Outage Types & Entering Tickets

PJM State & Member Training Dept.

Objectives

Students will be able to:

- Describe the outage reporting process & requirements

eDART

- eDART stands for Dispatcher Applications and Reporting Tool
- The eDART application provides communications with PJM Generation Operators regarding:
  - unit outage requests
  - updates to reactive capability curves (D-curves)
  - and voltage regulator statuses among other generation and transmission functionalities

Business Rules

- PJM Members can request outages via the Gen. Ticket eDART tool
  - All outage requests are analyzed together, and PJM only rejects outage requests when they affect the reliability of the PJM RTO
  - It is the responsibility of each PJM Member to determine its own best outage schedule
  - Outage requests are honored by PJM on a first-come first-serve basis

Business Rules

- Where a user is required to give PJM verbal notification, the following PJM personnel should be contacted:
  - Master Coordinator
    - All Outages
    - Clearing of Outage Tickets
  - Generation Dispatcher
    - Outages of units on-line or scheduled to come on-line
- Generation Outages fall into the following categories:
  - Forecasted Planned/ Planned
  - Maintenance
  - Unplanned

Forecasted Planned/ Planned Outage

- The initial Planned outage request has to be submitted to PJM no later than 30 days prior to the Operating Day
- If the outage start date is greater than 31 days in the future, it is classified as a "Forecasted Planned" outage
- Every evening the eDART system will automatically change the status of all "Forecasted Planned" outages due to start in less than 31 days to "Planned" outages
- Once the ticket is changed to "Planned," and has a status of approved, a reduction revision can be submitted, but only to decrease the amount of reduction
- The Start date of a Planned ticket can only be increased (and no more than 30 days into the future)
- The End date can also be changed

Forecasted Planned/ Planned Outage

- An approved Planned outage may be rescheduled within the 30 day timeframe of approval only if it is approved by PJM, but once an approved Planned outage is moved, it becomes “Unplanned” and cannot be extended past the original timeframe
- Other than cancellation, no other changes can be made
- The approval process involves checking for conditions such as violation of Black Start power failure solution and Reliability scenarios, availability of adequate reserves and whether the outage is scheduled during the Peak Period Maintenance season, which occurs from the 24th Wednesday of the calendar year through the 36th Wednesday of the same year

*(Note: Only Hydro plants can schedule Forecasted Planned outages during the Peak Period Maintenance season)

Forecasted Planned/ Planned Outage

- A Planned outage is in Black Start Scenario violation if a station already has an outage for a critical Black Start unit during the same period
  - However a Generation Owner may substitute another black start unit (currently not designated as critical) at a plant (on the same voltage level) for a black start unit that is on a planned outage to allow a concurrent planned outage of another critical black start unit at a plant to begin
  - This substituted unit must have a valid black start test within the last 13 months to be considered as an eligible substitution
- If the request is denied, members re-evaluate their Planned outage schedule and submit a new outage request
  - This process is repeated until the request submitted is acceptable
- PJM may withdraw its approval for a Planned outage by notifying members at least 24 hours in advance in order to ensure the adequacy of reserves or the reliability of the PJM RTO

Forecasted Planned/ Planned Outage

- A Planned Outage Extension is the extension beyond the originally estimated completion date which can only be used in instances when the original scope of work requires more time to complete than originally scheduled, and not when unexpected problems or delays are encountered
  - The request for a Planned Outage Extension must be submitted via eDART at least 48 hours before the end date of the outage

Maintenance Outages

- Maintenance outages may occur throughout the year, have flexible start dates, are much shorter than Planned outages, and have a predetermined duration established at the start of the outage
  - A Maintenance outage is an outage that may be deferred beyond the next weekend (It is an outage that can be postponed to the following Monday morning [0800 hrs])
  - The duration of a Maintenance outage is generally unlimited except during the PJM Peak Period Maintenance *(PPM) Season, during which approved Maintenance outages will be limited to a maximum duration of 9 consecutive days, 5 weekdays plus the included weekends
    - The Weekend Period is defined from Friday at 2200 hrs to Monday at 0800 hrs

* Peak Period Maintenance (PPM) shall be defined as those weeks containing the 24th through the 36th Wednesdays of a calendar year. Each such week shall begin on a Monday and end on the following Sunday, except for the week containing the 36th Wednesday, which shall end on the following Friday

Maintenance Outages

- A Maintenance outage Extension is an extension beyond the originally estimated completion date which can only be used in instances when the original scope of work requires more time to complete than originally scheduled
  - Not when unexpected problems or delays are encountered
  - The request for a Maintenance outage Extension must be submitted before the original end date
- If a Maintenance outage is extended beyond 9 days in PPM season, it becomes an "Unplanned" outage

Maintenance Outages

- If a company requests a Maintenance outage during the Peak Period Maintenance Season, and PJM denies the outage, and the company decides to take the outage anyway, the following rules apply:
  - The company has the option to enter the outage as an "Unplanned outage" or a "Maintenance outage"
  - If the company does not enter an "Unplanned outage" and opts to take an "unapproved" Maintenance outage, the "Peak Period Maintenance Compliance Penalty" will be assessed*
  - If the company enters an "Unplanned outage," the "Peak Period Maintenance Compliance Penalty" will not be assessed but the Unplanned outage will affect the unit's EFORd (Equivalent Forced Outage Rate)
    - EFORd will affect the capacity value for the unit (RPM)

For reference, the formula for the "Peak Period Maintenance Compliance Penalty" is as follows:
(Weighted Average Resource Clearing Price + the higher of (.2 * Weighted Average Resource Clearing Price or $20/MW-Daily) multiplied by (Daily Peak Season Maintenance Shortfall for RPM Resource Commitments * (1-Effective EFORd)) and also could affect the unit's EFORp

Unplanned Outages

- In case of an Unplanned Outage, members are expected to do the following:
  - Advise PJM of the Unplanned Outage suffered or anticipated as promptly as possible, provide a verbal notification to the PJM Generation Dispatcher
  - Provide PJM with the expected date and time that the resource will be made available
  - Make and submit to PJM a record of the events and circumstances giving rise to the Unplanned outage using eDART
  - An unplanned outage will also affect the EFORd

EFORD Calculation

FORCED OUTAGE RATE CALCULATION

The equivalent demand forced outage rate ("EFORD") shall be calculated as follows:

EFORD (%) = {(ff * FOH + fp * EFPOH) / (SH + ff * FOH)} * 100

Where

ff = full outage factor

fp = partial outage factor

FOH = full forced outage hours

EFPOH = equivalent forced partial outage hours

SH = service hours

Value of Generation Resource

Calculated based on Unforced Capacity (UCAP)

Unforced Capacity Value of Unit X	=	**SUMMER** Installed Capacity (ICAP) Rating	*	(1 – EFORd*)
For Example: 96 MW	=	100 MW	*	(1 – .04)

