10.2 TURBINE-GENERATOR

10.2.1 DESIGN BASES

For both Unit 1 and Unit 2, the turbine is a 1,800 rpm, tandem compound, six-flow, non-reheat steam turbine. The capability of the turbine for Unit 1 is 1,345,812 kW and for Unit 2 is 1,350,108 kW when operating with initial steam conditions of 976.1 psia, and 1190.3 Btu/lbm, while exhausting to the multipressure condenser at 2.39, 2.77, and 3.59 inches. HgAbs back pressures; with 0 percent makeup and extracting steam for the normal five stage feedwater heating and feed pump turbine drives. The turbines can produce approximately 1,383,809 kW for Unit 1 and 1,388,531 kW for Unit 2 when operating at valves wide open (VWO) and with the corresponding design VWO steam and cycle conditions shown on the heat balances.
(Reference 10.2-10, and 10.2-11).

The generator is a 1,354,000 KVA, 1800 rpm, direct connected, 4 pole, 60 Hz, 24,000 V, liquid cooled stator, hydrogen cooled rotor, synchronous rated at 0.935 power factor, 0.57 short circuit ratio at a maximum hydrogen pressure of 75 psig. The output of the turbine and reactor will be limited to maintain approximately 1300 MWe from the generator in order to stay within the generator capability.

The excitation system consists of a 60 Hz, 1,800 rpm air cooled generator and liquid cooled rectifiers with static thyristor automatic regulation equipment. The exciter is rated for a maximum output of 3210 kW at 530 V.

The turbine generator control is accomplished by an electrohydraulic control (EHC) system capable of controlling speed, load, steam pressure and flow under startup, shutdown, transient and steady state conditions.

The turbine-generator is normally base loaded. The load following capability has been electrically disconnected.

The turbine-generator units, originally GE design, are built in accordance with GE standards and codes for existing GE components and to Siemens standards and codes for new replacement turbine components. The moisture separator vessels and steam seal evaporator vessels are built in accordance with ASME B&PV Code, Section VIII.

The steam generation rate has the ability to follow turbine load demand changes by as much as 35 percent without control rod movement merely by changing the recirculation flow rate through the core. If a load reduction of more than 10 percent occurs, the turbine bypass valves will open momentarily until the recirculation rate is sufficiently reduced. Bypass valves have the ability to bypass at least 21 percent of the reactor rated flow. The turbine control valves are capable of changing turbine steam flow for adequate pressure control performance.

During any event resulting in turbine stop valve closure, turbine inlet steam flow is not reduced faster than permitted by Figure 10.2-1.

During any event resulting in turbine control valve fast closure, turbine inlet steam flow is not reduced faster than permitted by Figure 10.2-2.

10.2.2 DESCRIPTION

10.2.2.1 Turbine

The turbine unit consists of one double flow high pressure turbine and three double exhaust flow low pressure turbines. The unit includes two horizontal moisture separator vessels located on the operating floor, one on each side of the turbine. The moisture separator vessels are of the non-reheat type.

Steam from the reactor enters the power conversion system through four main steamlines. Each of the four main steamlines to the high pressure turbine is connected to a main steam stop valve and a main steam control valve. The four stop valves and four control valves are combined to form a single valve chest. A pressure equalizing line connects the stop valves together just below the valve seats. Six combined intermediate valves (CIV) (each composed of an intercept valve and an intermediate stop valve) are located in the lines between the moisture separator vessels and the low pressure turbines. A five valve bypass valve chest is connected to each of the main steamline between the main steam isolation valves and main steam stop valves to remove excess flow to the condenser.

There is one stage of extraction from the high pressure turbine and four stages of extraction from each low pressure turbine. The extraction steam is used to heat the five stages of feedwater heating.

A portion of the cross-around steam is used to drive the reactor feed pump turbines (RFPTs) during normal operation.

The turbine-generator is provided with an emergency trip system that closes the main stop valves, control valves and combined intermediate valves, thus shutting down the turbine, on the following signals:

1. Turbine approximately 10% above rated speed.
2. Turbine approximately 12% above rated speed.
3. Vacuum decreases to less than 21.7 Hg.
4. Excessive thrust bearing wear.
5. Deleted.
6. Prolonged loss of generator stator coolant.
7. Electrical trip, via master trip solenoids.
8. Loss of hydraulic fluid supply pressure. Loss of emergency trip system fluid pressure automatically closes the turbine valves and then energizes the master trip relay to prevent a false restart at 1100 psig decreasing.
9. Signal from High turbine vibration.
10. Loss of both speed signals above 100 rpm.

