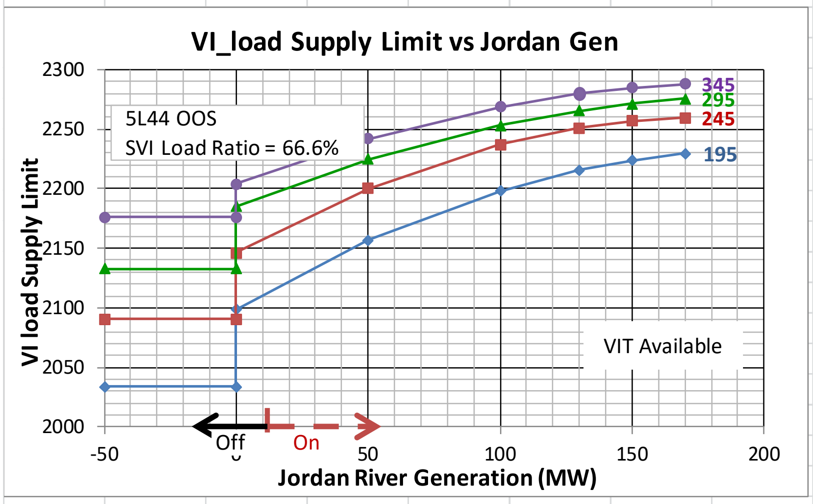
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2212	2230	2250	2266	2273	2277	2280
245	2231	2248	2264	2276	2283	2287	2290
295	2242	2261	2273	2284	2290	2293	2296
345	2257	2272	2280	2289	2294	2298	2301



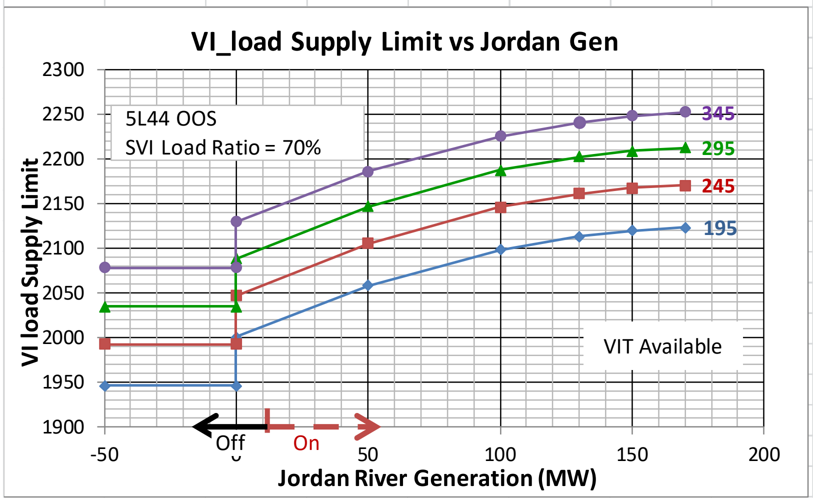
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2087	2144	2199	2235	2248	2253	2254
245	2135	2188	2226	2252	2263	2268	2271
295	2178	2206	2243	2268	2277	2281	2283
345	2203	2224	2257	2280	2288	2291	2293



Load Ratio: **66.6%**

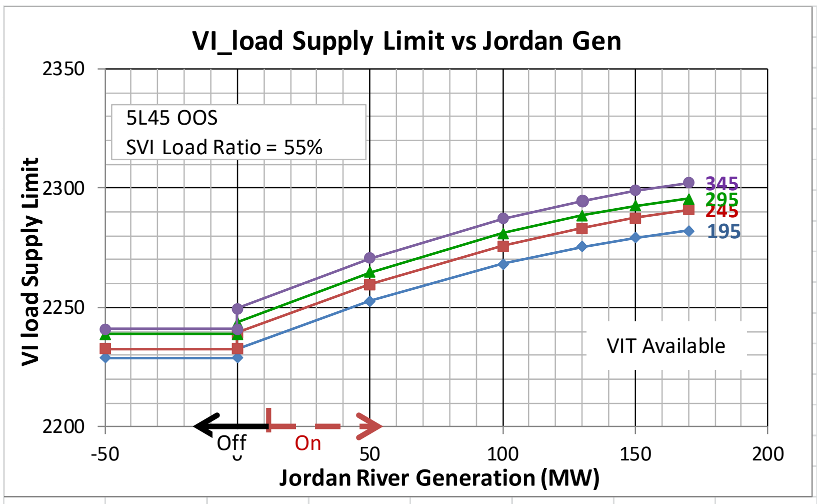
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2034	2099	2157	2198	2216	2224	2229
245	2091	2146	2200	2237	2251	2257	2260
295	2133	2185	2225	2253	2265	2271	2276
345	2176	2204	2242	2269	2280	2285	2288



Load Ratio: **70.0%**

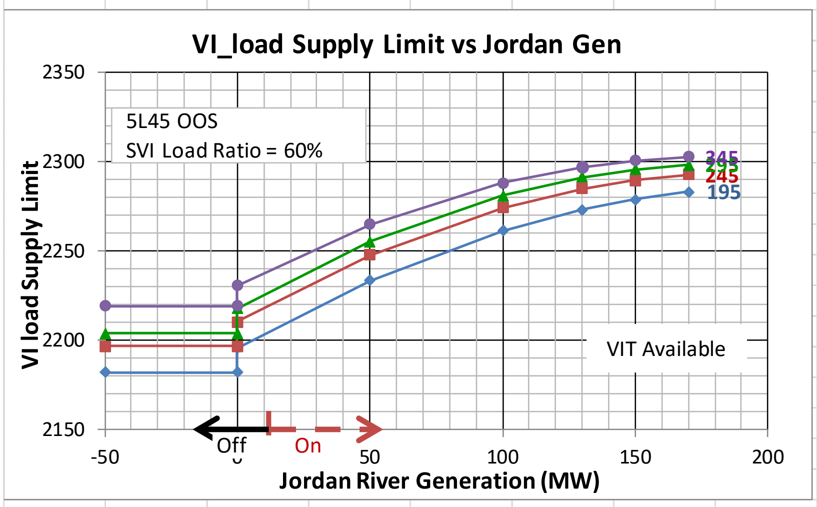
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1946	2001	2059	2098	2113	2120	2123
245	1993	2047	2106	2146	2161	2168	2171
295	2035	2089	2147	2187	2203	2209	2213
345	2078	2130	2186	2226	2241	2248	2252

A5.17 5L45 OOS



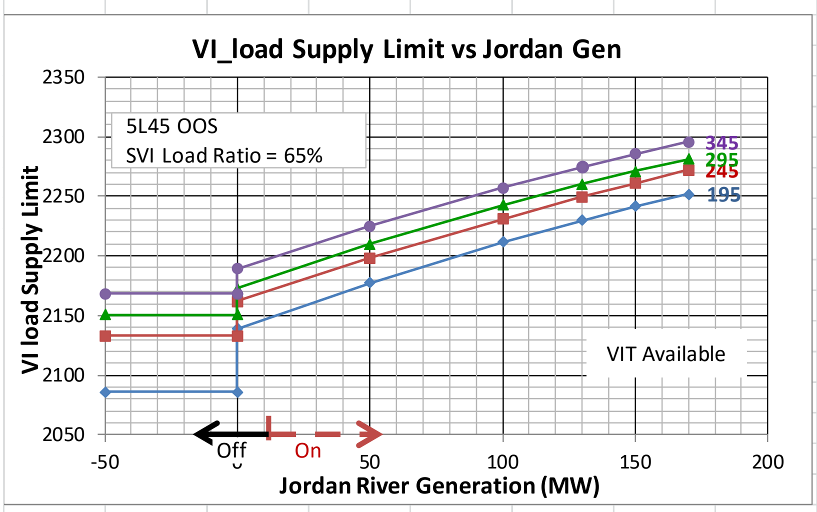
OOS: 5L45
Load Ratio: 55.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2229	2232	2253	2268	2275	2279	2282
245	2233	2239	2260	2276	2283	2287	2291
295	2239	2243	2265	2281	2289	2293	2296
345	2241	2250	2271	2287	2295	2299	2302



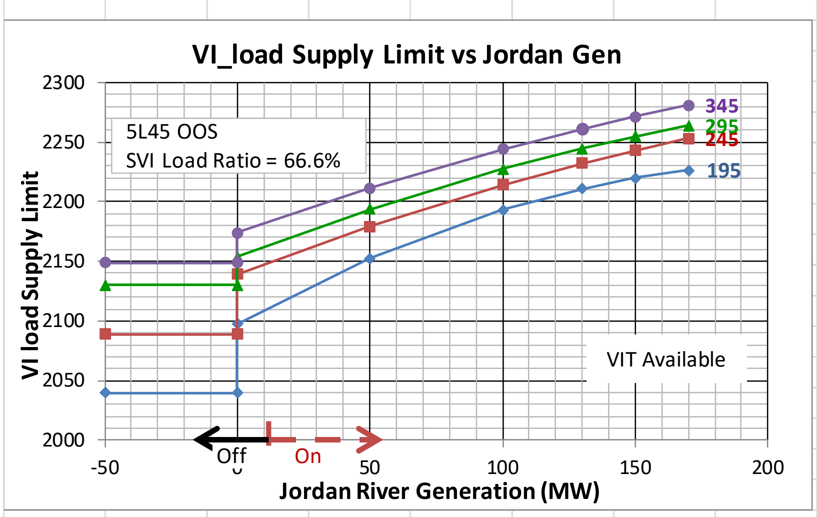
Load Ratio: 60.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2182	2196	2234	2261	2273	2279	2283
245	2197	2210	2248	2274	2285	2290	2293
295	2204	2218	2255	2281	2291	2296	2298
345	2219	2231	2265	2288	2297	2301	2303



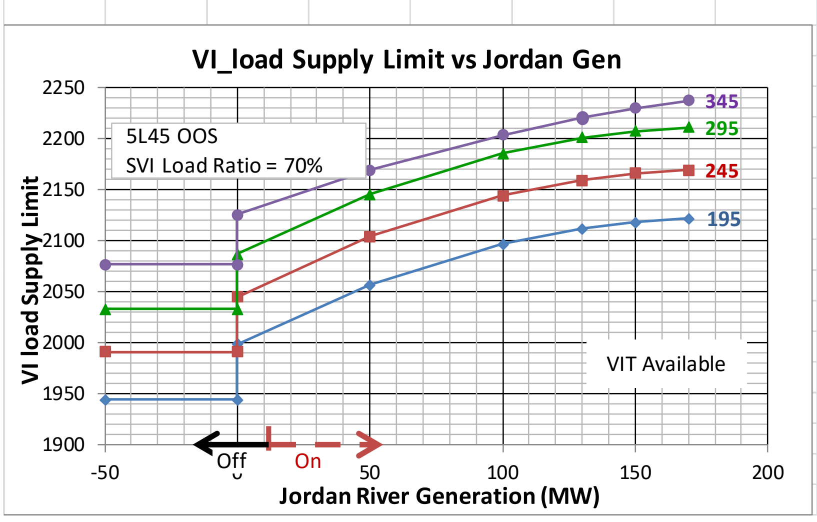
Load Ratio: 65.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2086	2139	2178	2212	2230	2241	2252
245	2133	2162	2198	2231	2249	2261	2272
295	2150	2173	2210	2243	2260	2271	2281
345	2168	2189	2225	2257	2274	2285	2296



Load Ratio: 66.6%

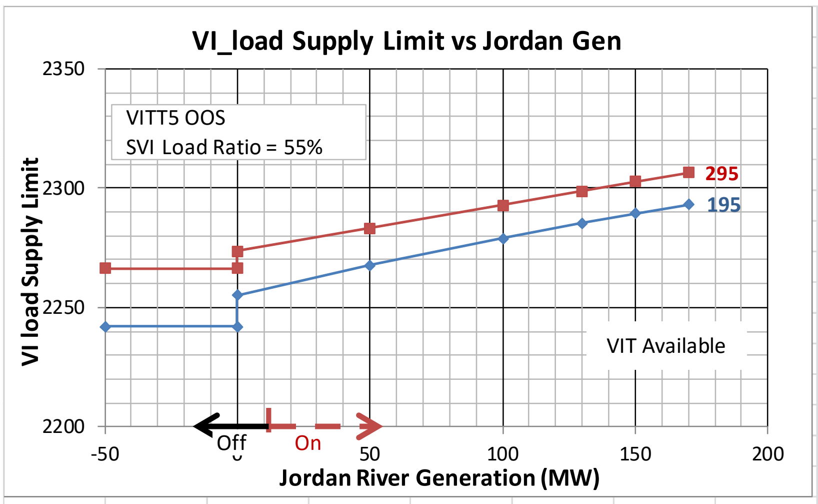
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2039	2098	2153	2193	2211	2220	2227
245	2089	2139	2179	2214	2232	2243	2253
295	2130	2154	2194	2227	2245	2255	2264
345	2149	2174	2211	2244	2261	2272	2281



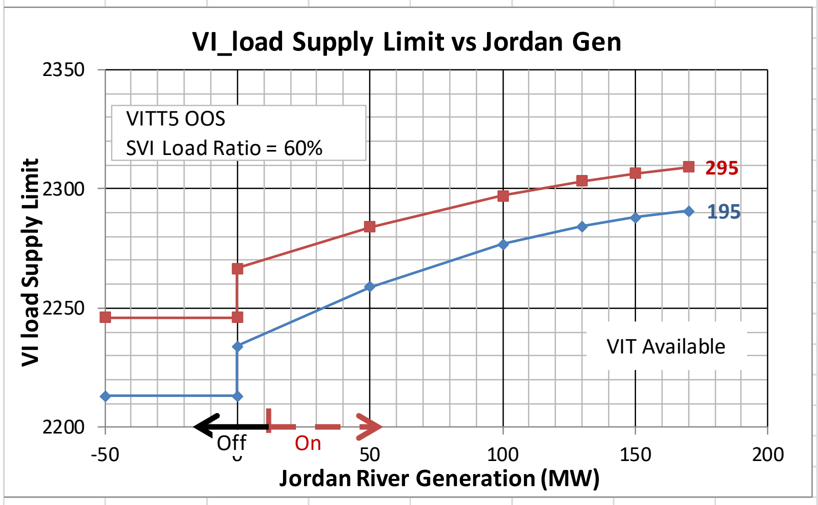
Load Ratio: 70.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1944	1999	2057	2097	2112	2118	2122
245	1991	2045	2104	2144	2160	2166	2169
295	2033	2087	2146	2186	2201	2207	2211
345	2077	2126	2169	2204	2220	2230	2238