Unforced Capacity Value For Unit X = 96 MW

**EFORd = Equivalent Forced Outage Rate*

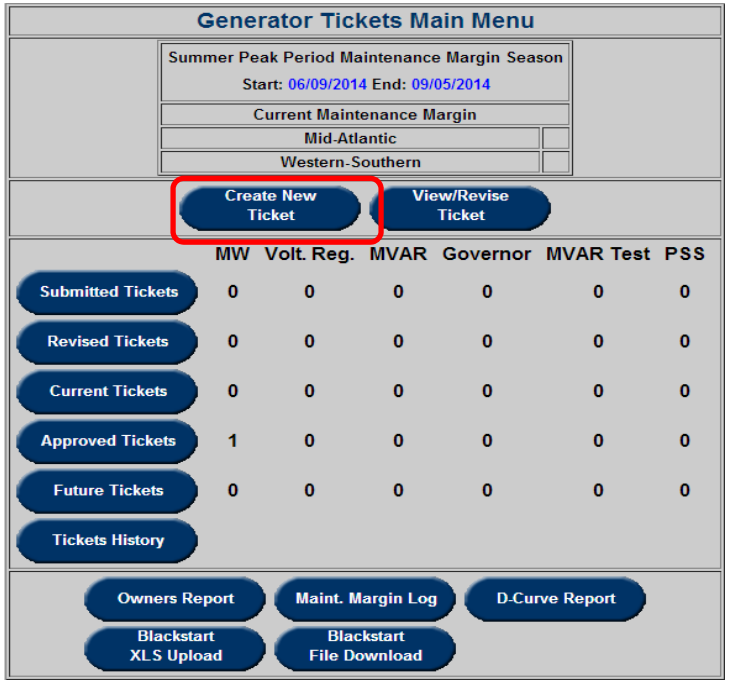
Entering Tickets

Creating a Generation Ticket

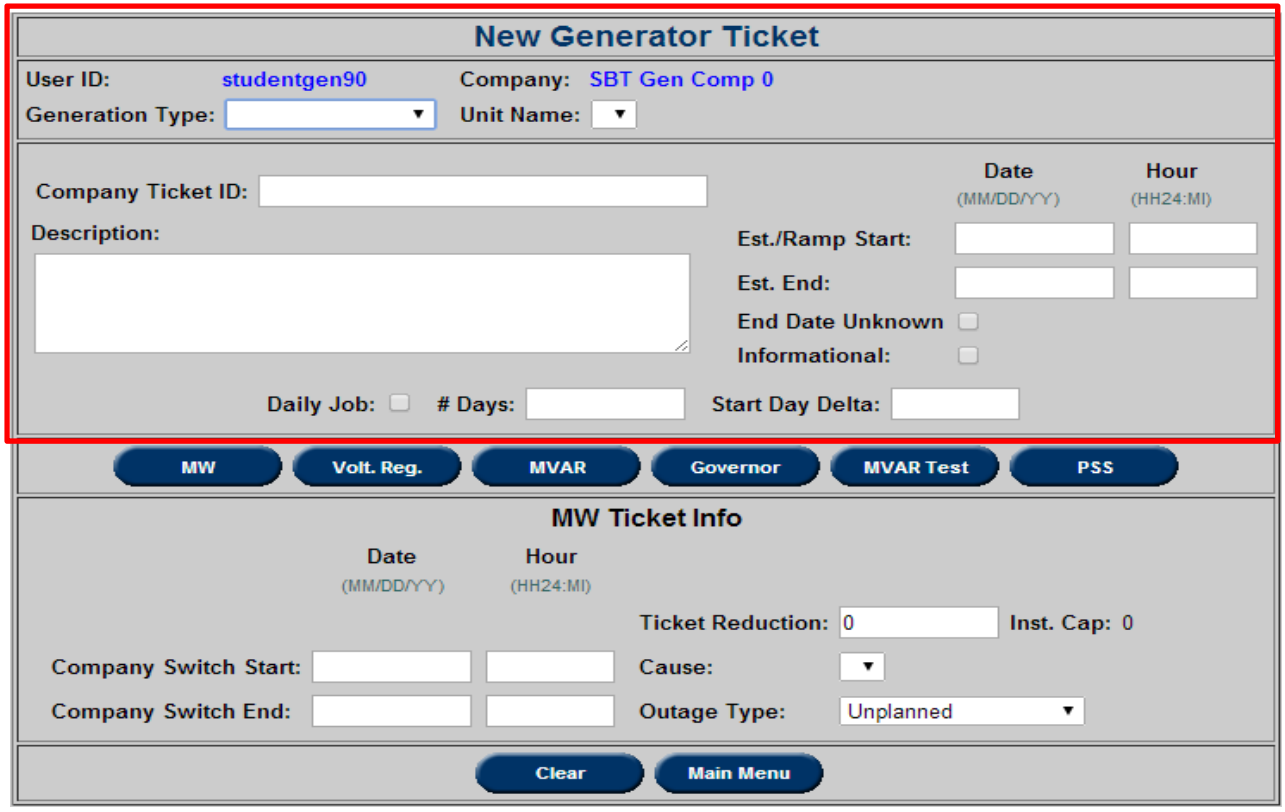
- PJM Members can request outages via the Gen. Ticket eDART tool
  - All outage requests are analyzed together, and PJM only rejects outage requests when they affect the reliability of the PJM RTO
  - It is the responsibility of each PJM Member to determine its own best outage schedule
  - Outage requests are honored by PJM on a first-come first-serve basis

Creating a Generation Ticket

- Tickets can be created for 6 types of Generator outages:
  - Generator Megawatt (MW) Outages
  - Voltage Regulator Outages
  - MVAR Capability Changes
  - Governor Outages
  - MVAR Test
  - Power System Stabilizer (PSS) Outages



Creating a Generation Ticket



Ticket fields

- The **User** and **Company** fields are system generated tags identifying the ticket's submitter and which company the user represents
- **Generation Type**: The generation type includes the options Combined Cycle, Diesel/CT, Diesel/CT (small unit), Geothermal, Hydro, Hydro – pumped storage, Nuclear, Nug, Solar, Fossil/Steam and Wind and refers to the method of generation the unit uses

Ticket fields

- **Unit Name**: Select unit from the drop-down menu based on the type already selected
- **Company Ticket ID**: Optional field for the company's internal application ticket number, the ticket's submitter should review their own company policy to see if they should utilize this field
- **Description**: Brief work description. In Unplanned outages and Emergency cases, this field should always provide information on the circumstance resulting in the outage

Ticket fields

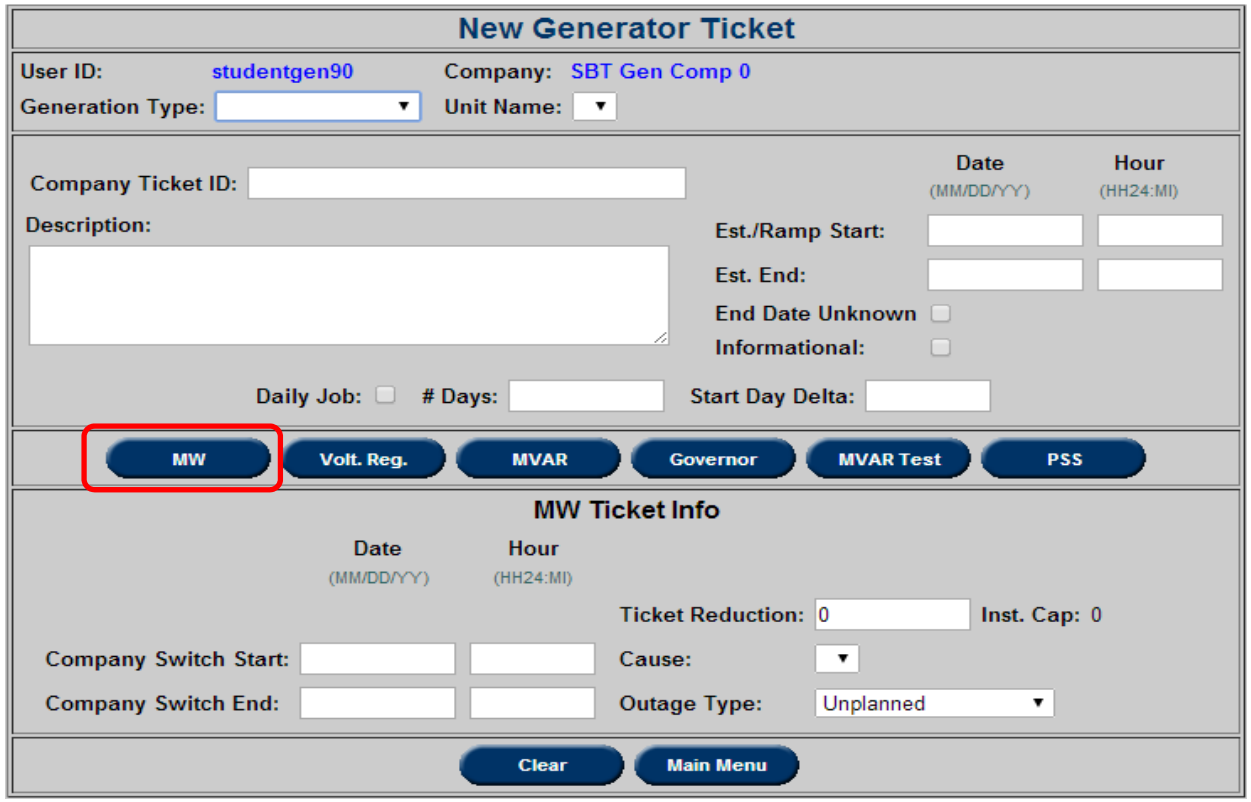
- **Est. /Ramp Start**: Proposed ticket start date and time. All times should be entered in MM/DD/YY and HH24:MI (or 24 hour “military” style time). Ramp Start times are designed mainly for larger units, which could take hours to come off line
- **Est. End**: Proposed ticket end date and time. Mandatory for “Forecasted Planned” and “Maintenance” outages
- **End Date Unknown**: Can only be selected for “Unplanned” MW outages, or for MVAR “New Default” tickets