11. Loss of both the primary and secondary 24 VDC power supplies.

12. Mechanical trip via manual trip handle of mechanical trip solenoid.

13. High level in a moisture separator drain system.

14. Main shaft lube oil pump low pressure trip above 1300 rpm.

15. Primary and backup unit protection lockout relay trip.

16. High reactor water level trip at 54".

17. Loss of ETS pressure trip at 800 psig decreasing.

18. Power/Load Imbalance >40%.

At reactor power greater than 26 percent, tripping the turbine will automatically cause the reactor to scram.

10.2.2.2 Generator and Exciter

The generator stator is water cooled and the rotor is hydrogen cooled. The generator hydrogen system includes all necessary controls and regulators for hydrogen make-up (See Dwg. M-133, Sh. 1). The hydrogen purity inside the generator is monitored on a continual basis. The pipe from the Generator Hydrogen system is routed below grade to the generator and does not enter any safety related areas. A seal oil system is provided to prevent hydrogen leakage through the generator shaft seals. The Bulk Hydrogen system is located between the cooling towers at grade level. A hydrogen makeup supply is provided outside the turbine building to replace any hydrogen leakage from the generator. To avoid having an explosive hydrogen-air mixture in the generator at any time, either when the generator is being filled with hydrogen prior to being placed into service, or when hydrogen is being removed from the generator prior to opening the generator for inspection or repairs, carbon dioxide is used for purging out the air or hydrogen in the generator casing. The generator is designed to withstand a hydrogen detonation.

Automatic water type fire protection systems are provided to protect the turbine and generator bearings, the area below the generator, the hydrogen seal oil system, the permanent bulk hydrogen storage area and the hydrogen truck unloading area. In addition, portable fire extinguishers and fire hose are provided inside the turbine building.

10.2.2.3 Protective Valves Functions

The primary function of the turbine stop valves is to quickly shut off steam to the turbine under emergency conditions. The stop valve disks are totally unbalanced and cannot open against full pressure drop. An internal bypass valve is provided in one of the four stop valves to permit slow warming of all stop and control valves and to pressurize the stop valve below seat area to allow valve opening.

The function of the turbine control valves is to throttle steam flow to the turbine. The valves are of sufficient size, relative to their cracking pressure, to require that they be partially balanced. A small internal valve is opened first to decrease the pressure in a balance chamber. The valves are opened by individual hydraulic cylinders.

The function of the bypass valves is to pass steam directly from the reactor to the condenser without the steam going through the turbine. The bypass valve chest is connected directly to the steam leads from the reactor. This chest is composed of five valves operated by individual hydraulic cylinders. When the valves are open steam flows from the chest, through the valve seat, out the discharge casing, and through connecting piping to the pressure breakdown assemblies where a series of baffle plates and orifices is used to further reduce the steam pressure before the steam enters the condenser. (See Subsection 10.4.4)

The function of the combined intermediate valves (CIV's) is to protect the turbine against overspeed from stored steam in the cross-around piping, moisture separator vessels, HP turbine, and main steam lines (downstream of control valves), and to throttle and balance steam flow to the LP turbines. Each valve is composed of an intercept valve and an intermediate stop valve incorporated into a single casing. The two valves have separate operating mechanisms and controls. The valves are located as close to the low pressure turbine as possible to limit the amount of uncontrolled steam available as an overspeed source.

During normal plant operation the intercept valves will be open. The intercept valves are capable of opening against maximum cross-around pressure and of controlling turbine speed during blowdown following a load rejection. The intermediate stop valves also remain open for normal operation and trip closed by actuation of the emergency governor or operation of the master trip. They provide backup protection if the intercept valves or the normal control devices fail.

10.2.2.4 Extraction System Check Valves

The energy contained in the extraction and feedwater heater system can be of sufficient magnitude to cause overspeed of the turbine-generator following an electrical load rejection or turbine trip. To prevent this the energy must be contained in the piping and feedwater heaters. This is done by installing positive closing bleeder trip valves (PCBTV) or antiflash baffles in the heaters. GE steam turbine design rules and code requirements specify that the turbine controls will be capable of preventing the turbine speed from rising above a certain maximum value after a full load rejection or trip. The PCBTV valves and antiflash baffles limit the amount of energy flashing back into the turbine so that the turbine speed increase is held below the maximum value. Antiflash baffles are used in feedwater heaters 1 and 2 extraction steamlines since the distance to the turbine is short and internal energy is low. PCBTVs are installed in the extraction lines, to feedwater heaters 3, 4, and 5.