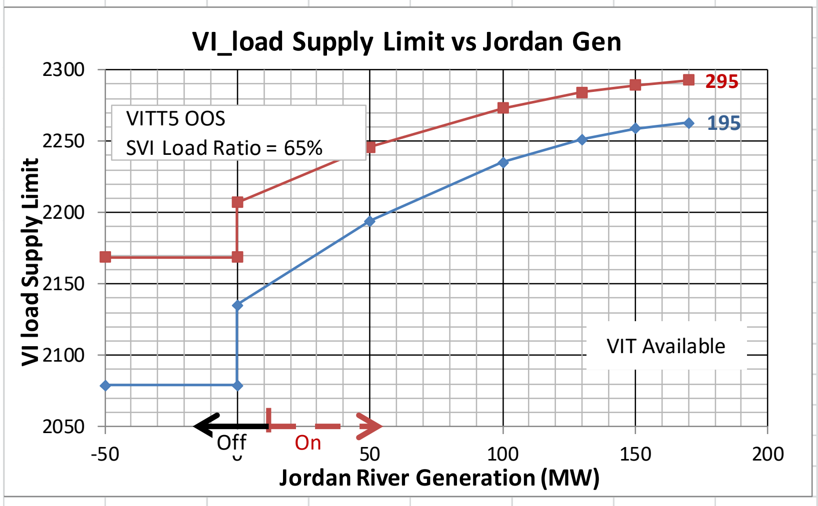
A5.18 VIT T5 OOS



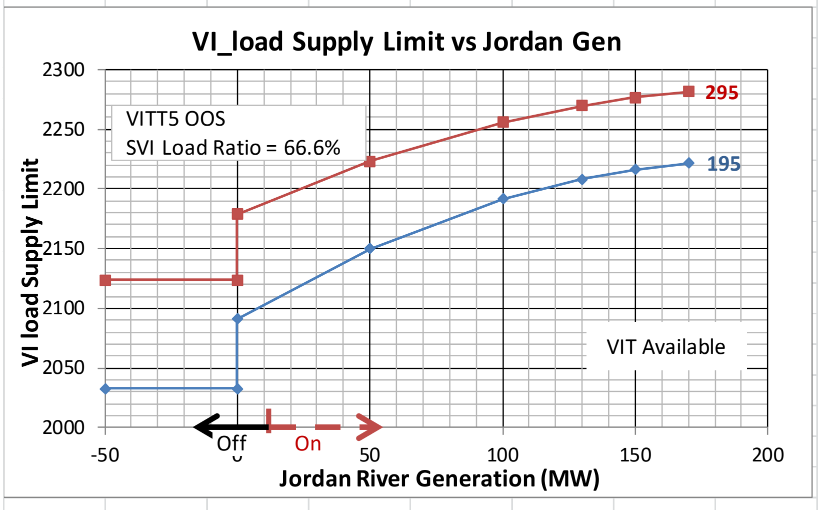
OOS:	VITT5						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2242	2255	2268	2279	2285	2289	2293
295	2266	2274	2283	2293	2299	2303	2307
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



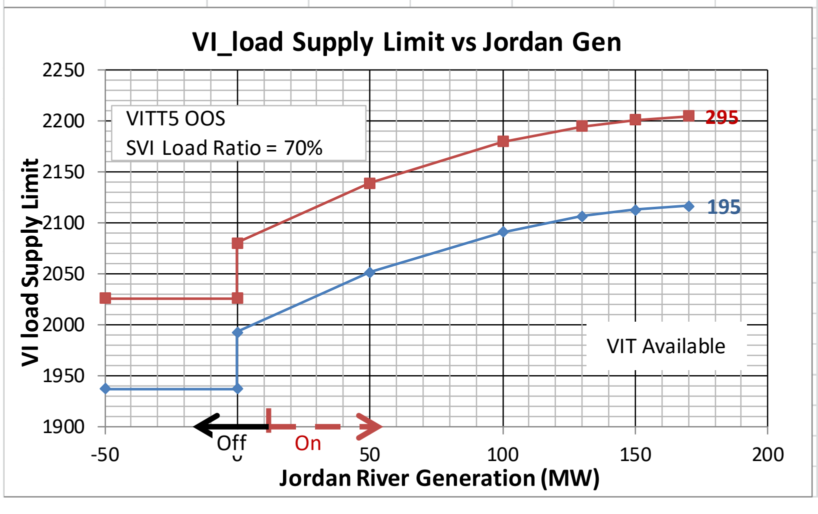
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2213	2234	2259	2277	2284	2288	2291
295	2246	2267	2284	2297	2303	2307	2309
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2079	2135	2194	2235	2251	2259	2263
295	2169	2207	2246	2273	2284	2289	2293
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

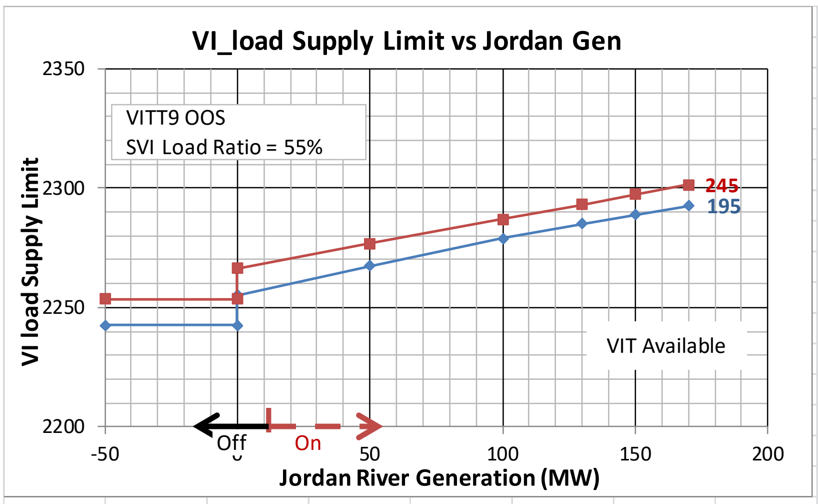


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2033	2091	2150	2191	2208	2216	2222
295	2124	2179	2223	2256	2270	2277	2282
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1938	1993	2051	2091	2107	2113	2116
295	2026	2080	2139	2180	2195	2201	2205
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

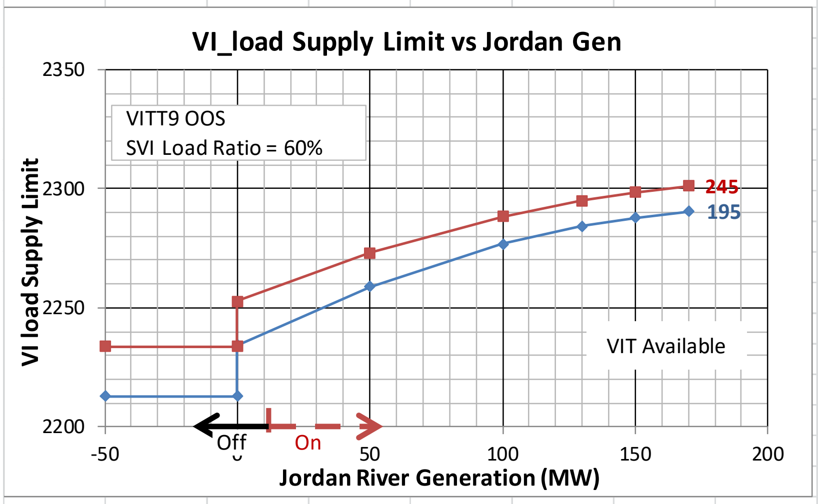
A5.19 VIT T9 or T10 OOS



OOS: VITT9

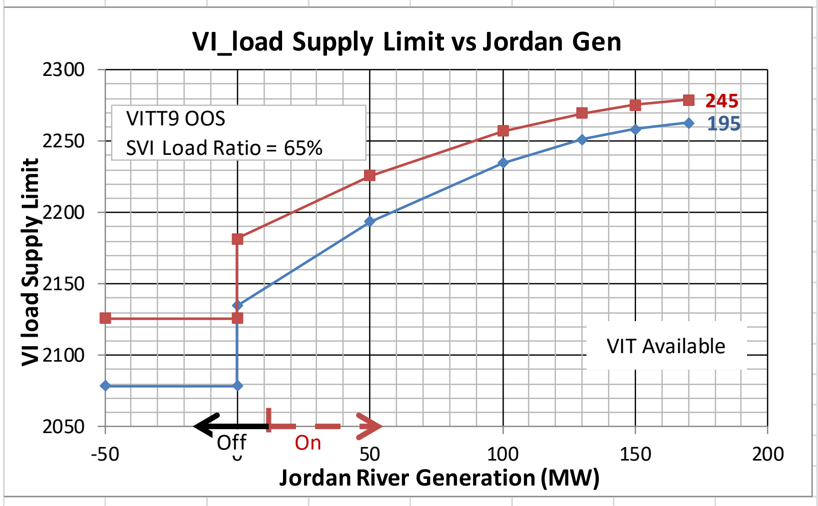
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2243	2255	2268	2279	2285	2289	2293
245	2253	2266	2277	2287	2293	2297	2301
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



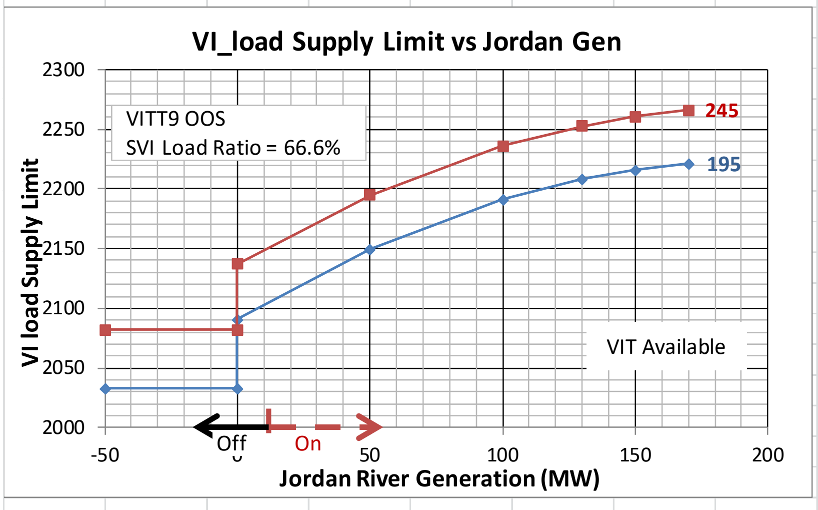
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2213	2234	2259	2277	2284	2288	2290
245	2234	2253	2273	2288	2295	2299	2301
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



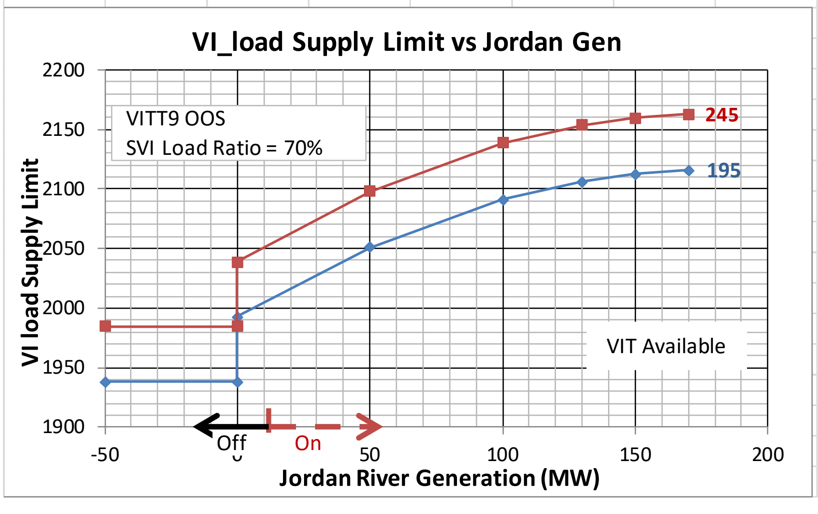
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2079	2135	2194	2235	2251	2258	2263
245	2126	2182	2226	2257	2270	2275	2279
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



Load Ratio: **66.6%**

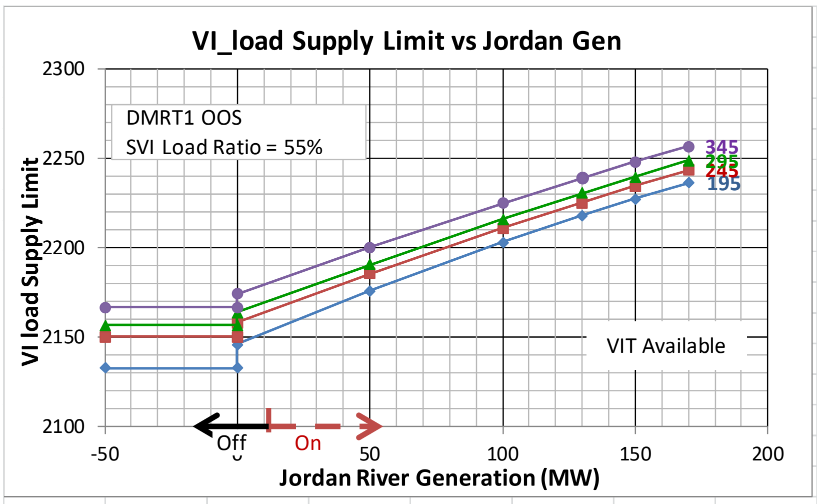
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2033	2091	2149	2191	2208	2216	2221
245	2082	2137	2195	2236	2253	2261	2266
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0