Ticket fields

- **Informational:** Indicates that outage is “Info-only” (MW Reduction = 0)
  - Only valid for Maintenance outages.
- **Daily Job**: Check this box to designate whether a ticket will be a multiple day, multiple ticket outage
- **# Days**: Enter the total number of days of labor require for the job
- **Start Day Delta**: Enter the number of days separating each day of labor. If the job will occur on consecutive days, enter “1”

Outage Ticket Types

Creating a MW (Real Power) Ticket



MW Ticket fields

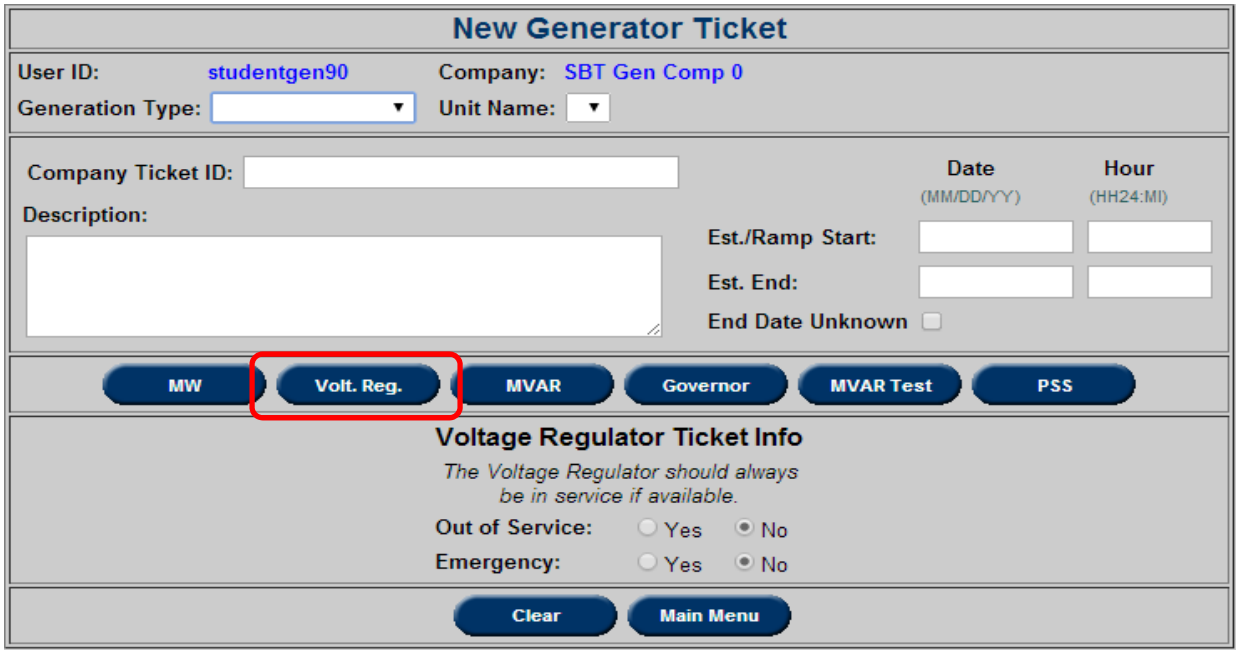
- **Company Switch Start Date and Hour**: Actual outage start date and time. Cannot be before the Est./Ramp Start time or 2 hours later than the Est./Ramp Start time
- **Company Switch End Date and Hour**: Actual outage End date and time. Must be entered no later than 2 hours after the Est. End time
- **Ticket Reduction**: MW Reduction value. Cannot be zero for non-Informational tickets. Can be negative only if the “Cause” is Ambient Air and the “Outage Type” is Maintenance
- **Inst. Cap.**: Installed capacity for the unit selected on the ticket
- **Cause**: Reason for outage. Cannot be “Not Applicable.” If cause is “Other,” it is necessary to provide more information in the Description
- **Outage Type**: Unplanned, Maintenance or Forecasted Planned

Cause Types

- The following cause types are available for Generator MW tickets
- Voltage Regulator, MVAR, Governor, MVAR Test, and PSS tickets do not have a corresponding cause type

Cause ID Description		
1 Air Heater	20 Feed Pump	39 Testing
2 Annual Inspections	21 Fuel Problem	40 Transformer Problem
3 Annual Inspections/Refuel	22 Fuel System	41 Transformer Problems
4 Boiler Feed Pumps	23 General Maintenance	42 Transformer Work
5 Boiler Work	24 Ground Problem	43 Transmission
6 Breaker Problems	25 Inspections	44 Transmission Line
7 Breaker Work (Maintenance)	26 Mill Problem	45 Transmission Problem
8 Chemistry Problem	27 Mill Work	46 Tube Leak
9 Clean Intakes	28 No Fuel	47 Turbine Repair
10 Coal Feeder	29 Opacity	48 Turning Gear
11 Condenser System	30 Other	49 Unit Trip
12 Diver Safety	31 Precipitator	50 Unknown
13 Electrical	32 Pump Work/Problem	51 Vibrations
14 Emissions	33 Rampdown	52 Water Chemistry
15 Engine Repair	34 Rod Pattern Adjustments	53 Wicket Gate
16 Engine Work	35 Rod Swap	54 Ambient Conditions
17 Environmental	36 SCRAM Test	60 Ambient Conditions (Auto App.)
18 Fan Problem	37 Start Failure	
19 Fan Work	38 Substation/Yard	

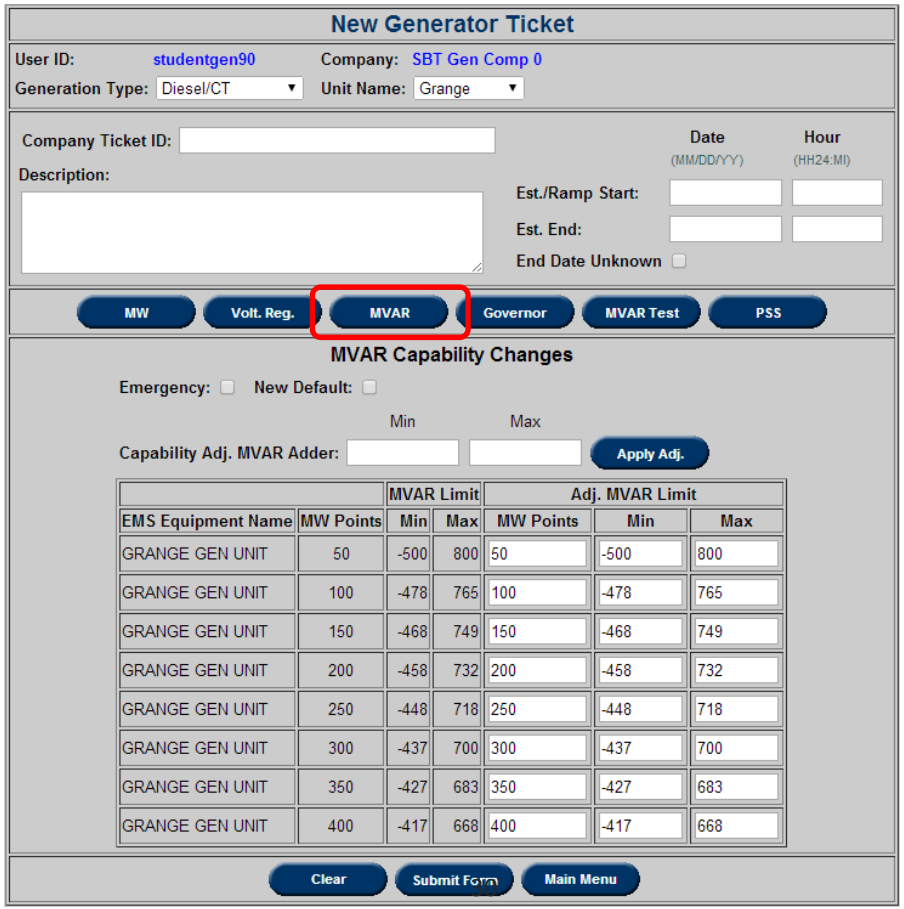
Creating a Voltage Regulator Ticket



Volt. Reg. Ticket fields

- **Out of Service**: Indicates if the Voltage Regulator is Out of Service
- **Emergency**: Indicates if it is an Emergency outage