10.2.2.5 Control System

The turbine generator control system is a GE Mark I electrohydraulic control (EHC) system. The speed control unit produces the speed/acceleration error signal that is determined by comparing the desired speed from the reference speed circuit, with the actual speed of the turbine for steady state conditions. For step changes in speed, an acceleration reference circuit takes over to either accelerate or decelerate the turbine at a selected rate to the new speed. There is no limit to the deceleration. The speed/ acceleration error signal is combined with the load requirements on the load control unit to provide the flow signal to the control valves. Because of the importance of overspeed protection the speed control signal has two independent redundant channels. Two independent pulse signals are obtained from magnetic pick-ups located over a gear-toothed wheel on the turbine shaft. Loss of both speed signals will trip the turbine.

10.2.2.6 Overspeed Protection

To protect the turbine generator against overspeed two trip devices are provided either of which when initiated will close the main stop valves, control valves, and combined intercept valves thus shutting down the turbine.

These two trip devices are as follows:

1. A mechanical overspeed trip which is initiated if the turbine speed reaches approximately 10% above rated speed, and

2. An electrical overspeed trip which serves as a backup to the mechanical trip and is initiated at approximately 12% above rated speed.

The mechanical overspeed trip device is an unbalanced ring mounted on the turbine shaft and held concentric with it by a spring (See Figure 10.2-3). When the turbine speed reaches the trip speed (10% above rated) the centrifugal force acting on the ring overcomes the tension of the spring and the ring snaps to an eccentric position. In doing this it strikes the trip finger which operates the mechanical trip valve, MTV. This is a three way valve that feeds hydraulic fluid (1600 psi) to the lockout valve, and when tripped blocks the hydraulic fluid supply system and removes the emergency trip system pressure which causes the main stop valves, control valves and combined intercept valves to close. Failure of the hydraulic portion of this trip will result in a stop valve closure.

The electrical overspeed trip receives its signal from a 112% speed trip relay (VCS840) that is operated by a speed signal sensed by a magnetic pickup from a toothed wheel on the turbine shaft and fed to a power amplifier and megacycles circuit whose output is a dc voltage proportional to speed (See Dwg. M2H-54, Sh. 1).

The signal from the speed trip relay energizes the master trip relay XKT1000 (Dwg. M2J-101, Sh. 5) which then energizes the mechanical trip solenoid MTS and deenergizes the master trip solenoid valves MTSV-A & MTSV-B.

Either one of these actions will trip the turbine, that is close stop, control and combined intercept valves.

When the overspeed trip system is under test, the lockout valve, LV, is actuated which bypasses the mechanical trip valve. However, under this condition, system protection is provided by the backup overspeed trip acting on the master trip solenoid valve, MTSV, by deenergizing MTSV-A & MTSV-B.

An additional feature of the protective system which will minimize the likelihood of an overspeed condition is the power/load unbalance circuitry (Figure 10.2-6). Generator load is sensed by means of three current transformers and is compared with the turbine power input which is sensed by the turbine intermediate pressure sensor. If the difference between the steam power input and the generator output rises to at least 40% in 35 msec, auxiliary relays will be actuated which will energize the control valves fast closing solenoids, remove the load reference at the load control unit and automatically drive the load reference motor to zero setpoint.

Table 10.2-1 summarizes the overall turbine overspeed protection assurance that stable operation following a turbine trip can be obtained from the requirement that both the stop valves and the combined intercept valves close in a turbine trip thereby accomplishing two things: a) Preventing steam from the main steam line from entering the turbine and b) preventing the expansion of steam already in the high-pressure stage and in the moisture separator. An additional provision is also made to isolate the major steam extraction lines from the turbine.

There are four steam lines at the high pressure stage, each line is provided with one stop valve and one control valve in series. Steam from the high pressure turbine(s) stages flows to the moisture separators and then to the three low pressure turbine stages. Each of the six low pressure lines has a combined intercept valve which is actually made up of a stop valve in series with a control valve in one housing. All of the above valves close on turbine trip. Assuming a single failure to any one of the above system of 20 valves in case of a turbine overspeed trip signal, the turbine will be successfully tripped. Furthermore, each of the major steam extraction lines, with the exception of the #1 and #2 heaters, have an isolation valve and a bleeder trip valve which are independently closed in case of a turbine trip.