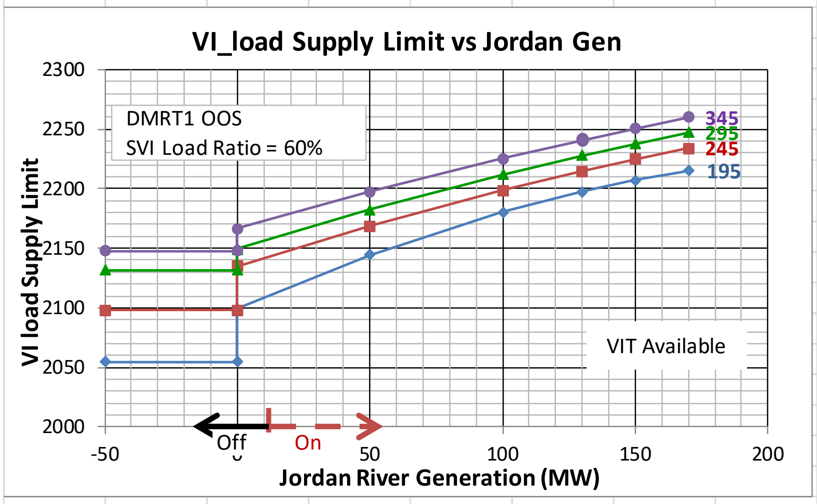
Load Ratio: **70.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1938	1992	2051	2091	2106	2113	2116
245	1985	2039	2098	2139	2154	2160	2163
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

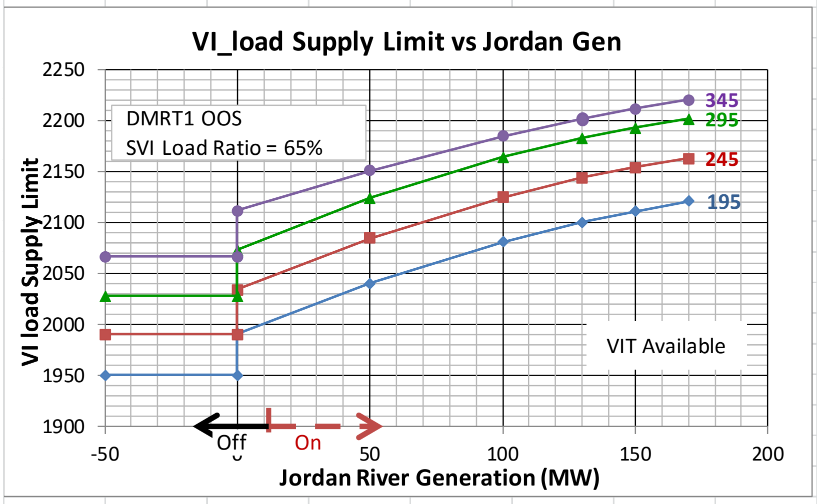
A5.20 DMR T1 or T2 OOS



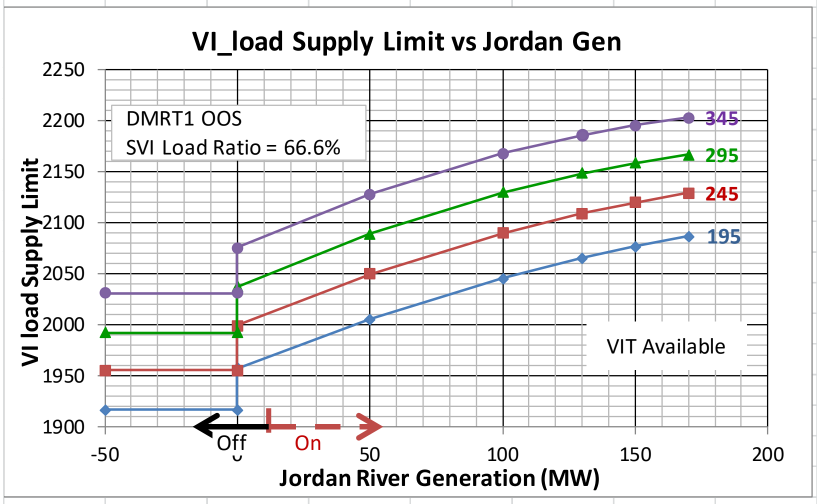
OOS:	DMRT1						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2133	2146	2176	2203	2218	2227	2236
245	2150	2158	2186	2211	2225	2235	2244
295	2157	2164	2191	2216	2230	2240	2249
345	2167	2174	2200	2225	2239	2248	2257



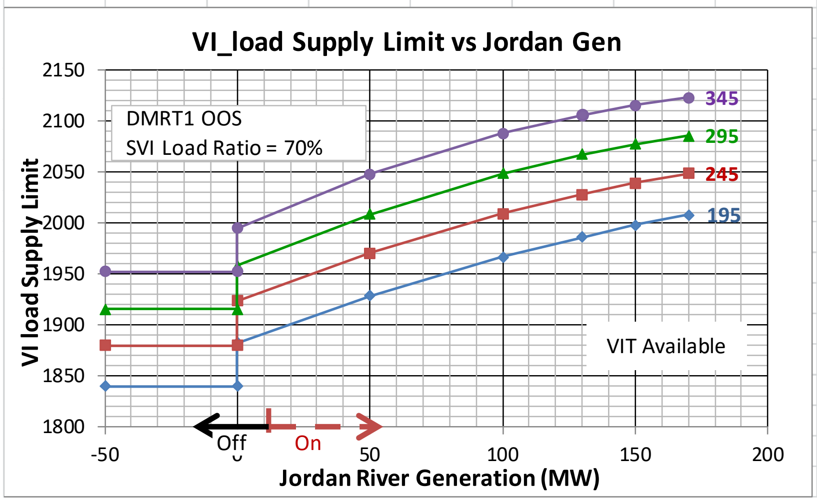
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2055	2099	2144	2181	2198	2207	2215
245	2098	2135	2169	2199	2215	2225	2234
295	2132	2149	2182	2212	2228	2238	2247
345	2148	2166	2197	2226	2241	2251	2260



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1951	1991	2041	2081	2100	2111	2121
245	1990	2034	2085	2125	2144	2154	2163
295	2028	2073	2124	2164	2183	2193	2202
345	2067	2112	2151	2185	2202	2212	2221

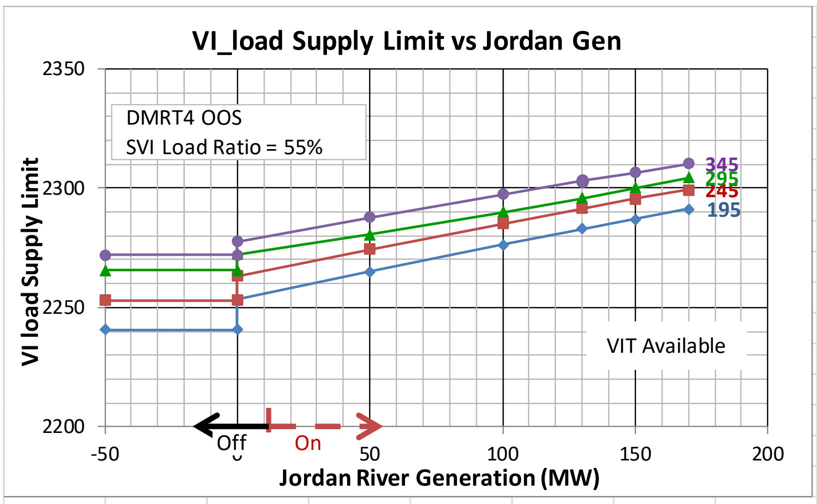


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1917	1957	2006	2045	2065	2077	2087
245	1955	1999	2050	2090	2109	2120	2129
295	1993	2037	2089	2130	2148	2159	2167
345	2031	2076	2128	2168	2186	2195	2203

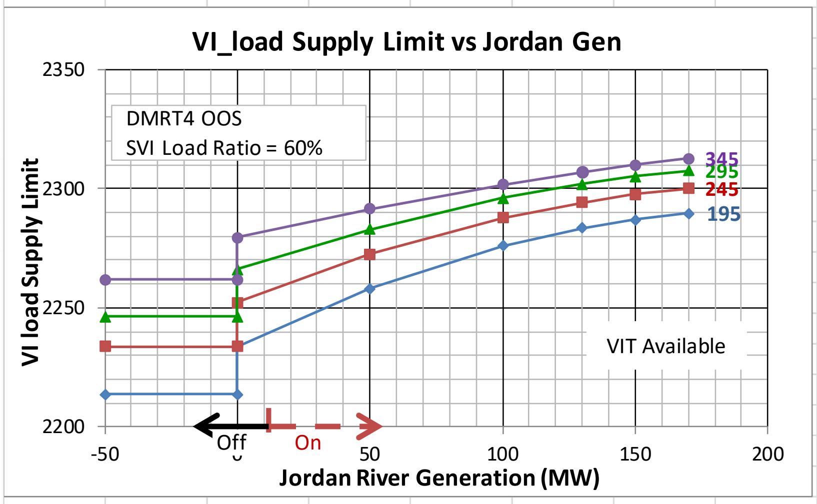


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1840	1882	1928	1967	1986	1998	2008
245	1880	1923	1971	2009	2028	2039	2049
295	1916	1958	2009	2048	2067	2077	2086
345	1953	1995	2048	2088	2106	2116	2123

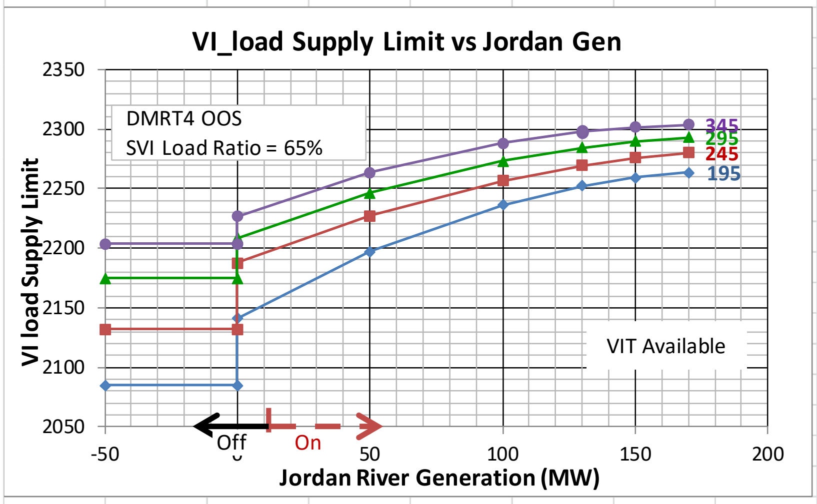
A5.21 DMR T4 or T7 OOS



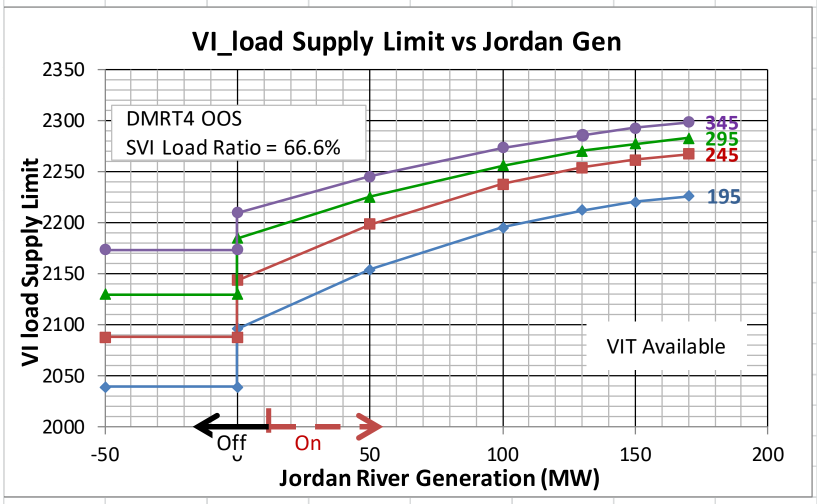
OOS:	DMRT4						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2241	2253	2265	2276	2283	2287	2291
245	2253	2263	2274	2285	2291	2295	2299
295	2266	2272	2281	2290	2296	2300	2305
345	2272	2278	2288	2297	2303	2307	2310



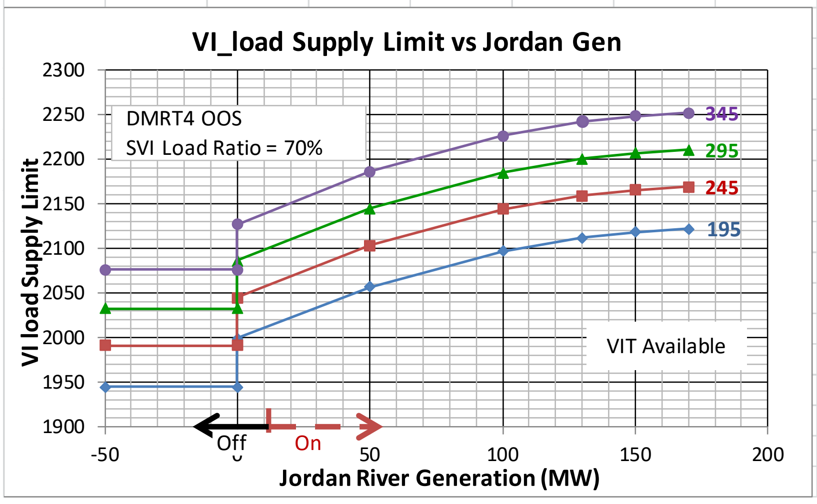
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2214	2234	2258	2276	2283	2287	2290
245	2234	2252	2273	2288	2294	2298	2300
295	2246	2266	2283	2296	2302	2305	2308
345	2262	2280	2292	2302	2307	2310	2313



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2085	2141	2197	2237	2252	2259	2263
245	2132	2187	2227	2257	2269	2276	2280
295	2175	2209	2246	2273	2284	2290	2293
345	2204	2227	2264	2288	2298	2302	2304

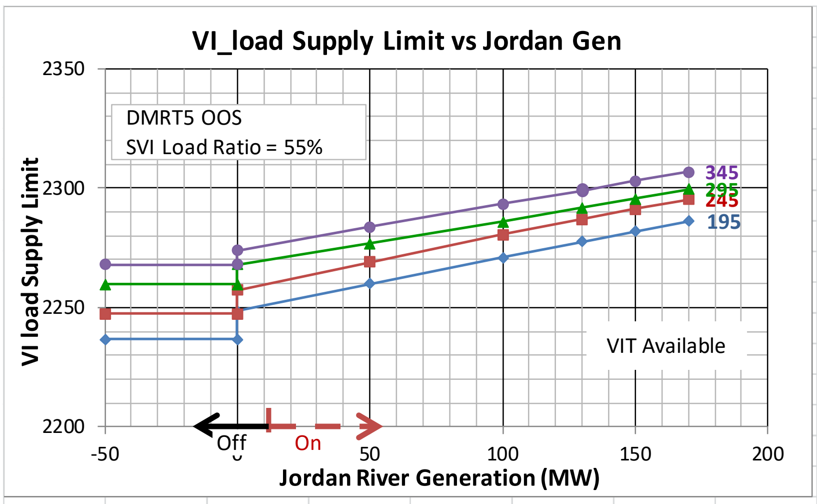


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2039	2096	2154	2196	2213	2221	2226
245	2088	2144	2198	2238	2254	2262	2267
295	2130	2185	2225	2256	2270	2277	2283
345	2173	2210	2246	2273	2286	2293	2299