Creating a MVAR (Reactive Power) Ticket



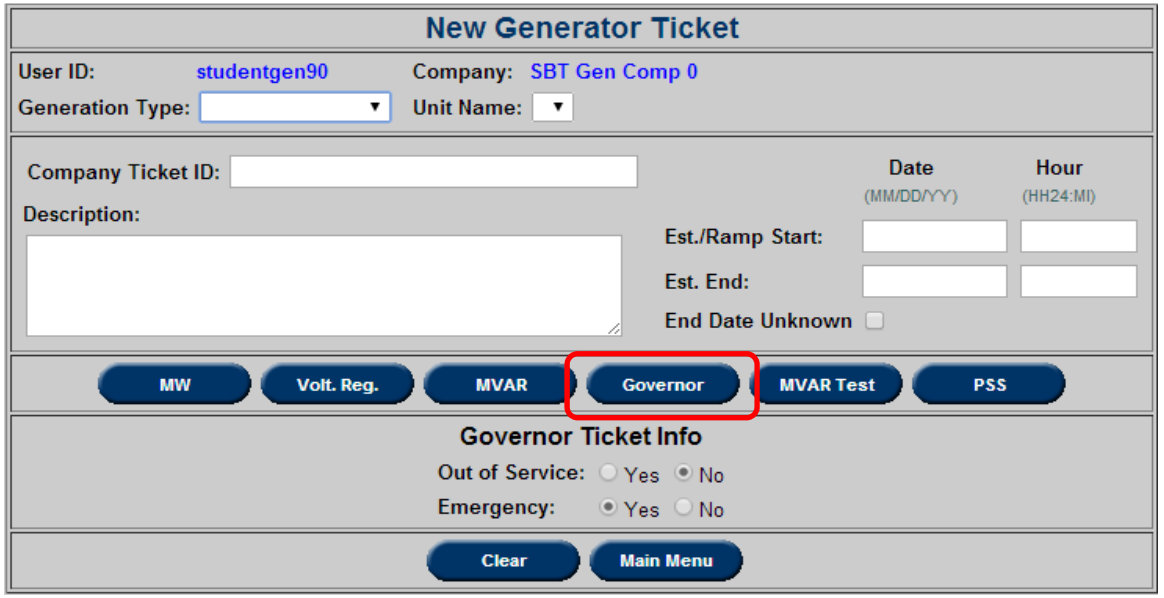
MVAR Ticket fields

- **Emergency:** Indicates if it is an Emergency outage. Only applies if the change was unplanned
- **New Default:** Indicates that the change to the D-curve is permanent and will be used as the default going forward
- **Capability Adj. MVAR Adder:** Add or subtract a value from all entries at once rather than changing values individually to shift the entire D-curve
- **Max:** MVAR Max values should decrease or stay constant as MW Point value increases
- **Min:** MVAR Min values should increase or stay constant as MW Point value increases

MVAR Ticket fields

- **Apply Adj.:** Apply adder value to MVAR values
- **MVAR Limit:** The Min and Max columns under MVAR Limit display the existing minimum and maximum values respectively
- **Adjusted MVAR Limit:** The MW points and the Min and Max columns under the Adjusted MVAR Limit field display the new values after the adder is applied

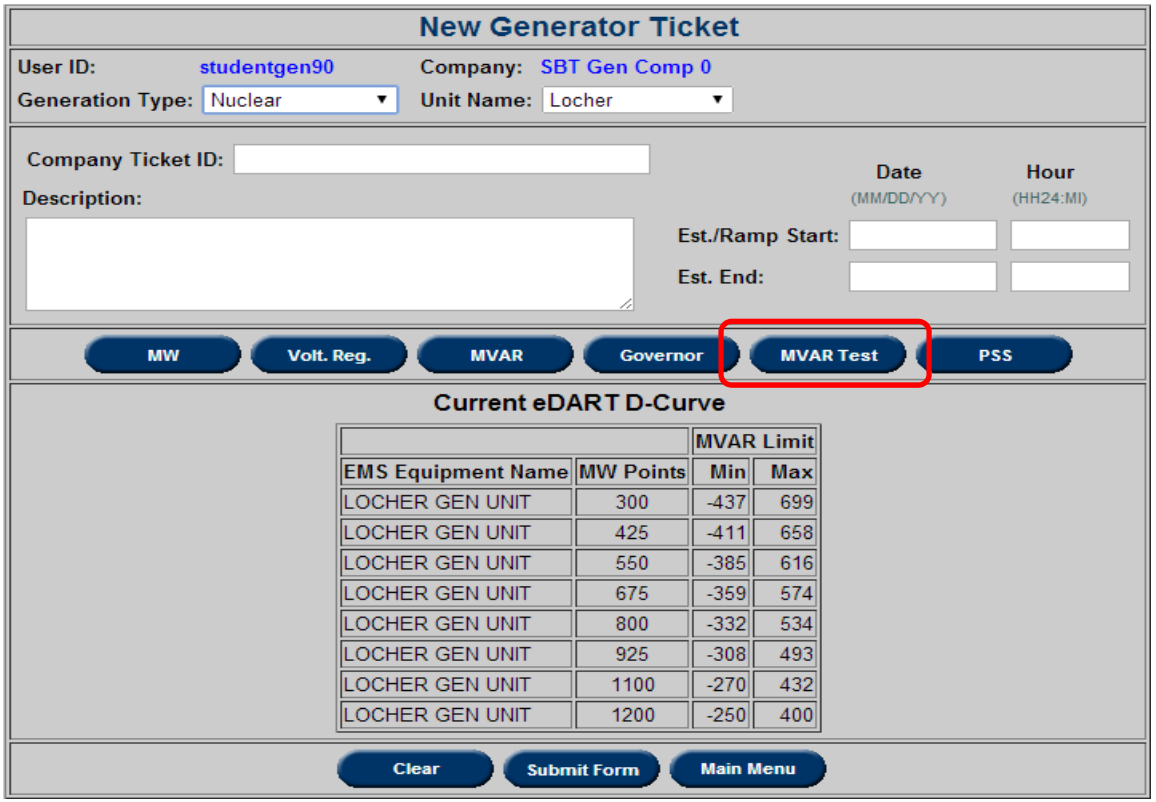
Creating a Governor Ticket



Governor Ticket fields

- **Out of Service**: Use this field to indicate if the governor is Out of Service
- **Emergency**: Use this field to indicate if it is an Emergency outage

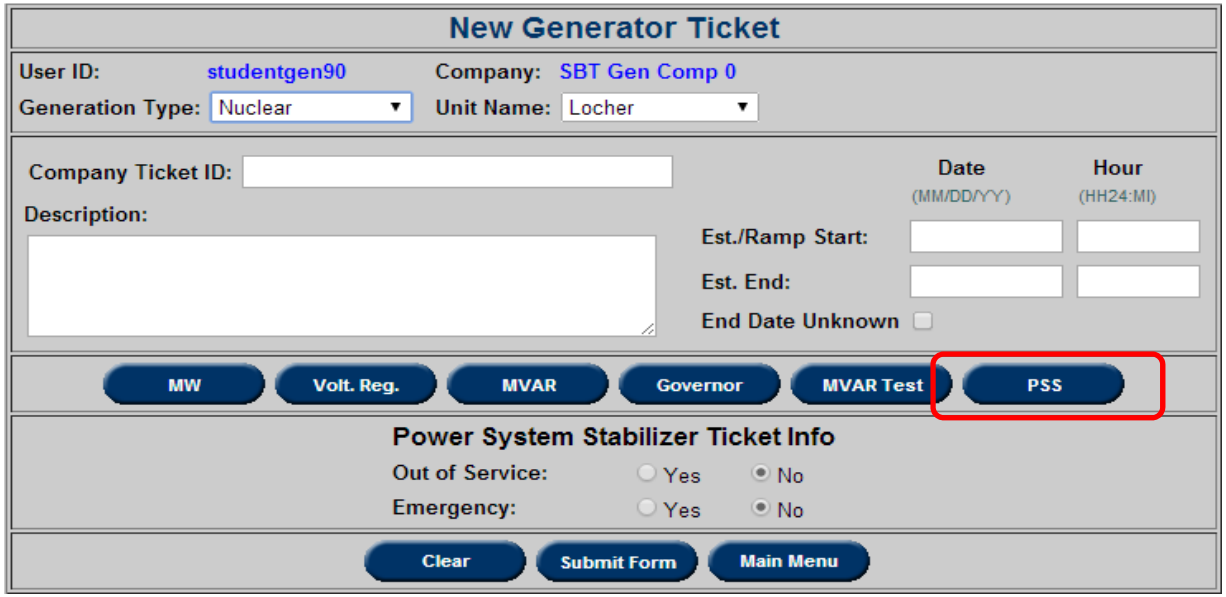
Creating a MVAR Test (Reactive Power Test) Ticket