10.2.2.7 Turbine Shell Diaphragms

For overpressure protection of the turbine exhaust hoods and the condenser shells, two diaphragms are provided in each low pressure turbine exhaust hood, which rupture at approximately 5 psig. An exhaust hood spray system is provided to spray condensate into the hoods for overtemperature protection.

10.2.2.8 Turbine-Generator Load Following Capability

The load following capability of the turbine-generator system has been electrically disconnected.

10.2.3 TURBINE DISK INTEGRITY

10.2.3.1 Material Selection

Turbine disk and rotors for turbines operating with light water reactors are forged from vacuum degassed Ni-Cr-Mo-V alloy steel by processes which minimize flaw occurrence and provide adequate fracture toughness. Tramp elements are controlled to the lowest practical concentrations consistent with good scrap selection and melting practices, and consistent with obtaining adequate initial and long life fracture toughness for the environment in which the parts operate. The turbine disk and rotor materials have the lowest fracture appearance transition temperatures (FATT) and highest Charpy V-notch energies obtainable, on a consistent basis from water quenched Ni-Cr-Mo-V material at the sizes and strength levels used. Since actual levels of FATT and Charpy V-notch energy vary depending upon the size of the part and the location within the part, etc., these variations are taken into account in accepting specific forgings for use in turbines for nuclear application. Charpy tests essentially in accordance with Specification ASTM A-370 are included.

10.2.3.2 Fracture Toughness

Suitable material toughness is obtained through the use of materials described in Subsection 10.2.3.1 to produce a balance of adequate material strength and toughness to ensure safety while simultaneously providing high reliability, availability, efficiency, etc., during operation. Bore stress calculations include components due to centrifugal loads, interference fit, and thermal gradients where applicable.

For Siemens turbines, the value of material fracture toughness (K_{IC}) used in the calculations is conservatively based on material specifications for the disks, as correlated from minimum Charpy impact strength. The maximum specified FATT for the Siemens disks is -80°C, which is low enough to ensure that the ambient temperature Charpy impact energies and K_{IC} are in the upper shelf range. If an increase of 50°C in FATT is conservatively assumed for the disk interior, the material toughness will still be in the upper shelf region at ambient temperature. The material used is a Ni-Cr-Mo-V steel forging, which has excellent hardenability. Additional information is provided in the turbine missile report (reference 10.2-9).

Turbine operating procedures are employed to preclude brittle fracture at startup by ensuring that the metal temperature of disks and rotors is adequately above the FATT.

10.2.3.3 High-Temperature Properties

The operating temperatures of the high pressure rotor in turbines operating with light water reactors are below the creep rupture range. Therefore, creep rupture is not considered to be a significant factor in assuring rotor integrity over the lifetime of the turbine. Basic data is obtained from laboratory creep rupture tests.

10.2.3.4 Turbine Design

The Siemens turbine assembly is designed to withstand normal conditions and anticipated transients including those resulting in turbine trip without loss of structural integrity. The LP rotor design utilizes a shrunk-on construction where each disk is shrunk on the LP rotor shaft via interference fit. The first disk is retained by a key on the downstream or exit side. The other two disks are not keyed; the shrink fit is more than sufficient to retain the disks to over 120% of rated speed. The design of the turbine assembly meets the following criteria:

a) The maximum tangential stress in disks and rotors resulting from centrifugal forces, interference fit (shrunk on wheel LP's only), and thermal gradients does not exceed 0.50 of the yield strength of the material at 120% of rated speed.

b) Turbine shaft bearings are designed to retain their structural integrity under normal operating loads and anticipated transients, including those leading to turbine trips.

c) The multitude of natural critical frequencies of the turbine shaft assemblies existing between zero speed and 20% overspeed are controlled in the design and operation so as to cause no distress to the unit during operation.

10.2.3.5 Pre-service Inspection

The pre-service inspection program is as follows:

a) Disk and rotor forgings are rough machined with minimum stock allowance prior to heat treatment.

b) Each rotor and disk forging is subjected to a 100% volumetric (ultrasonic) examination. Each finish-machined rotor and wheel is subjected to a surface magnetic particle and visual examination. Results of the above examination are evaluated by use of Siemens acceptance criteria. These criteria are within those specified for Class 1 components in the ASME Boiler and Pressure Vessel Code, Sections III and V and include the requirement that subsurface sonic indications are either removed or evaluated to assure that they will not grow to a size which will compromise the integrity of the unit during the service life of the unit.

c) All finish-machined surfaces are subjected to a magnetic particle examination. No magnetic particle flaw indications are permissible in bores, holes, keyways, and other highly stressed regions.

d) Each fully bladed turbine rotor assembly is spin tested at 125% of rated speed.