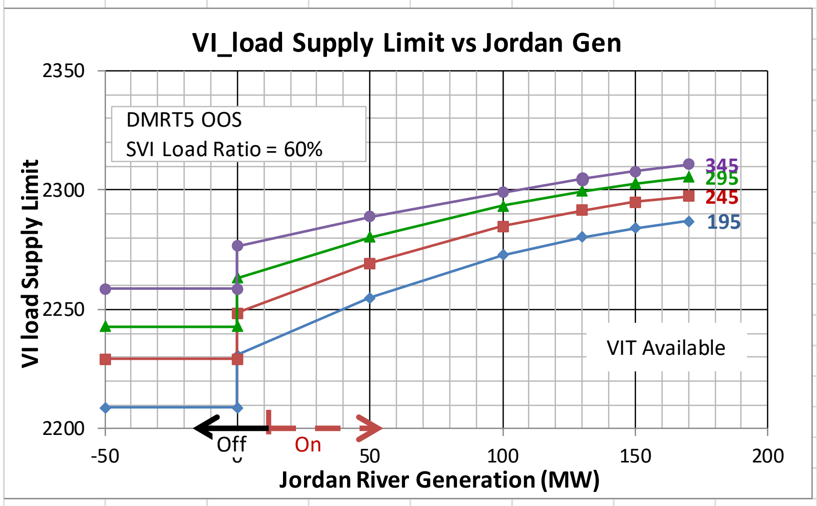


Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1945	1999	2057	2097	2112	2118	2122
245	1991	2045	2104	2144	2159	2166	2169
295	2033	2086	2145	2185	2200	2207	2210
345	2076	2127	2186	2226	2242	2248	2252

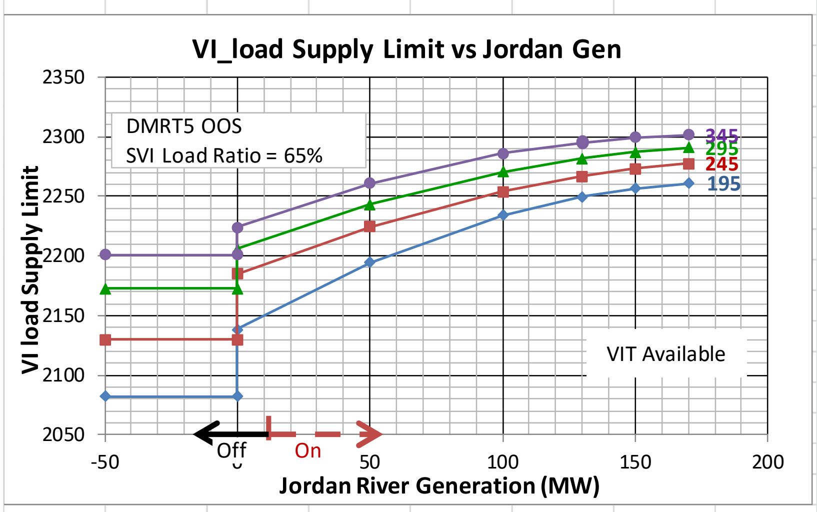
A5.22 DMR T5 or T6 OOS



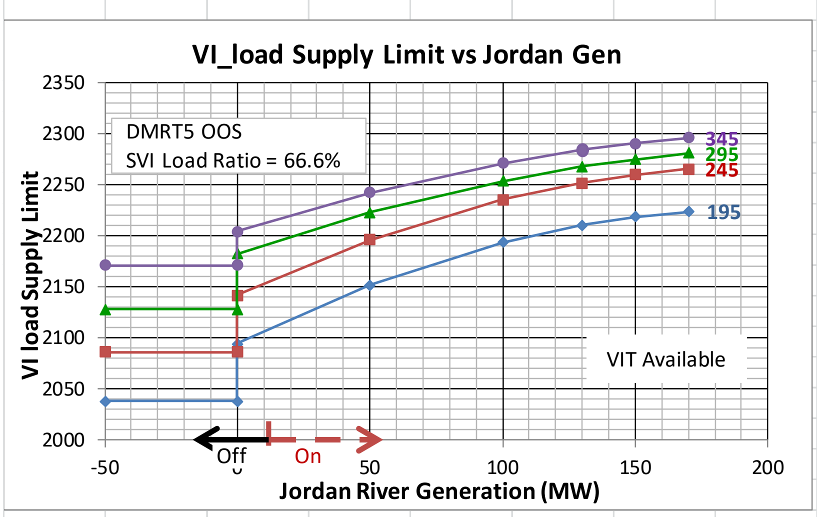
OOS:	DMRT5						
Load Ratio:	55.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2237	2248	2260	2271	2278	2282	2286
245	2247	2257	2269	2280	2287	2291	2295
295	2260	2268	2277	2286	2292	2296	2300
345	2268	2274	2284	2293	2299	2303	2307



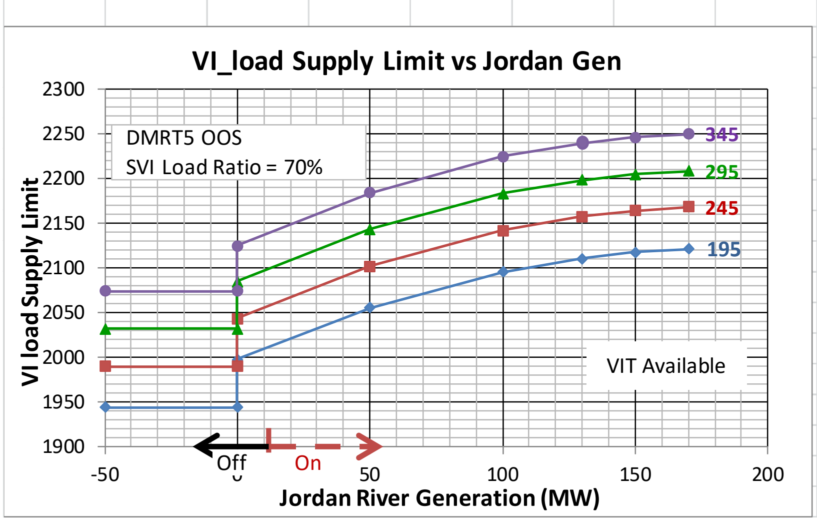
Load Ratio:	60.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2209	2231	2255	2273	2280	2284	2287
245	2229	2248	2269	2285	2292	2295	2298
295	2243	2263	2280	2293	2300	2303	2305
345	2259	2277	2289	2299	2305	2308	2311



Load Ratio:	65.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2082	2139	2195	2234	2250	2257	2261
245	2130	2185	2225	2254	2267	2273	2278
295	2173	2206	2243	2271	2282	2287	2291
345	2201	2224	2261	2286	2295	2299	2301

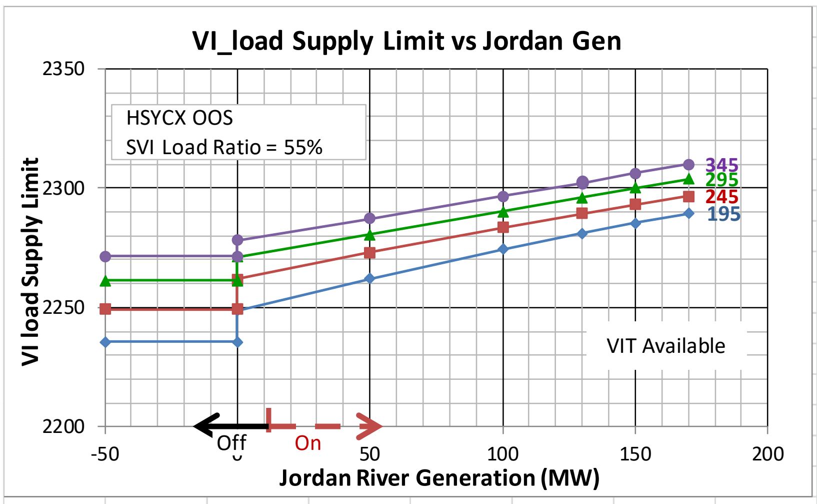


Load Ratio:	66.6%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2038	2094	2152	2193	2210	2218	2224
245	2086	2142	2196	2235	2252	2260	2265
295	2128	2182	2223	2254	2268	2275	2281
345	2171	2204	2242	2271	2284	2291	2296



Load Ratio:	70.0%						
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1944	1998	2055	2095	2111	2118	2122
245	1990	2043	2102	2142	2158	2164	2168
295	2032	2085	2143	2183	2198	2205	2209
345	2074	2125	2184	2225	2240	2246	2250

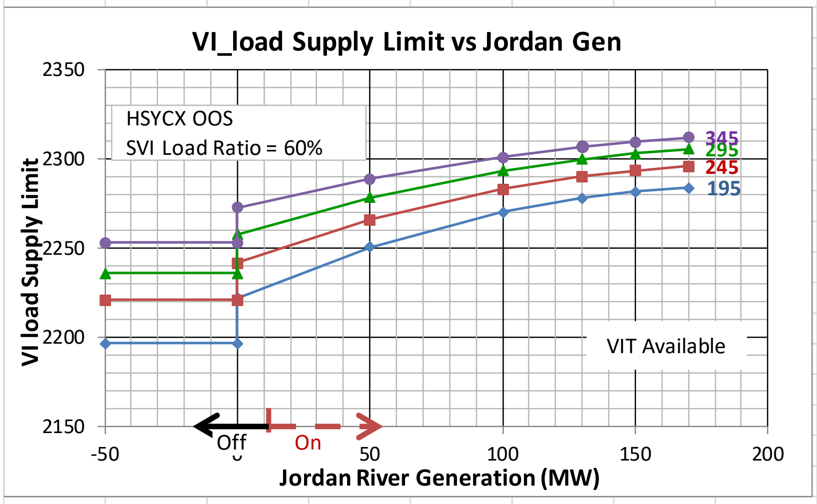
A5.23 HSY CX OOS



OOS: HSYCX

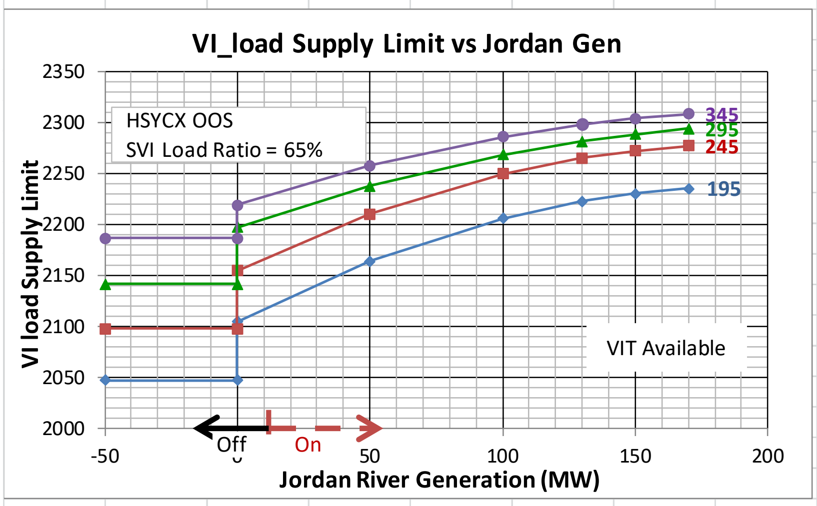
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2236	2249	2262	2274	2281	2285	2289
245	2249	2262	2273	2284	2289	2293	2297
295	2261	2271	2281	2290	2296	2300	2304
345	2271	2278	2287	2297	2302	2306	2310



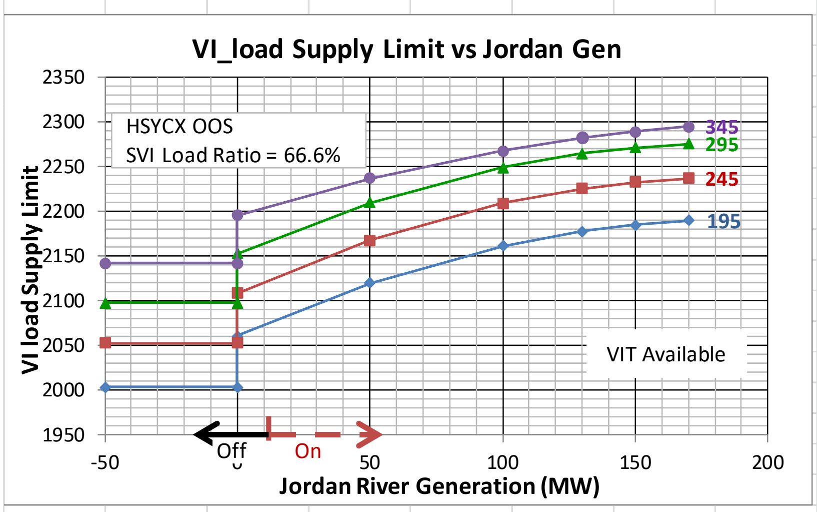
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2197	2222	2251	2270	2278	2282	2284
245	2221	2242	2266	2283	2290	2294	2296
295	2236	2258	2278	2293	2300	2303	2306
345	2253	2273	2289	2301	2307	2310	2312



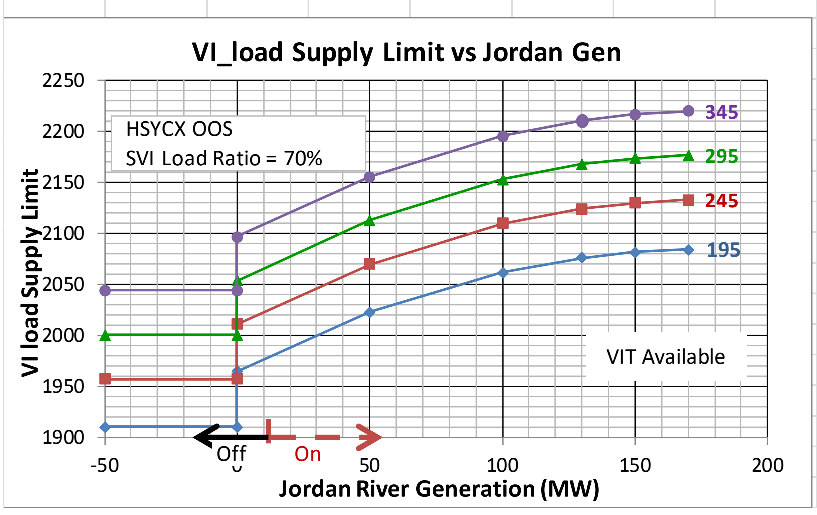
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2047	2105	2164	2206	2223	2231	2236
245	2098	2155	2210	2250	2265	2273	2277
295	2142	2197	2238	2269	2282	2289	2294
345	2187	2219	2258	2286	2298	2304	2308