MVAR Test Ticket fields

- **Current eDART D-curve**: This table displays the current D-Curve data for reference

Creating a Power System Stabilizer (PSS) Ticket

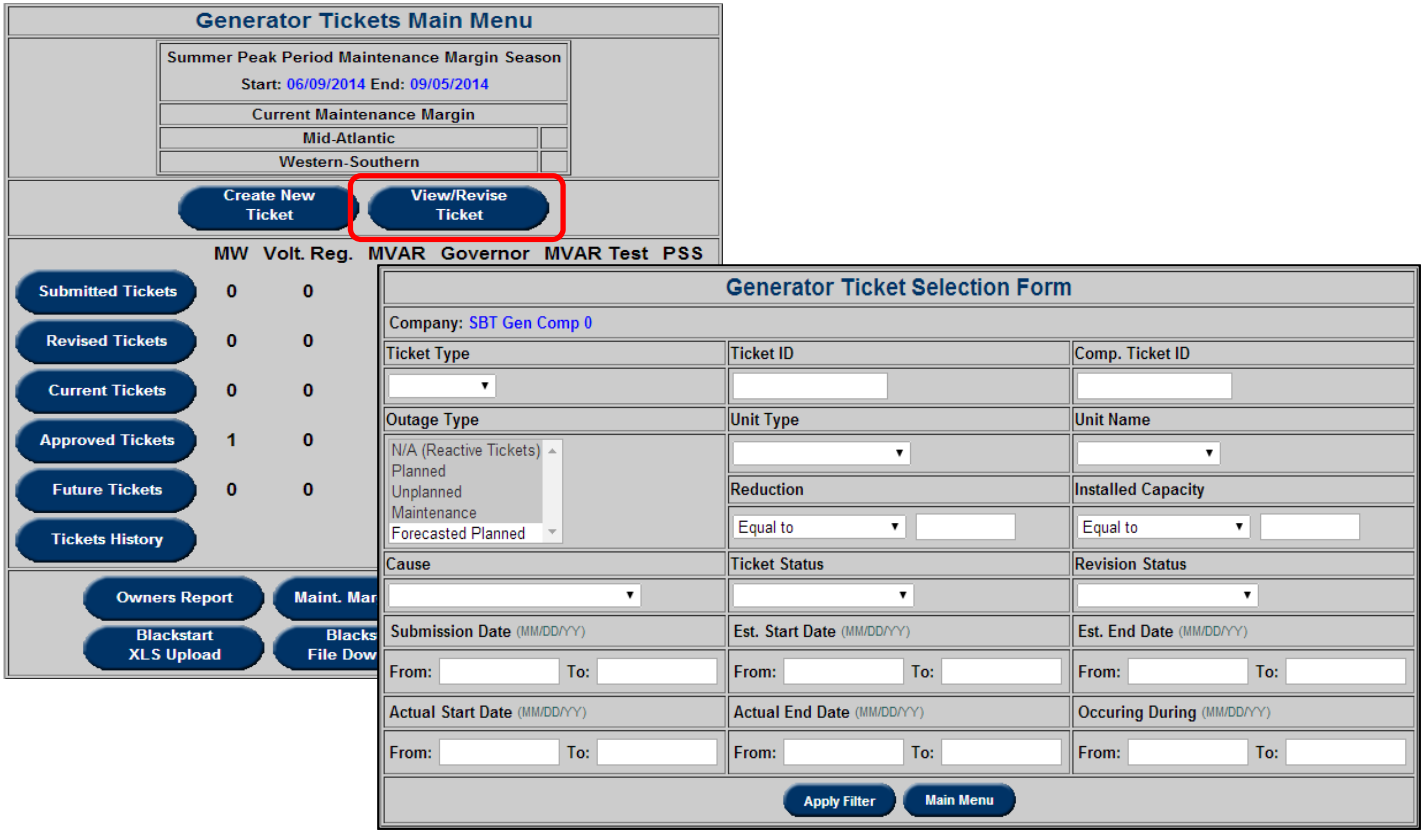


PSS Ticket fields

- **Out of Service**: Use this field to indicate if the PSS is Out of Service
- **Emergency**: Use this field to indicate if it is an Emergency outage

Revising Tickets & Ticket Status

View/Revise a Generation Ticket



View/Revise a Generation Ticket

Generator Tickets

Apply Sorting | Go to Filter

Ticket ID	Comp.Ticket ID	Ticket Type	Outage Type	Submittal Date	Unit Name	MW Reduction	Status
1							
973174		MW	Unplanned	02/12/2014	External 2	24	Approved
975820		Governor	N/A	08/01/2014	External 3		Submitted
975821		MVAR	N/A	08/01/2014	External 4		Submitted
975822		MVAR Test	N/A	08/01/2014	External 1		Submitted
975823		PSS	N/A	08/01/2014	Amus		Submitted
975824		Volt. Reg.	N/A	08/01/2014	Locher		Submitted