10.2.3.6 Inservice Inspection

The in-service inspection program for the main turbine rotor assembly describes the required inspections and frequency maximum values which ensure the main turbine missile damage probabilities described in Section 3.5.1.3.3 and Table 3.5-10, Turbine System Reliability Criteria are maintained. Inspection and exercising of the stop valves, control valves, and combined intermediate valves provide additional assurance of reliable operation of the turbine overspeed protection system.

The low pressure turbine inspections are performed on a frequency to support the main turbine missile damage probabilities described in Section 3.5.1.3.3. The intervals between main turbine inspections will not exceed 100,000 operating hours with no cracks visible per reference 10.2-9. If the inspection results in found abnormalities, the probability of generating a missile requires re-calculation and the main turbine inspection frequencies will be adjusted as per reference 10.2-9.

The in-service inspection program for the turbine assembly and valves include the following:

a) Disassembly of the turbine is conducted during plant shutdown coinciding with the in-service inspection schedule. Inspection of all parts that are normally inaccessible when the turbine is assembled for operation, such as couplings, coupling bolts, turbine shafts, low pressure turbine blades, low pressure discs, and high pressure rotors is conducted.

   This inspection consists of visual, surface, and volumetric examinations, as indicated below.

   1. A thorough nondestructive (NDE) examination of all HP disk rotors steam inlet and shaft seal areas is conducted. In addition, all accessible rotor surfaces are inspected visually. This inspection is conducted at intervals of about 10 years.
   2. The keyway region of each shrunk on disk LP rotor receives an ultrasonic examination. In addition, each disk is inspected visually and by magnetic particle testing on all accessible surfaces.

   3. A visual and surface examination of all blades.

   4. A 100% visual examination of couplings and coupling bolts.

b) Dismantle at least one main steam stop valve, one main steam control valve, and one combined intermediate valve, at approximately 3-1/3 year intervals during refueling or maintenance shutdowns coinciding with the in-service inspection schedule and conduct a visual and surface examination of valve seats, wheels, and stems. If unacceptable flaws or excessive corrosion are found in a valve, all valves of its type are inspected. Valve bushings are inspected and cleaned, and bore diameters are checked for proper clearance.

c) Main steam stop and control, and combined intermediate valves are exercised by closing each valve and observing, by the valve position, that it moves smoothly to a fully closed position.

The frequency of turbine valve exercising is dependent on the installed rotor configuration due to concerns over potential generation of turbine missiles. Rotor trains which have a lower probability of generating turbine missiles, or those for which the consequence of missile damage is less safety significant, require less frequent valve exercising. The LP rotors supplied by Siemens have shrunk-on disks and only the first disk is keyed. The frequency of turbine valve exercising is in accordance with the Technical Requirements Manual.

d) Perform a Channel Functional check of the turbine overspeed protection circuit at least once per refueling cycle.

10.2.4 EVALUATION

The turbine generator and the related steam system have been radiologically evaluated and the results are described in Chapter 12.

10.2.5 REFERENCES

10.2-1 Deleted.

10.2-2 Deleted.

10.2-3 NE-092-001A, "PP&L Licensing Topical Report, Susquehanna Steam Electric Station Licensing Topical Report for Power Uprate with Increased Core Flow."

10.2-4 Power Uprate Engineering Report for Susquehanna Steam Electric Station, Units 1 and 2, "NEDC-32161P, As Revised by PP&L Calculation EC-PUPC-1001, Revision 0, March, 1994.

10.2-5 Deleted.

10.2-6 PLA-3964, "Changes to Turbine Overspeed Protection System," R. G. Byram to C. L. Miller (April 30, 1993).

10.2-7 GE Technical Information Letter (TIL) 969-3 R1, Periodic Turbine Steam Valve Test - Nuclear Steam Turbines, December 27, 1993.

10.2-8 Deleted.

10.2-9 EC-093-1023, Turbine Missile Probability Analyses for Susquehanna Units 1 & 2.

10.2-10 Siemens letter, SPG-PPL-0746, “SSES PPL Unit 2 Thermal Kit.”