Load Ratio: **66.6%**

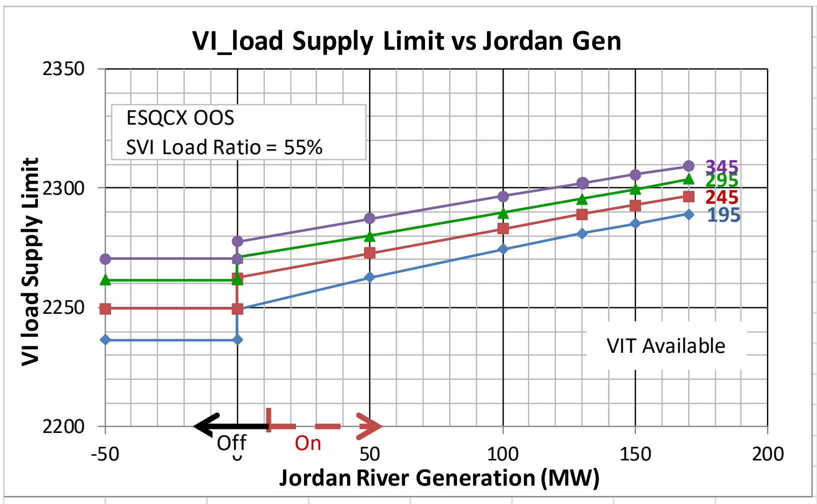
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2003	2061	2120	2162	2178	2185	2190
245	2053	2108	2168	2209	2226	2233	2237
295	2098	2153	2210	2249	2265	2272	2276
345	2142	2196	2237	2268	2282	2289	2295



Load Ratio: **70.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1910	1965	2023	2062	2076	2082	2084
245	1957	2011	2070	2110	2124	2130	2133
295	2001	2054	2113	2153	2168	2174	2177
345	2044	2097	2156	2195	2210	2216	2220

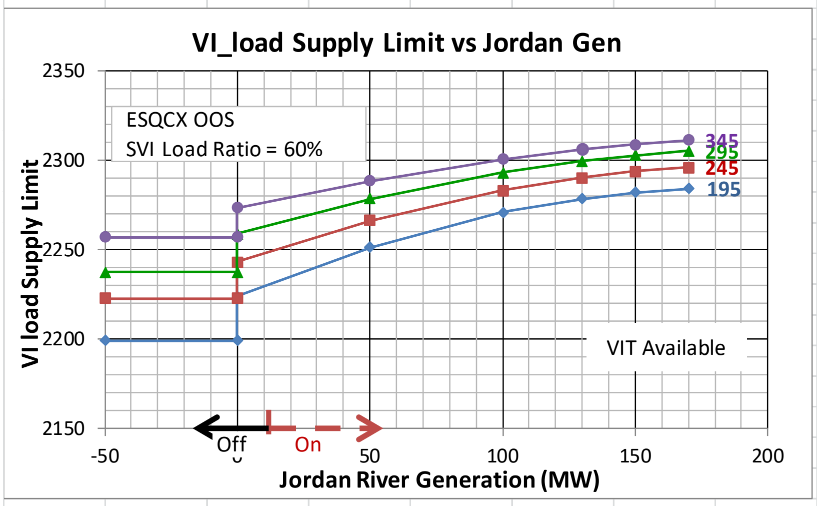
A5.24 ESQ CX OOS



OOS: ESQCX

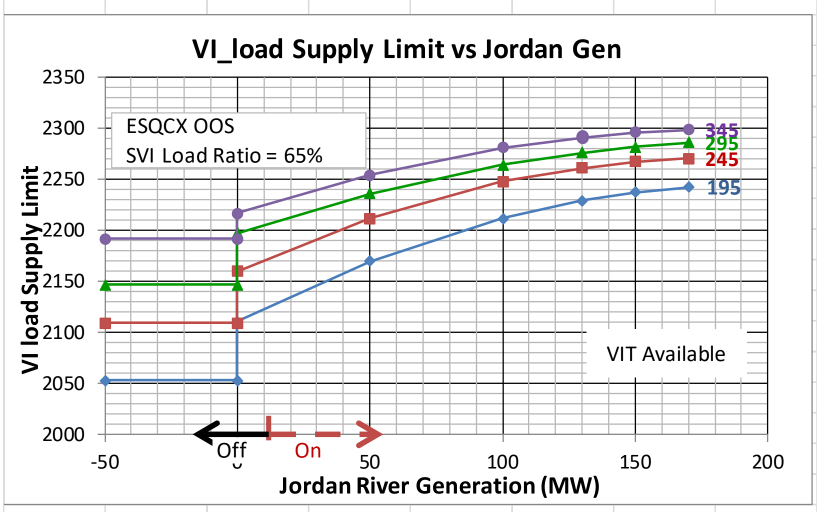
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2236	2249	2263	2274	2281	2285	2289
245	2250	2262	2273	2283	2289	2293	2297
295	2262	2271	2280	2290	2296	2300	2304
345	2270	2278	2287	2297	2302	2306	2309



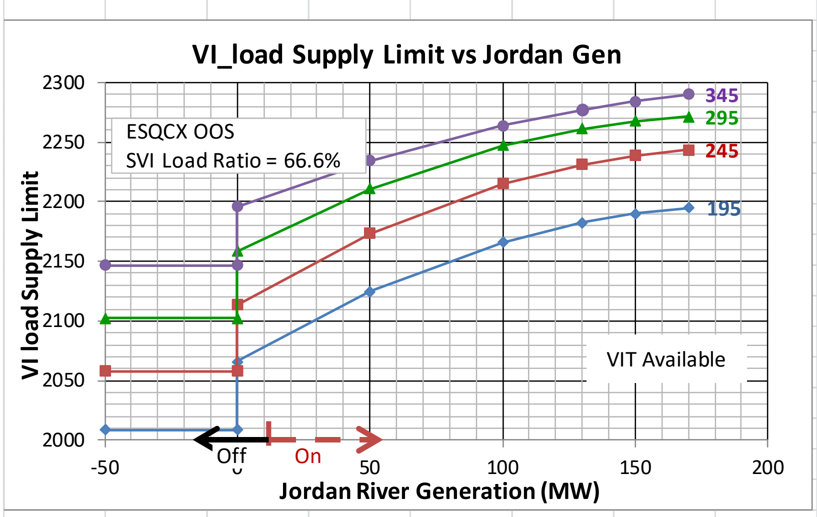
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2199	2224	2251	2271	2279	2282	2284
245	2223	2243	2266	2283	2290	2294	2296
295	2237	2259	2279	2293	2300	2303	2305
345	2257	2274	2289	2300	2306	2309	2311



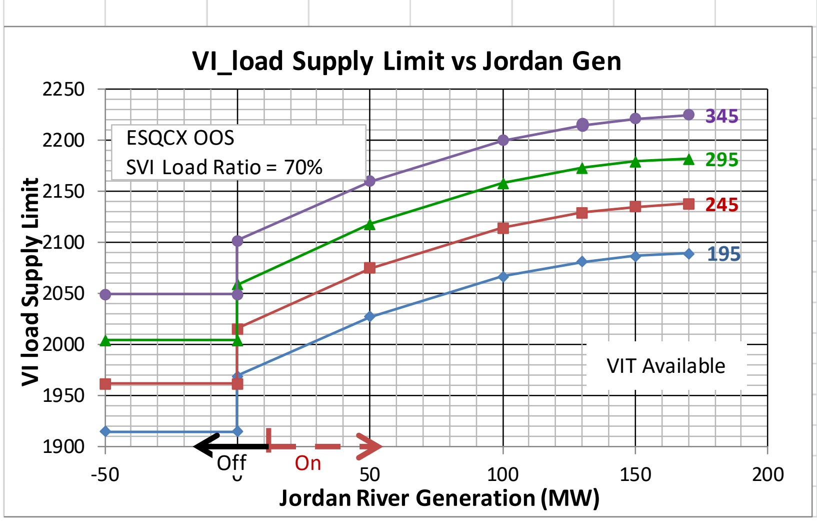
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2053	2110	2170	2212	2229	2237	2243
245	2109	2160	2212	2248	2261	2267	2270
295	2147	2197	2236	2265	2276	2282	2286
345	2192	2217	2255	2281	2291	2296	2299



Load Ratio: **66.6%**

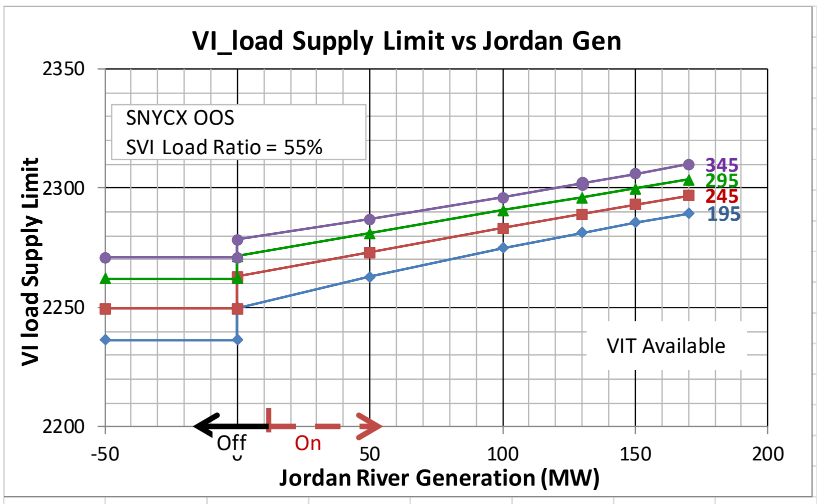
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2009	2066	2125	2166	2183	2190	2195
245	2058	2114	2173	2215	2232	2239	2243
295	2102	2158	2211	2247	2261	2268	2271
345	2146	2196	2234	2264	2277	2284	2290



Load Ratio: **70.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1915	1969	2028	2067	2081	2087	2089
245	1962	2016	2075	2114	2129	2135	2138
295	2004	2058	2118	2158	2173	2179	2182
345	2049	2101	2160	2200	2215	2221	2225

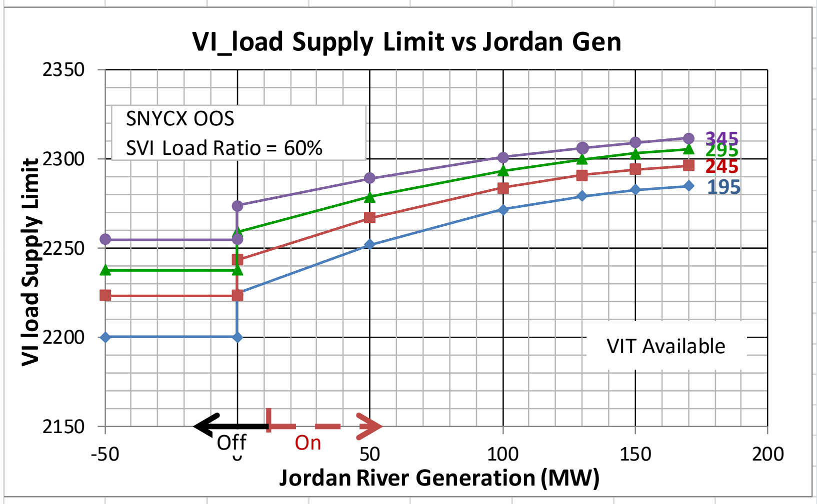
A5.25 SNY CX OOS



OOS: SNYCX

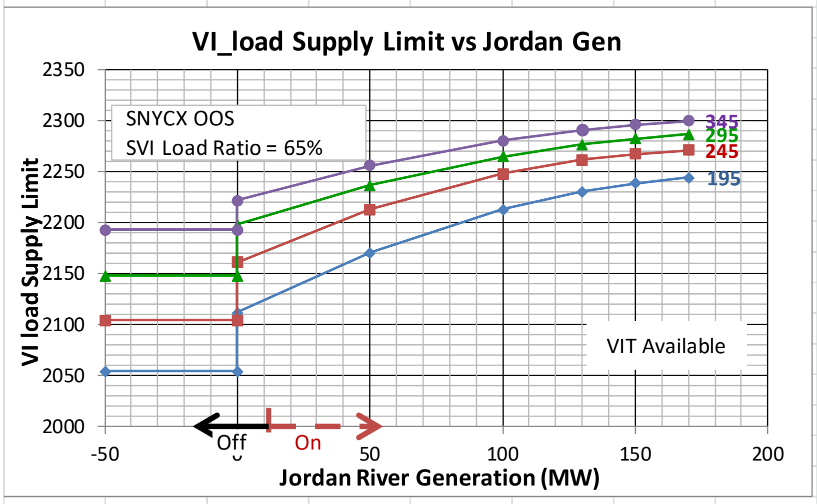
Load Ratio: 55.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2237	2250	2263	2275	2281	2286	2289
245	2250	2263	2273	2283	2289	2293	2297
295	2262	2271	2281	2291	2296	2300	2303
345	2271	2278	2287	2296	2302	2306	2310