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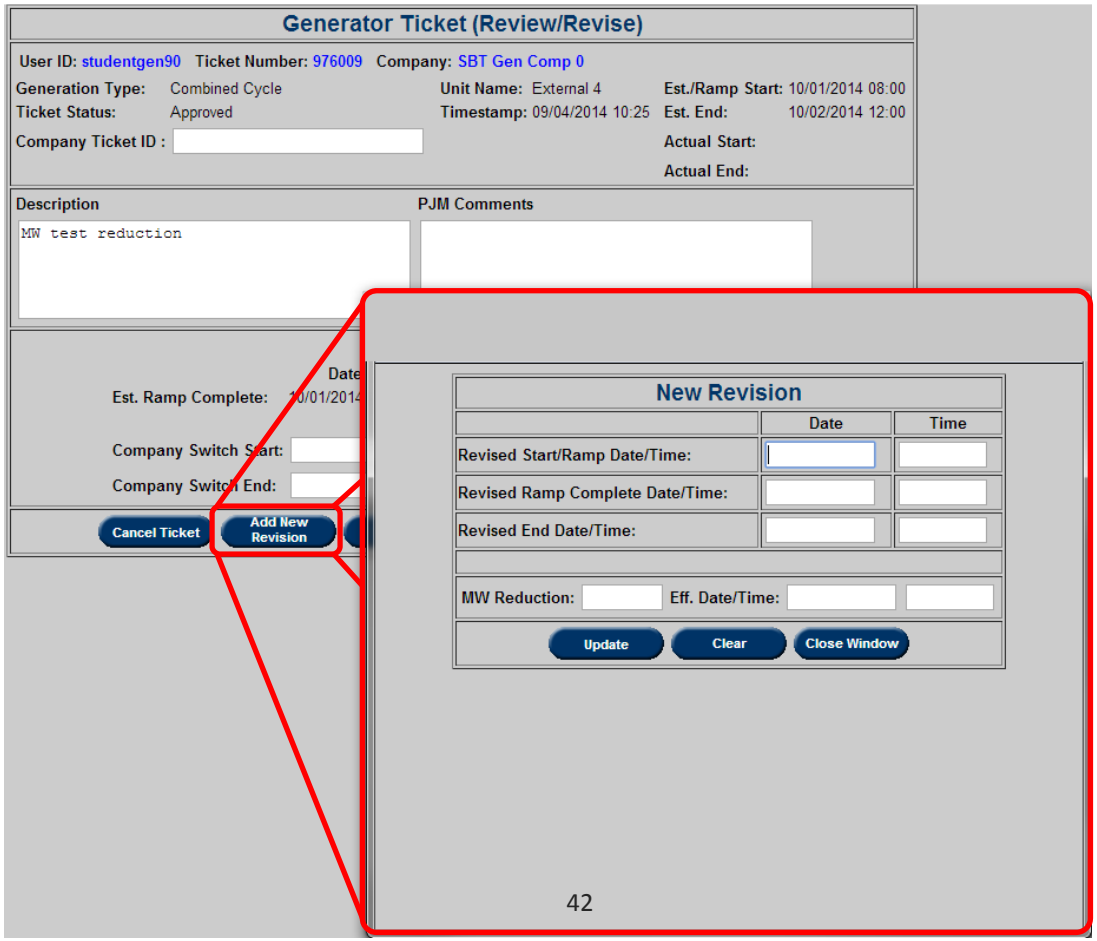
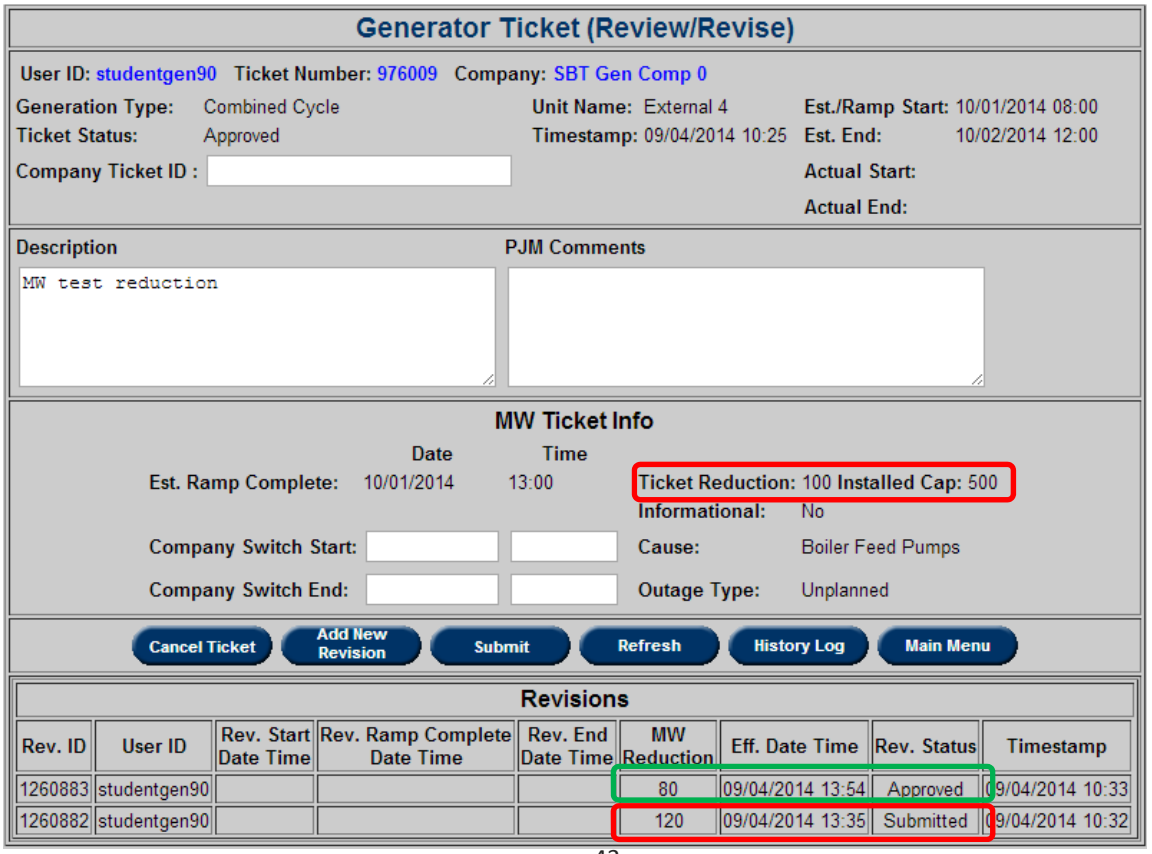
View/Revising a MW (Real Power) Ticket



View/Revising a MW (Real Power) Ticket



Generator Ticket (Review/Revise)

User ID: studentgen90 Ticket Number: 976009 Company: SBT Gen Comp 0

Generation Type: Combined Cycle
Ticket Status: Approved
Company Ticket ID :

Unit Name: External 4
Timestamp: 09/04/2014 10:25

Est./Ramp Start: 10/01/2014 08:00
Est. End: 10/02/2014 12:00
Actual Start:
Actual End:

Description: MW test reduction

PJM Comments:

MW Ticket Info

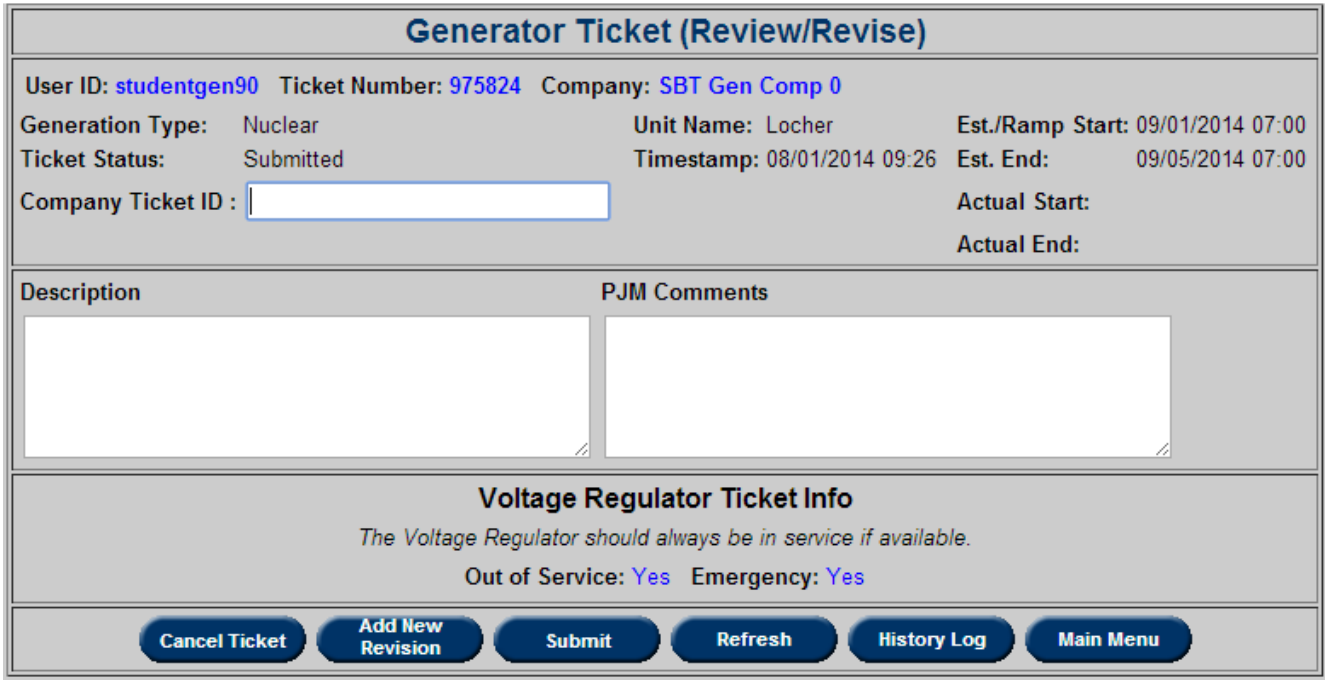
	Date	Time		
Est. Ramp Complete:	10/01/2014	13:00	Ticket Reduction: 100 Installed Cap: 500	
			Informational:	No
Company Switch Start:			Cause:	Boiler Feed Pumps
Company Switch End:			Outage Type:	Unplanned