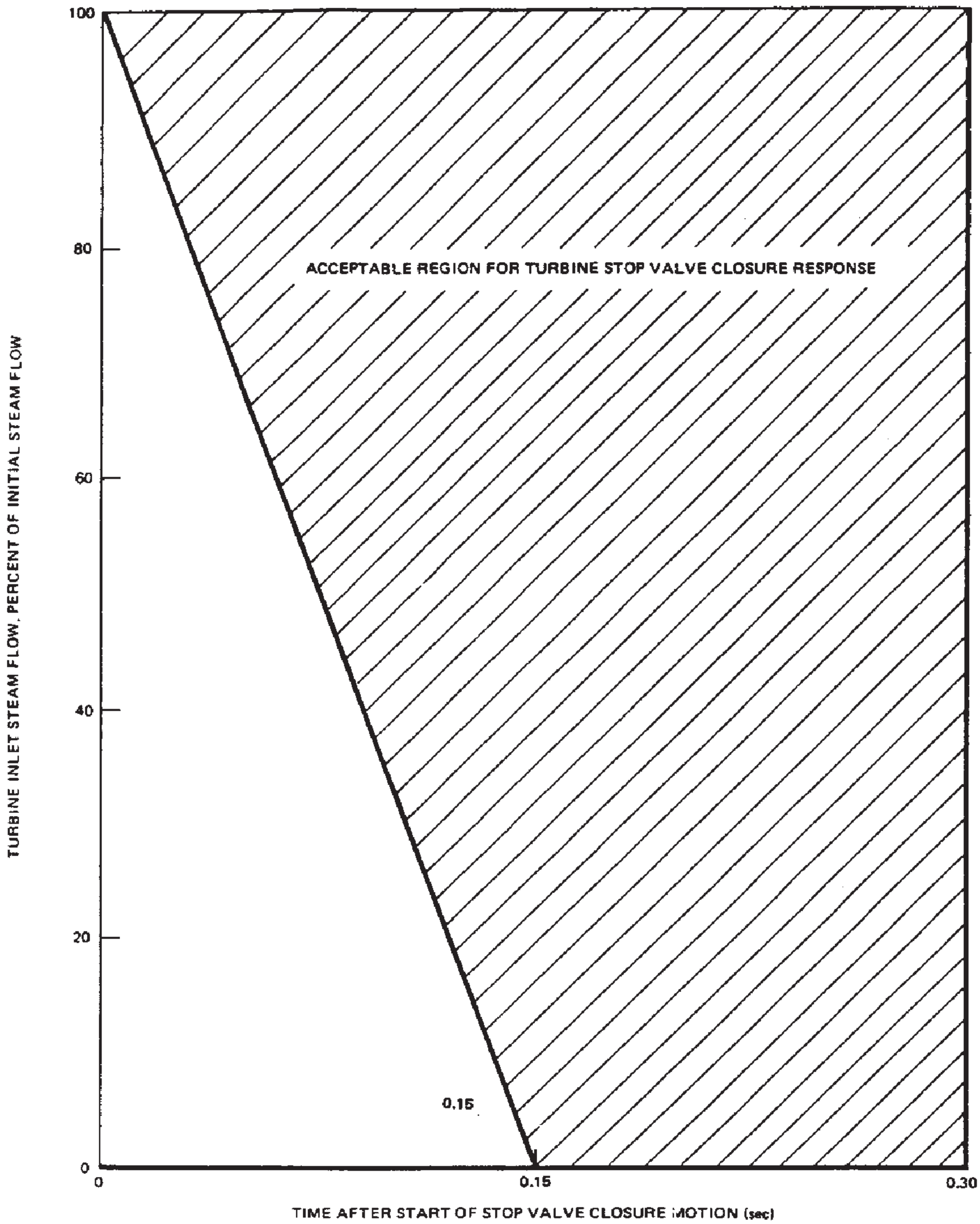
10.2-11 Siemens letter, SPG-PPL-0747, “SSES PPL Unit 1 Thermal Kit ”

10.2-12 Deleted.

TABLE 10.2-1
TURBINE OVERSPEED PROTECTION

DEVICE	DESCRIPTION/FUNCTION	TRIP SETTING	ACTUATING DEVICE INTERMEDIATE	ACTUATING DEVICE FINAL	ACTUATED VALVE	ACTUATED POSITION
Overspeed Trip	Unbalanced ring, concentric with shaft, eccentric on overspeed Close mech. trip Vlv. & remove electro-hyd control oil press	110% of rated speed	Mechanical Linkage	Mechanical Trip VLV	All SV's All CV's All CIV's	Close
Backup Overspeed Trip	Toothed wheel magnetic pick-up speed sensor, electronic signal amplifier Close mech. trip vlv. and master trip sol vlvs.; remove electro. hyd control oil press	112% of rated speed	Master Trip Relay	Mechanical trip solenoid (MTS) & master trip solenoids (MTSV-A&B)	All SV's All CV's All CIV's	Close
Power/ Load Unbalance	Gen current & steam pressure transducers, electronic comparators & control logics Energize CV fast closing solenoids & remove electro-hyd control oil press from the CV's.	40% unbal.			All CV's	Fast Close