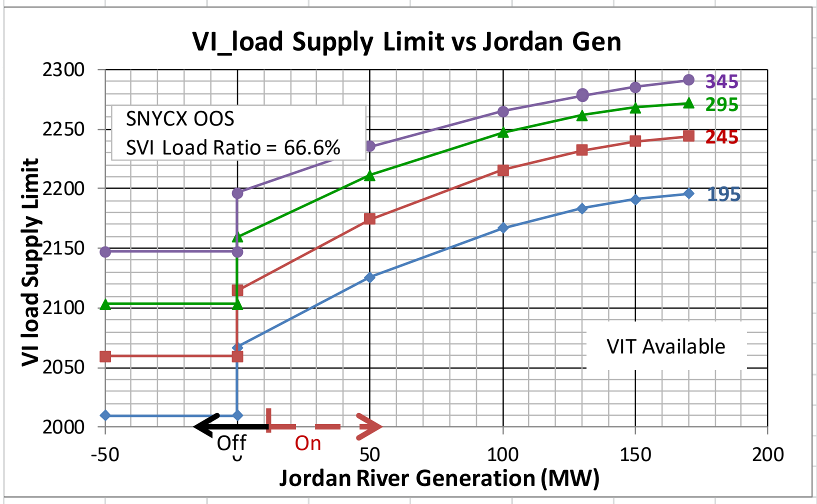
Load Ratio: 60.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2200	2225	2252	2272	2279	2283	2285
245	2224	2243	2267	2284	2291	2294	2296
295	2238	2259	2279	2294	2300	2303	2306
345	2255	2274	2289	2301	2306	2309	2312



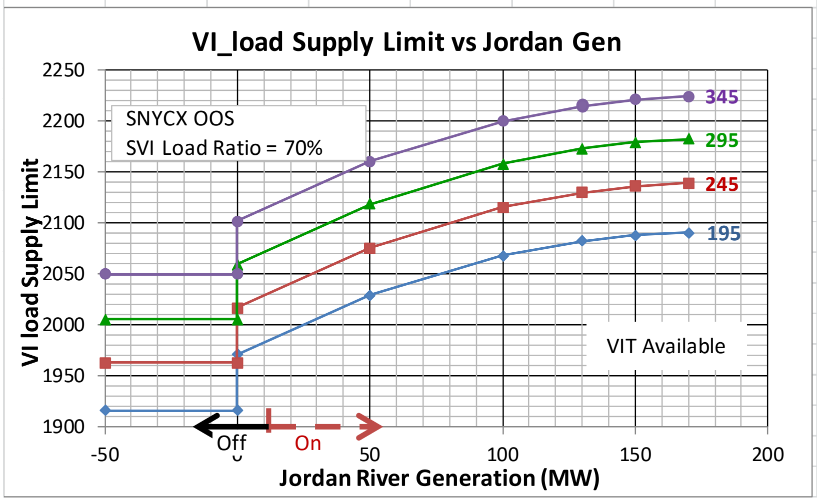
Load Ratio: 65.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2054	2112	2171	2213	2230	2238	2244
245	2104	2161	2213	2248	2262	2268	2271
295	2148	2198	2237	2265	2277	2283	2287
345	2193	2222	2256	2281	2291	2296	2300



Load Ratio: 66.6%

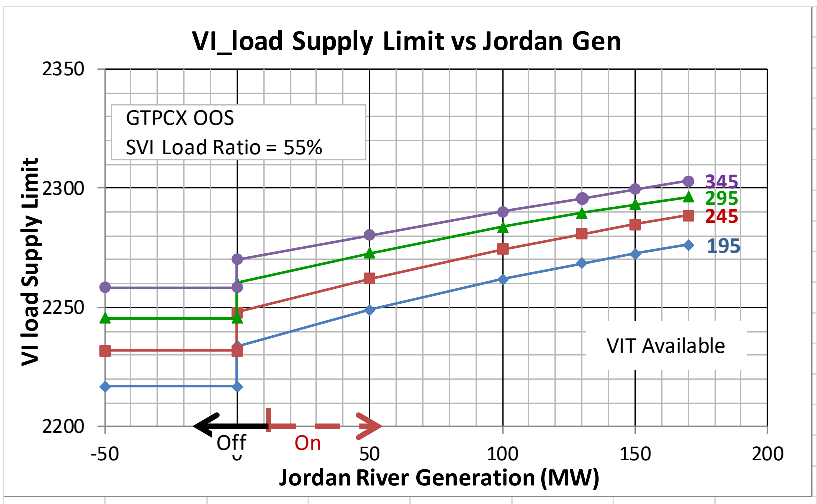
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2010	2067	2126	2167	2184	2191	2196
245	2060	2115	2174	2216	2232	2240	2244
295	2104	2159	2211	2248	2262	2268	2272
345	2147	2196	2236	2265	2279	2286	2291



Load Ratio: 70.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1916	1971	2029	2068	2082	2088	2090
245	1963	2017	2076	2115	2130	2136	2139
295	2006	2059	2118	2158	2173	2179	2182
345	2050	2102	2160	2200	2215	2221	2224

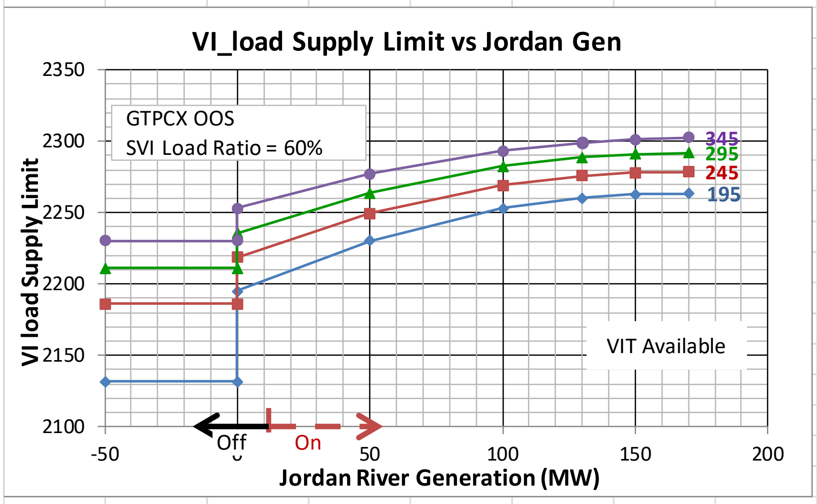
A5.26 GTP CX OOS



OOS: GTPCX

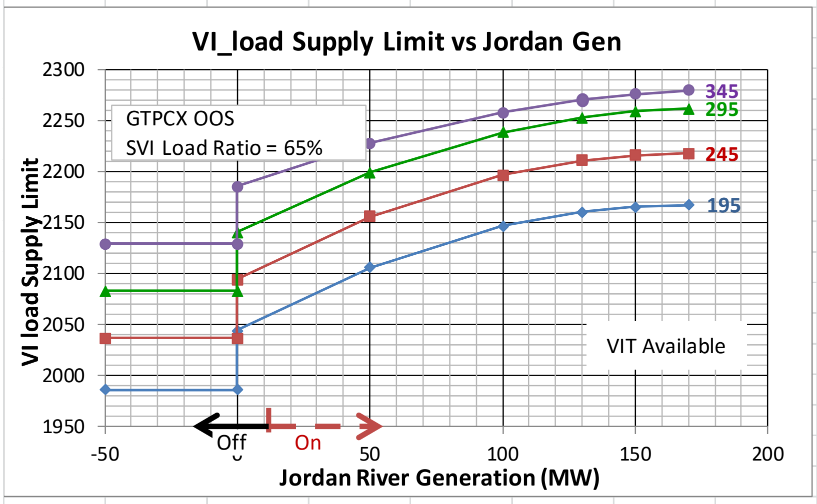
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2217	2234	2249	2262	2268	2273	2276
245	2232	2248	2262	2274	2281	2285	2289
295	2246	2260	2273	2284	2290	2293	2296
345	2258	2270	2280	2290	2296	2299	2303



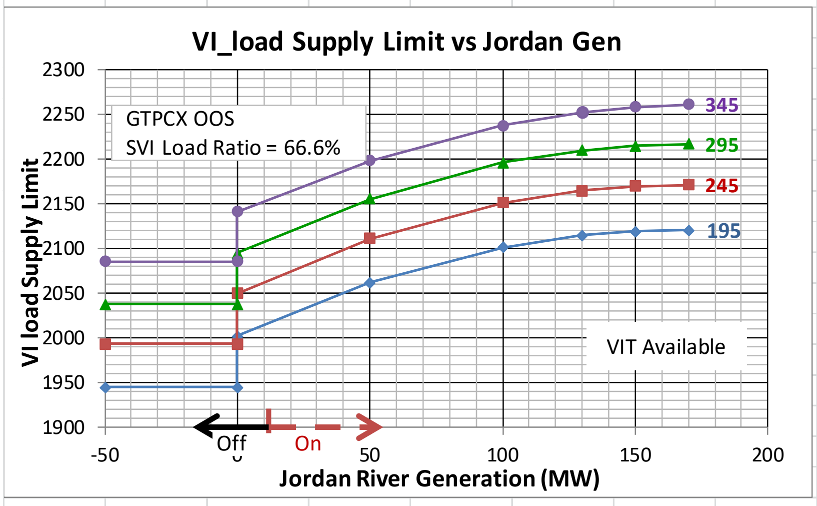
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2132	2195	2230	2253	2260	2263	2263
245	2186	2219	2249	2269	2276	2278	2279
295	2211	2236	2264	2282	2289	2291	2292
345	2230	2253	2277	2293	2299	2301	2302



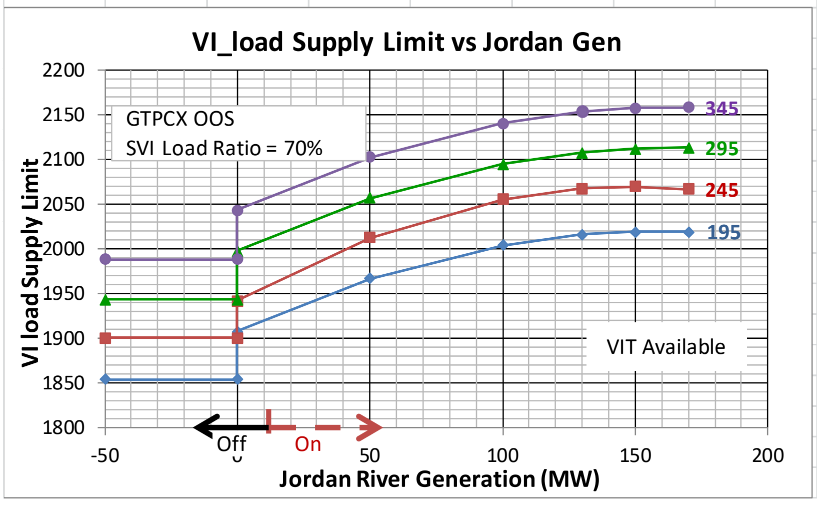
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1986	2045	2106	2147	2161	2166	2167
245	2037	2094	2156	2197	2211	2216	2218
295	2083	2140	2199	2239	2253	2259	2262
345	2129	2185	2228	2258	2270	2276	2280



Load Ratio: **66.6%**

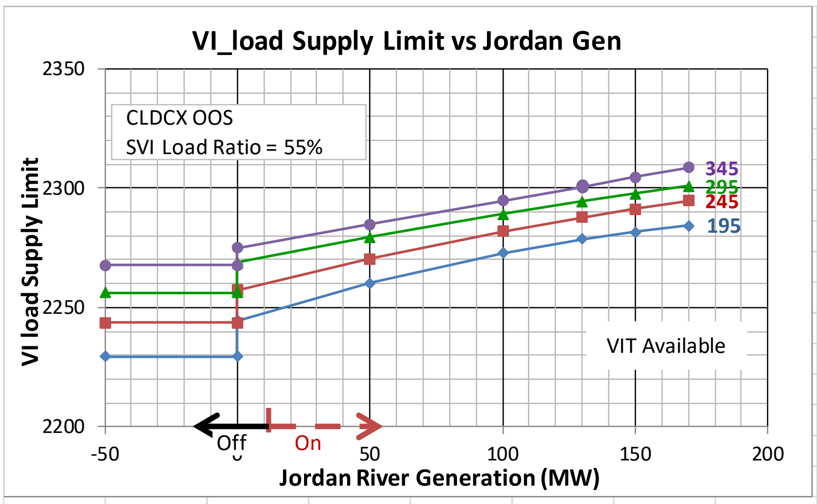
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1945	2002	2062	2101	2115	2119	2120
245	1994	2050	2111	2151	2165	2170	2171
295	2038	2095	2156	2196	2210	2215	2217
345	2086	2141	2198	2237	2252	2258	2261



Load Ratio: **70.0%**

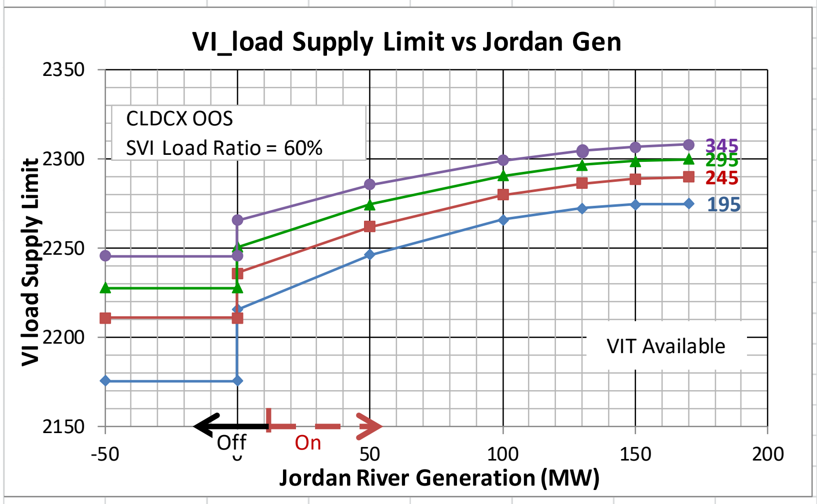
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1854	1908	1967	2004	2016	2019	2019
245	1901	1942	2013	2056	2067	2070	2067
295	1943	1998	2057	2095	2108	2112	2113
345	1989	2043	2103	2141	2153	2158	2158