Cancel Ticket | Add New Revision | Submit | Refresh | History Log | Main Menu

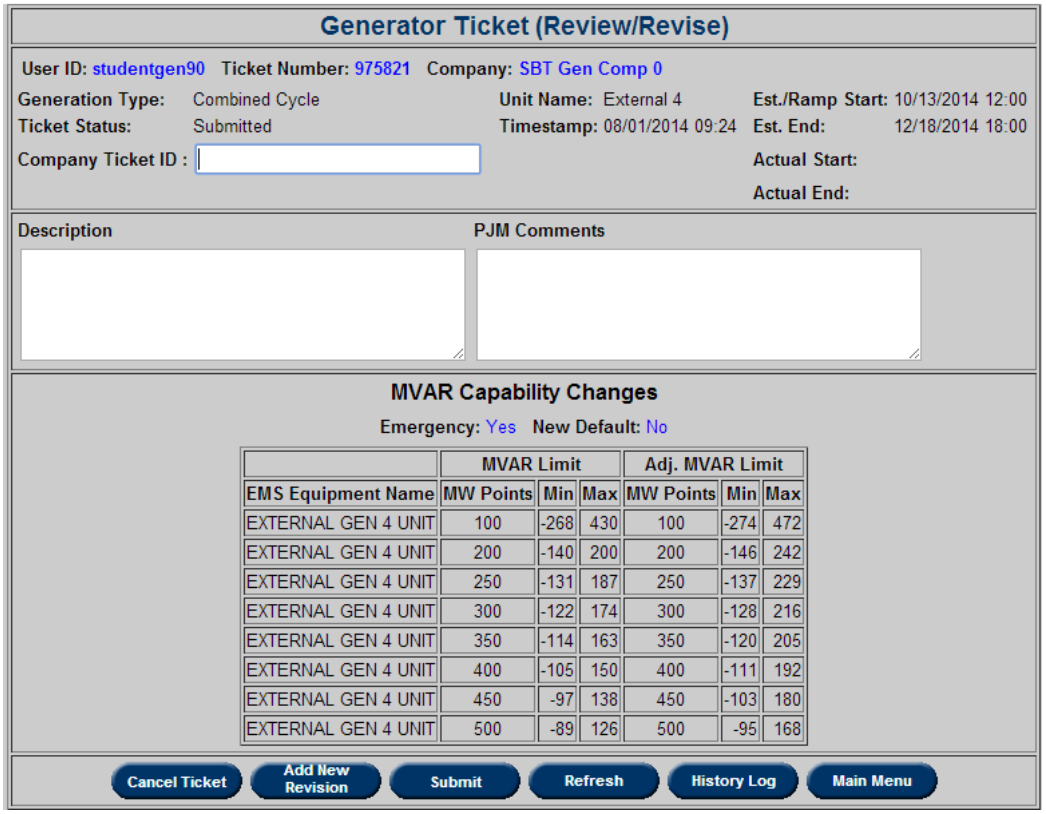
Revisions

Rev. ID	User ID	Rev. Start Date Time	Rev. Ramp Complete Date Time	Rev. End Date Time	MW Reduction	Eff. Date Time	Rev. Status	Timestamp
1260883	studentgen90				80	09/04/2014 13:54	Approved	09/04/2014 10:33
1260882	studentgen90				120	09/04/2014 13:35	Submitted	09/04/2014 10:32

View/Revising a Voltage Regulator Ticket



View/Revising a MVAR (Reactive Power) Ticket



Generator Ticket (Review/Revise)

User ID: studentgen90 Ticket Number: 975821 Company: SBT Gen Comp 0

Generation Type: Combined Cycle
Ticket Status: Submitted
Company Ticket ID :

Unit Name: External 4
Timestamp: 08/01/2014 09:24

Est./Ramp Start: 10/13/2014 12:00
Est. End: 12/18/2014 18:00
Actual Start:
Actual End:

Description

PJM Comments

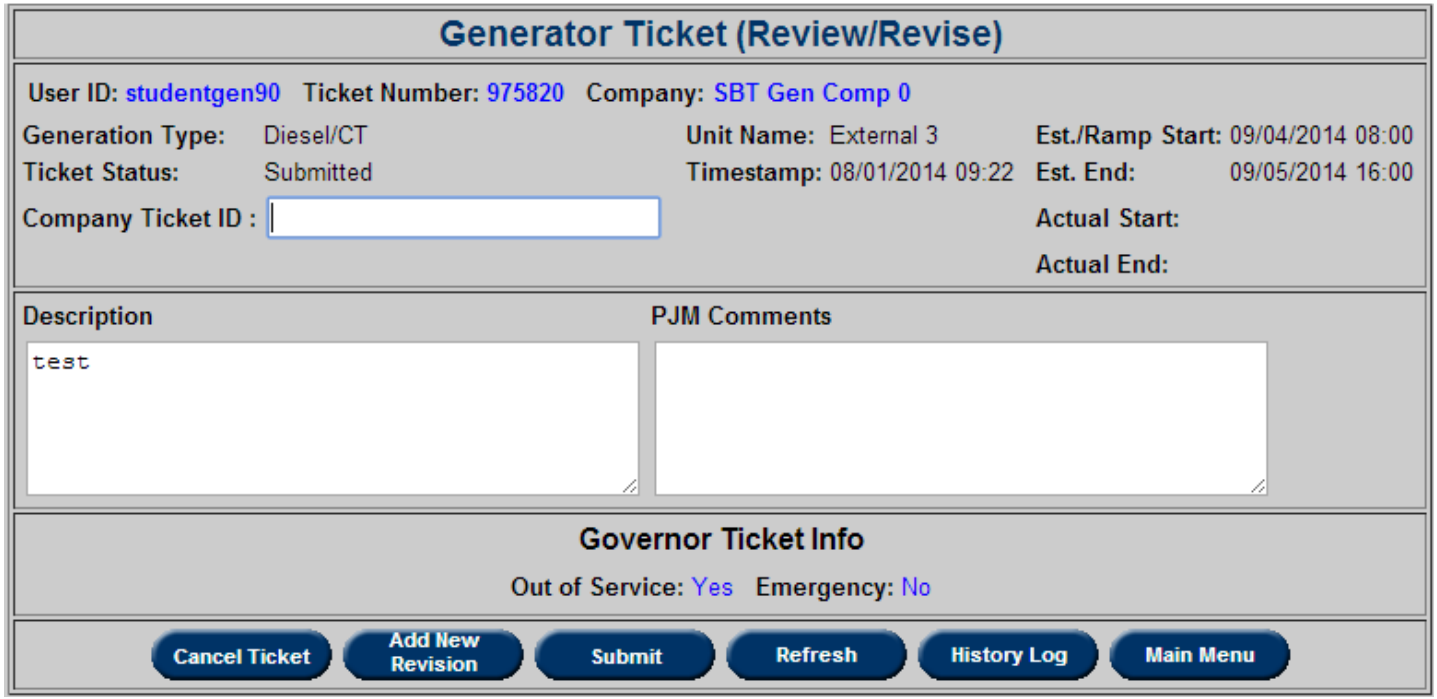
MVAR Capability Changes

Emergency: Yes New Default: No

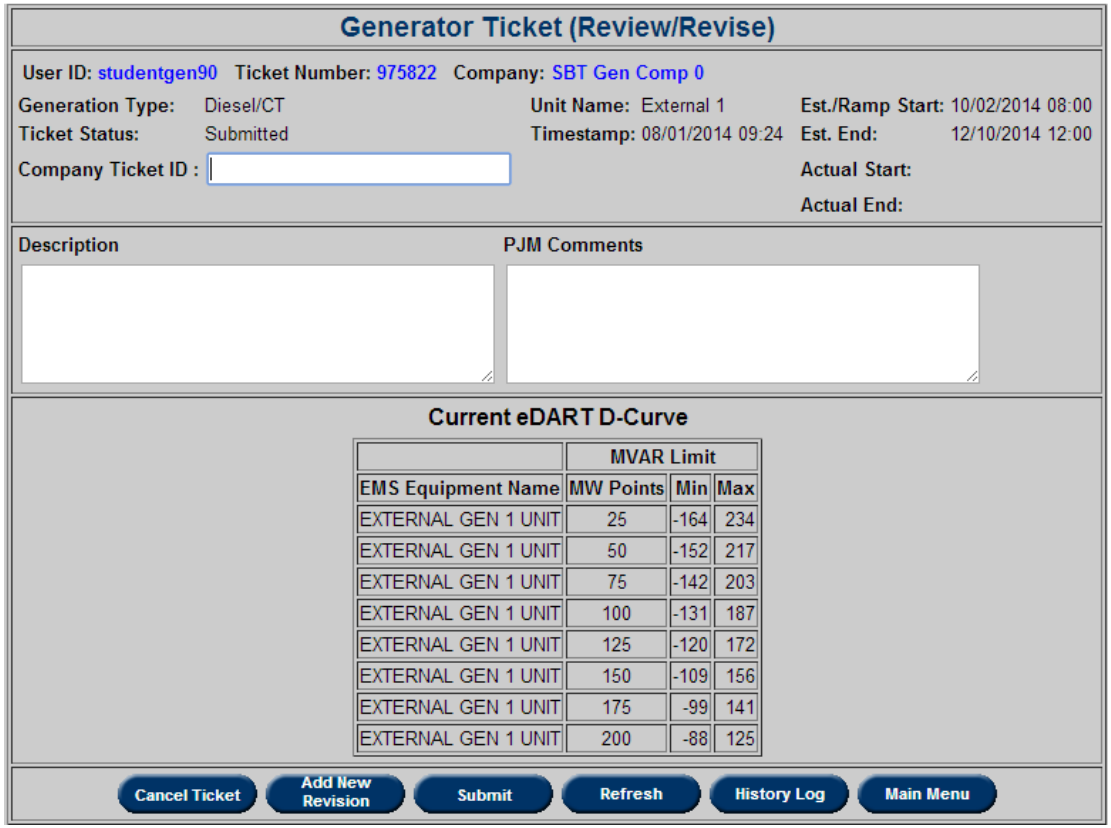
	MVAR Limit			Adj. MVAR Limit		
EMS Equipment Name	MW Points	Min	Max	MW Points	Min	Max
EXTERNAL GEN 4 UNIT	100	-268	430	100	-274	472
EXTERNAL GEN 4 UNIT	200	-140	200	200	-146	242
EXTERNAL GEN 4 UNIT	250	-131	187	250	-137	229
EXTERNAL GEN 4 UNIT	300	-122	174	300	-128	216
EXTERNAL GEN 4 UNIT	350	-114	163	350	-120	205
EXTERNAL GEN 4 UNIT	400	-105	150	400	-111	192
EXTERNAL GEN 4 UNIT	450	-97	138	450	-103	180
EXTERNAL GEN 4 UNIT	500	-89	126	500	-95	168

Cancel Ticket | Add New Revision | Submit | Refresh | History Log | Main Menu

View/Revising a Governor Ticket



View/Revising a MVAR Test (Reactive Power Test) Ticket



Generator Ticket (Review/Revise)

User ID: studentgen90 Ticket Number: 975822 Company: SBT Gen Comp 0

Generation Type: Diesel/CT
Ticket Status: Submitted
Company Ticket ID :

Unit Name: External 1
Timestamp: 08/01/2014 09:24

Est./Ramp Start: 10/02/2014 08:00
Est. End: 12/10/2014 12:00
Actual Start:
Actual End:

Description

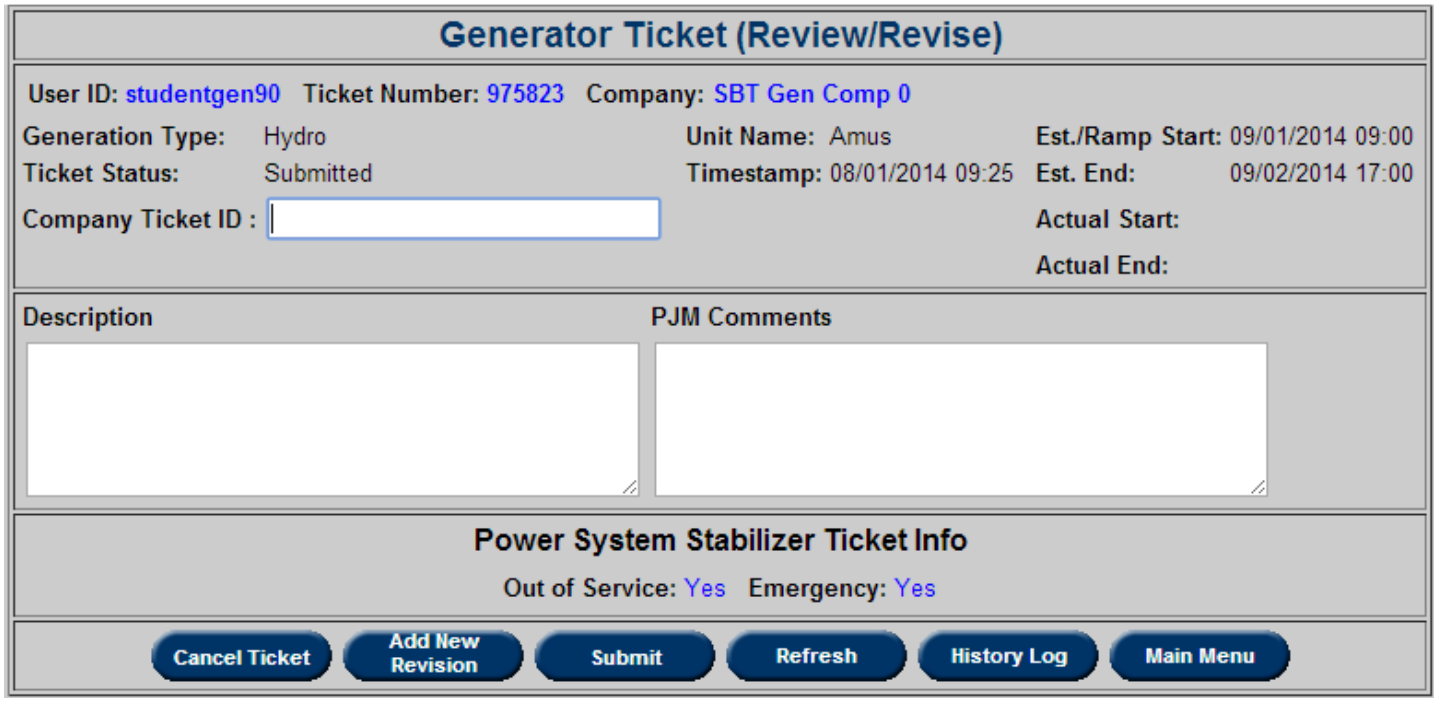
PJM Comments

Current eDART D-Curve

	MVAR Limit		
EMS Equipment Name	MW Points	Min	Max
EXTERNAL GEN 1 UNIT	25	-164	234
EXTERNAL GEN 1 UNIT	50	-152	217
EXTERNAL GEN 1 UNIT	75	-142	203
EXTERNAL GEN 1 UNIT	100	-131	187
EXTERNAL GEN 1 UNIT	125	-120	172
EXTERNAL GEN 1 UNIT	150	-109	156
EXTERNAL GEN 1 UNIT	175	-99	141
EXTERNAL GEN 1 UNIT	200	-88	125

Cancel Ticket | Add New Revision | Submit | Refresh | History Log | Main Menu

View/Revising a Power System Stabilizer (PSS) Ticket



eDART Ticket Status

- **Submitted**: This is the original status of the ticket upon submittal
- **Approved**:
  - MW Ticket – The ticket status is changed to Approved by PJM upon review and approval.
  - Reactive Ticket – The ticket status is changed to Received by PJM upon receipt of this type of ticket by PJM PD. The status is displayed as Approved on the menu.
- **Active**: The ticket status is changed to Active upon input of an actual outage "start" date by PJM
- **Complete**: The ticket status is changed to Complete upon input of an actual outage "end" date by PJM

eDART Ticket Status

- **Denied**:
  - MW Ticket – The ticket status is changed to Denied by PJM upon review and denial
  - Reactive Ticket – The ticket status cannot be changed to Denied
- **Cancelled by Company**: The ticket status is changed to Cancelled by Company if the company initiates cancellation of the ticket.
  Note: A verbal notification to PJM is required if the change affects current or the next operating day
- **Cancelled by PJM**: The ticket status is changed to Cancelled by PJM if PJM initiates cancellation of the ticket. A verbal notification is given to the company

Questions?