NOTE:
SV = Stop Valve
CV = Control Valve
CIV = Combined Intercept Valve



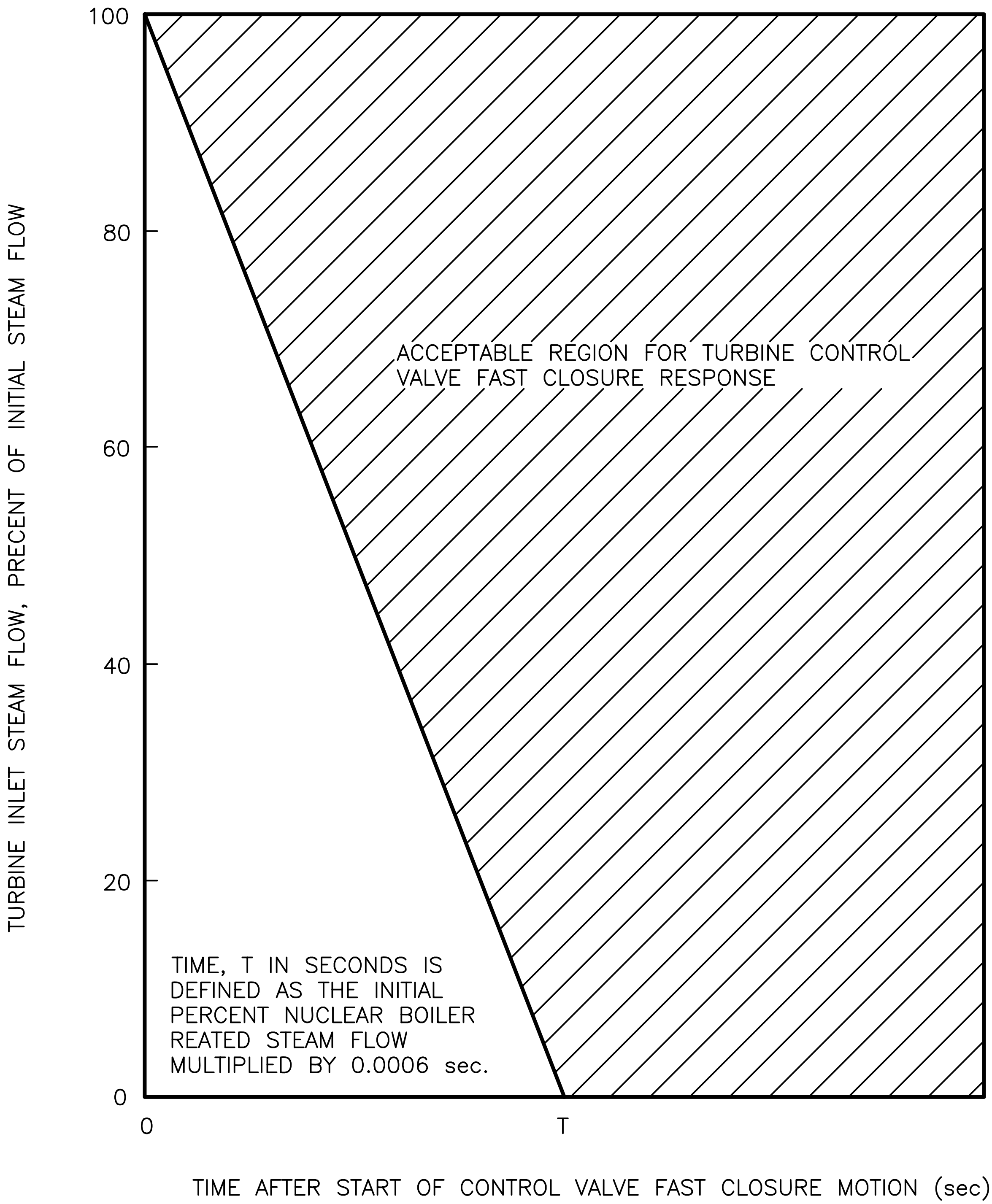
FSAR REV.65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