A5.27 CLD CX OOS



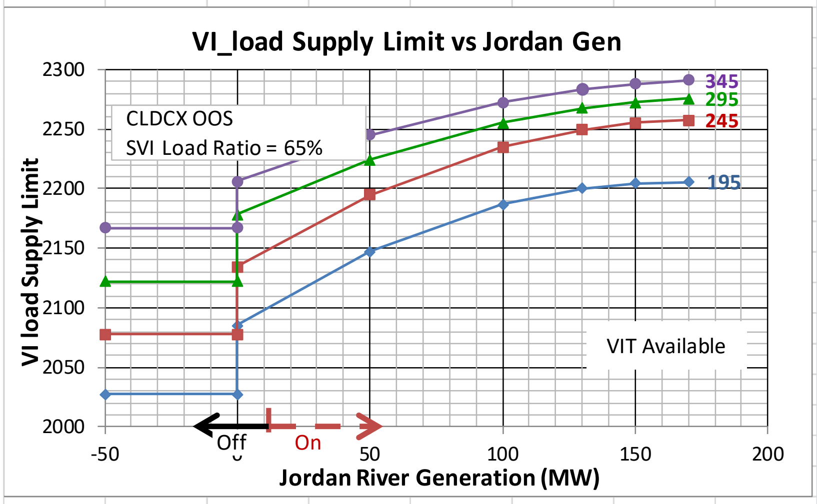
OOS: CLDCX
Load Ratio: 55.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2229	2244	2260	2273	2279	2282	2284
245	2244	2257	2270	2282	2288	2291	2295
295	2256	2269	2280	2289	2294	2298	2301
345	2268	2275	2285	2295	2301	2305	2309



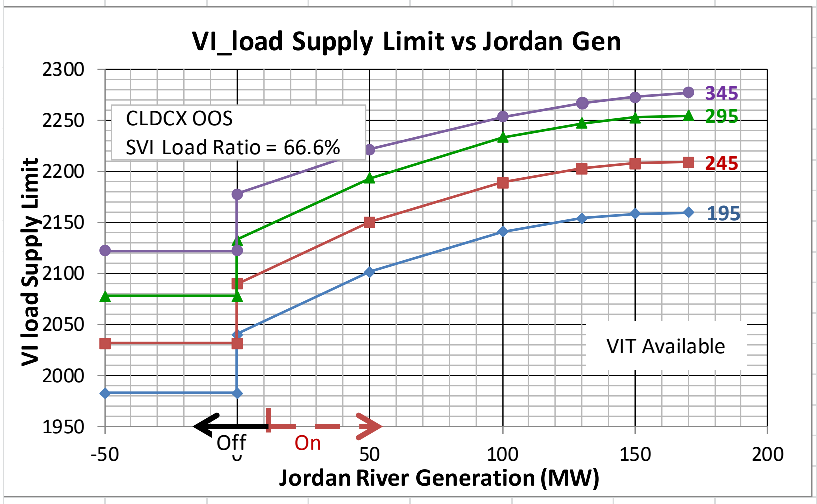
Load Ratio: 60.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2176	2216	2246	2266	2272	2275	2275
245	2211	2236	2262	2280	2286	2289	2290
295	2228	2251	2275	2291	2297	2299	2300
345	2246	2266	2286	2299	2304	2307	2308



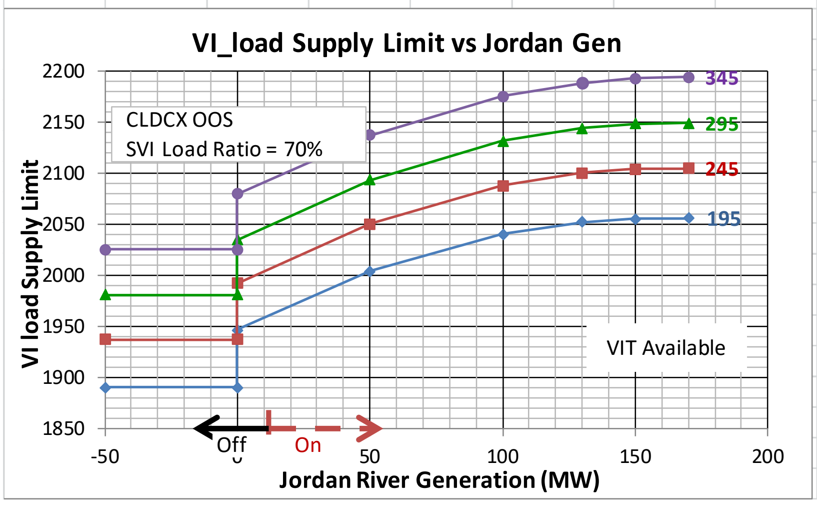
Load Ratio: 65.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2027	2085	2147	2187	2200	2205	2206
245	2078	2134	2195	2235	2250	2255	2258
295	2122	2179	2224	2255	2268	2273	2276
345	2167	2206	2245	2272	2283	2288	2291



Load Ratio: 66.6%

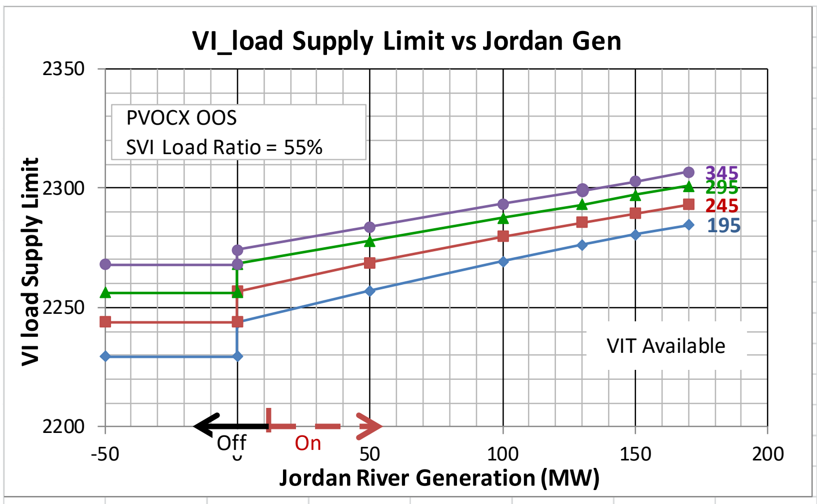
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1983	2041	2102	2141	2154	2159	2160
245	2032	2090	2150	2189	2203	2208	2209
295	2078	2133	2193	2233	2247	2253	2255
345	2123	2178	2222	2254	2267	2273	2277



Load Ratio: 70.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1891	1947	2004	2040	2052	2056	2056
245	1938	1993	2051	2088	2100	2104	2105
295	1981	2035	2094	2132	2144	2149	2149
345	2026	2080	2138	2175	2188	2193	2194

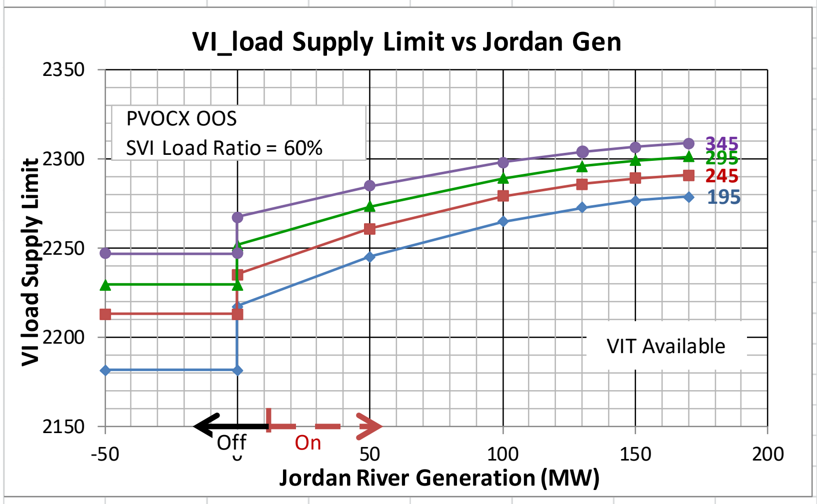
A5.28 PVO CX OOS



OOS: PVOCX

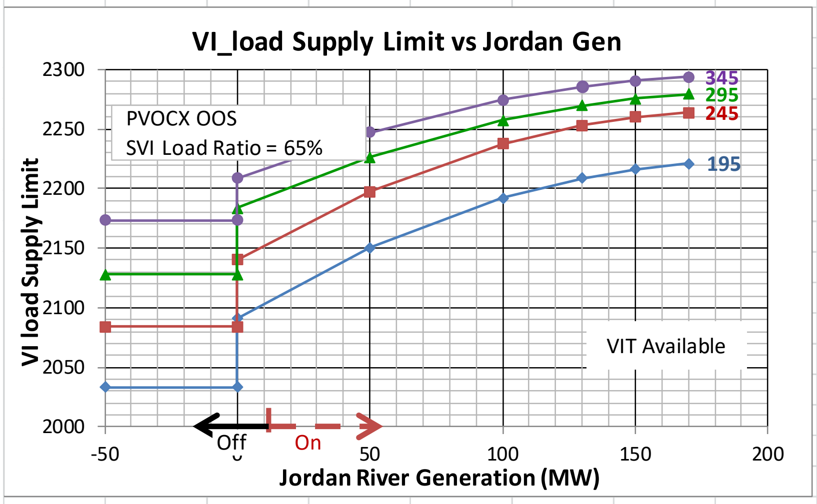
Load Ratio: 55.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2230	2244	2257	2269	2276	2280	2285
245	2244	2257	2269	2280	2286	2289	2293
295	2256	2268	2278	2287	2293	2297	2301
345	2268	2274	2284	2293	2299	2303	2307



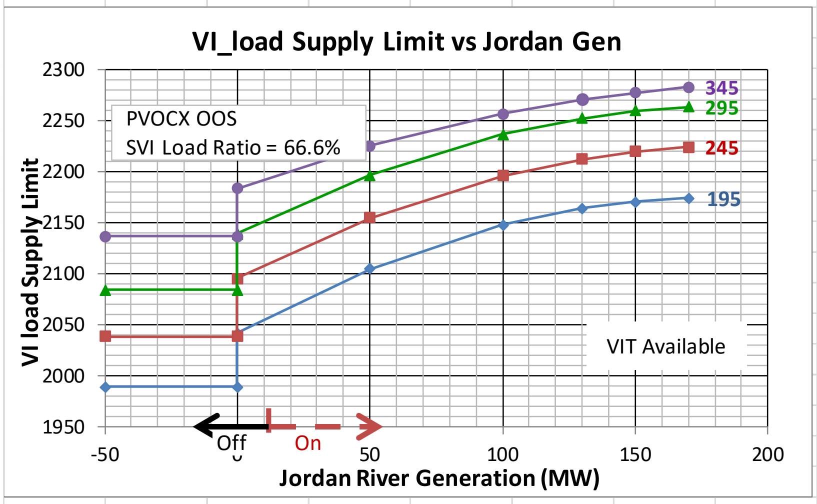
Load Ratio: 60.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2182	2218	2245	2265	2273	2277	2279
245	2213	2235	2261	2279	2286	2289	2291
295	2229	2252	2274	2289	2296	2299	2301
345	2247	2267	2285	2298	2304	2307	2309



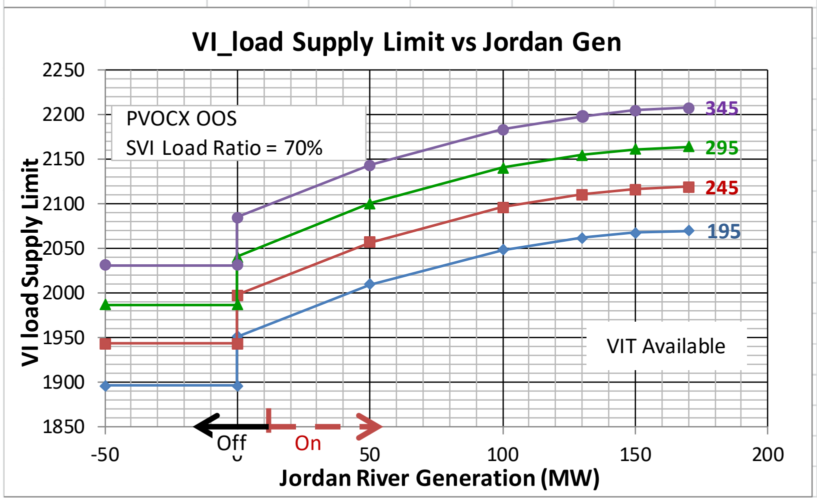
Load Ratio: 65.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2033	2091	2150	2192	2209	2217	2221
245	2084	2140	2198	2238	2253	2260	2264
295	2128	2184	2227	2257	2270	2276	2280
345	2174	2209	2247	2274	2286	2291	2294



Load Ratio: 66.6%

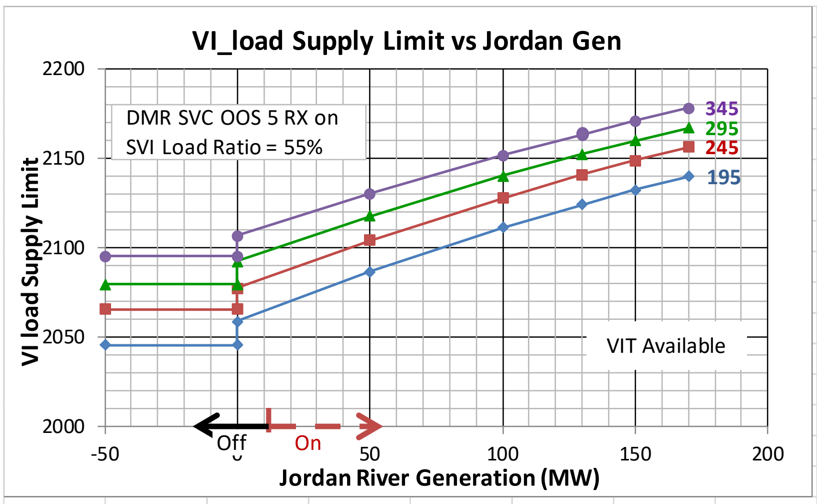
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1990	2042	2105	2148	2164	2171	2174
245	2039	2095	2155	2196	2212	2220	2224
295	2084	2139	2197	2237	2253	2260	2264
345	2137	2183	2225	2257	2270	2278	2283



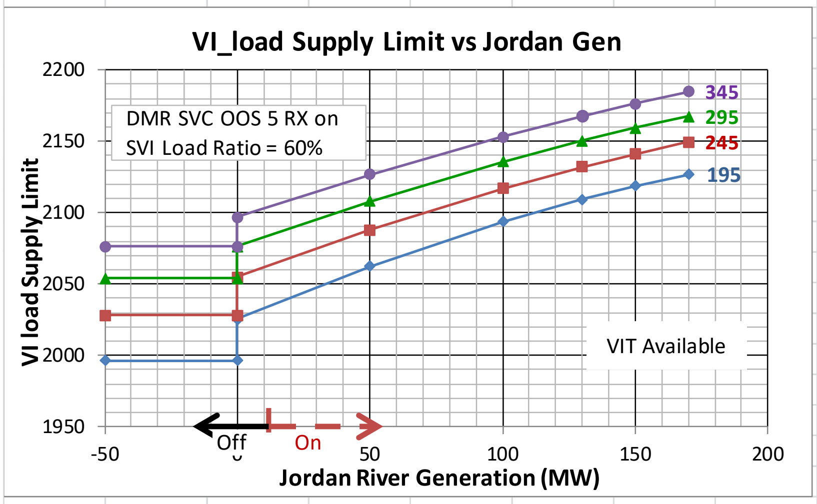
Load Ratio: 70.0%

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1897	1951	2010	2048	2062	2068	2070
245	1944	1998	2057	2096	2111	2116	2119
295	1987	2041	2100	2140	2155	2161	2164
345	2031	2085	2144	2183	2198	2205	2208

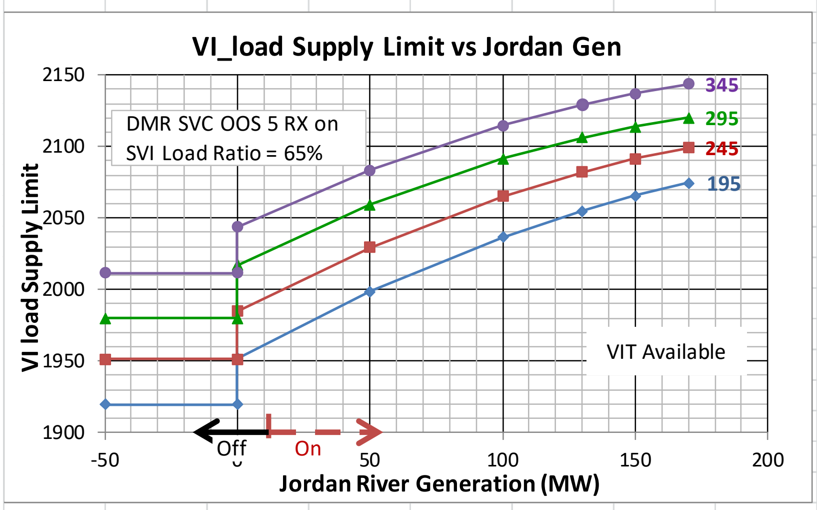
A5.29 SVC OOS with DMR 5-5RX on line



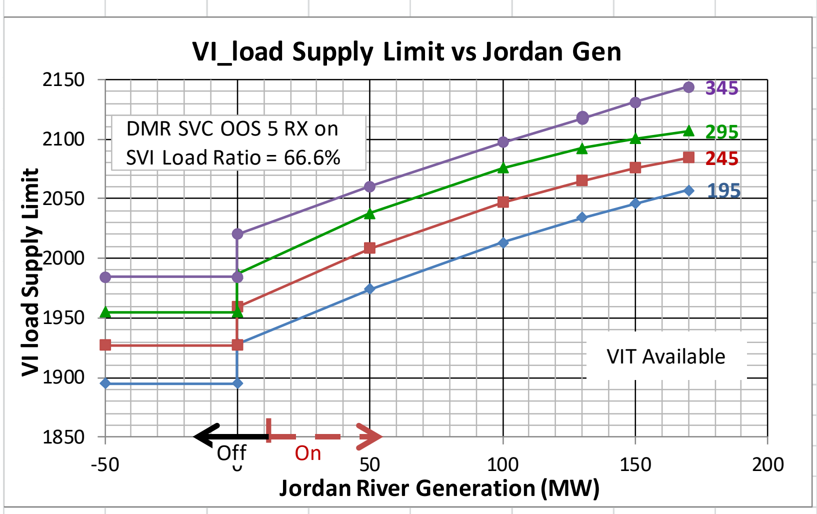
OOS:		DMR SVC OOS with 5 RX on					
Load Ratio:		55.0%					
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2046	2059	2087	2111	2124	2132	2140
245	2066	2077	2104	2128	2141	2149	2156
295	2080	2093	2118	2140	2152	2160	2167
345	2095	2107	2130	2152	2164	2171	2178



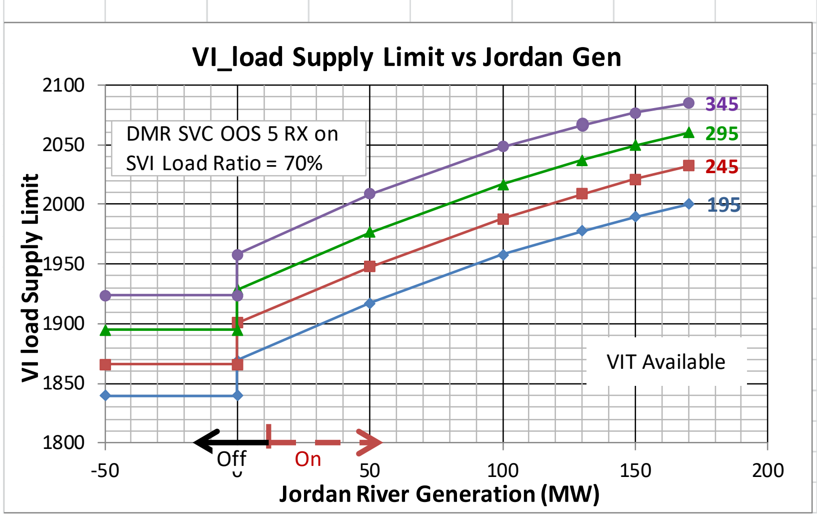
Load Ratio:		60.0%					
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1996	2025	2062	2094	2109	2118	2127
245	2028	2055	2088	2117	2132	2141	2150
295	2054	2076	2108	2136	2150	2159	2168
345	2076	2097	2127	2153	2167	2176	2185



Load Ratio:		65.0%					
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1920	1952	1999	2037	2055	2065	2074
245	1951	1985	2030	2065	2082	2091	2099
295	1980	2017	2059	2092	2106	2114	2120
345	2011	2044	2084	2115	2129	2137	2143

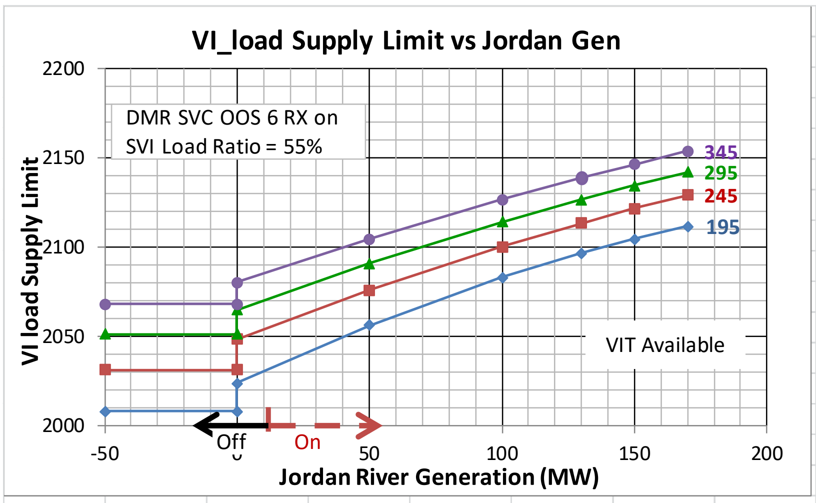


Load Ratio:		66.6%					
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1895	1928	1974	2014	2034	2046	2057
245	1927	1959	2008	2047	2065	2076	2084
295	1955	1987	2038	2076	2092	2101	2107
345	1985	2020	2060	2097	2118	2131	2144



Load Ratio:		70.0%					
VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1839	1869	1917	1958	1978	1990	2000
245	1866	1900	1948	1988	2009	2021	2032
295	1894	1928	1977	2017	2037	2050	2060
345	1924	1958	2009	2048	2067	2077	2085

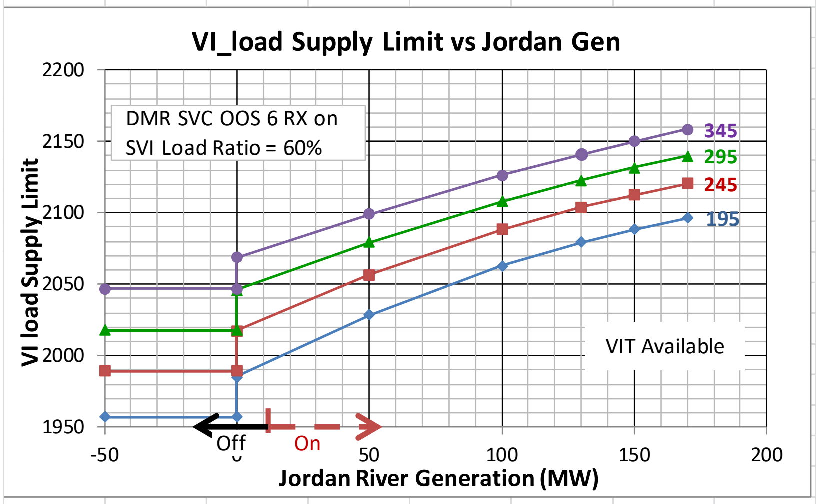
A5.30 SVC OOS with 6-5RX online



OOS: DMR SVC OOS with 6 RX on

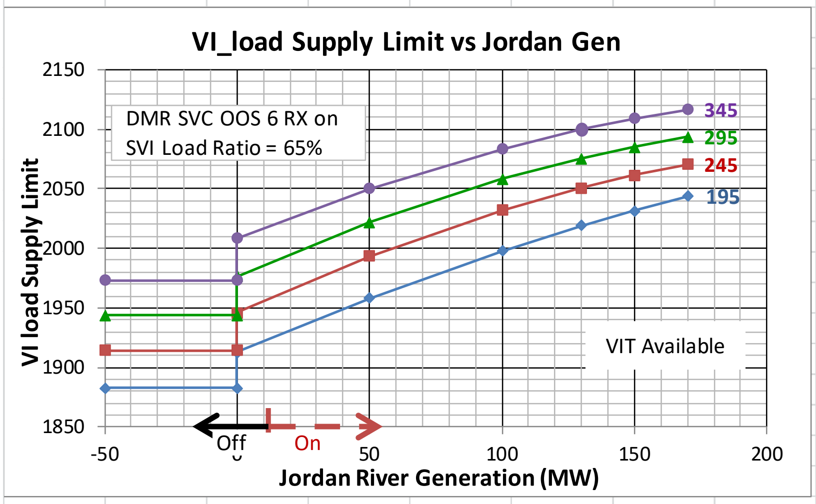
Load Ratio: **55.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	2008	2024	2056	2083	2097	2105	2112
245	2031	2048	2076	2100	2114	2122	2129
295	2052	2065	2091	2114	2127	2135	2142
345	2068	2080	2105	2127	2139	2146	2154



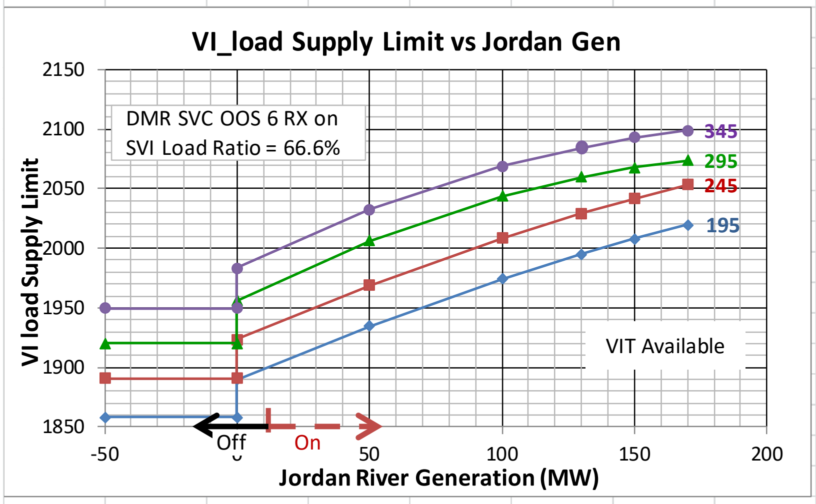
Load Ratio: **60.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1957	1985	2029	2063	2079	2089	2096
245	1989	2017	2057	2088	2104	2113	2120
295	2018	2046	2079	2108	2123	2132	2140
345	2047	2069	2099	2126	2141	2150	2158



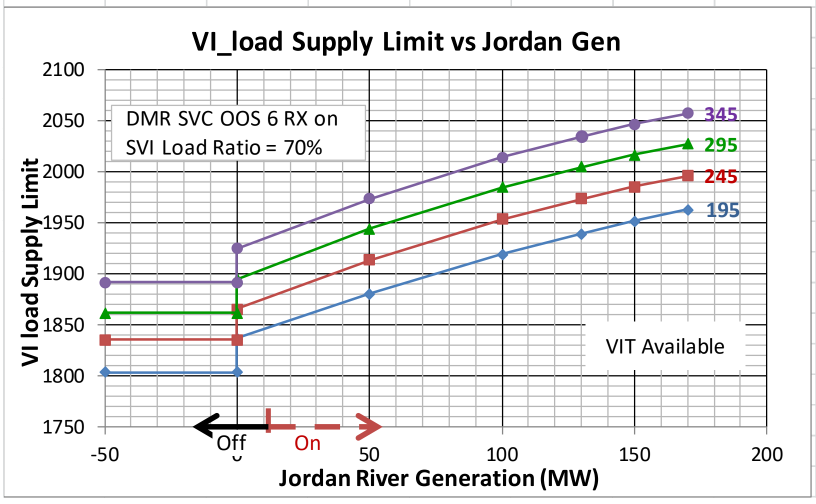
Load Ratio: **65.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1883	1913	1958	1998	2019	2032	2044
245	1914	1946	1993	2032	2051	2061	2071
295	1944	1976	2022	2058	2076	2085	2094
345	1973	2008	2050	2084	2100	2109	2117



Load Ratio: **66.6%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1858	1890	1935	1974	1995	2008	2020
245	1891	1923	1969	2009	2029	2042	2053
295	1920	1956	2007	2044	2060	2068	2074
345	1950	1984	2032	2069	2085	2093	2099



Load Ratio: **70.0%**

VIT VAR	Jordan Gen						
	off	0	50	100	130	150	170
195	1804	1837	1881	1919	1939	1952	1963
245	1836	1866	1913	1953	1974	1986	1996
295	1862	1895	1944	1985	2005	2017	2027
345	1892	1925	1974	2014	2035	2046	2057