TURBINE STOP VALVE
CLOSURE CHARACTERISTIC

FIGURE 10.2-1, Rev 49

AutoCAD: Figure Fsar 10_2_1.dwg



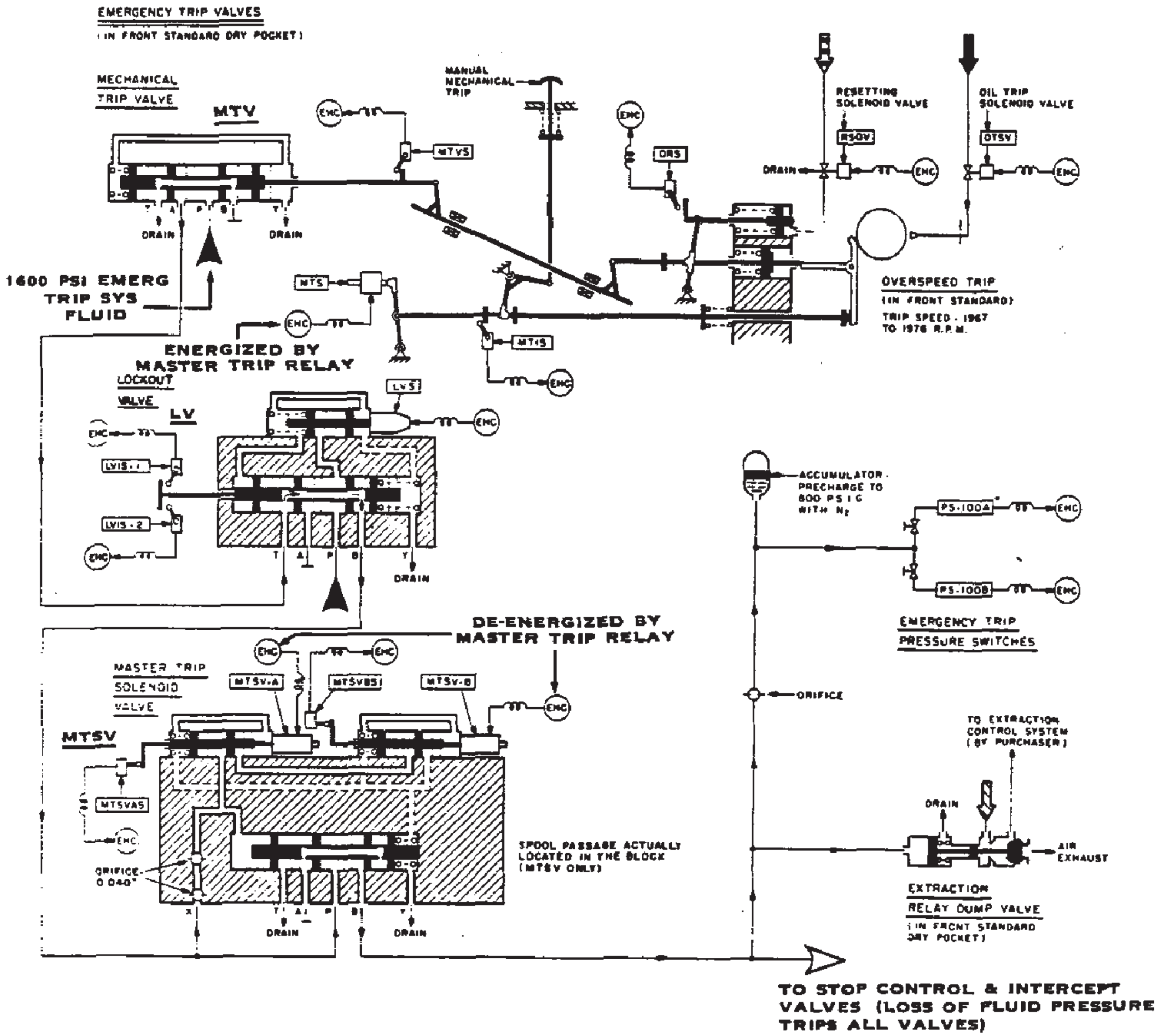
FSAR REV.65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

TURBINE CONTROL VALVE FAST CLOSURE CHARACTERISTIC

FIGURE 10.2-2, Rev 50

AutoCAD: Figure Fsar 10_2_2.dwg



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MECHANICAL OVERSPEED TRIP

FIGURE 10.2-3, Rev 49

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THIS FIGURE HAS BEEN
REPLACED BY DWG.
M2H-54, Sh. 1

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Figure 10.2-4 replaced by dwg.
M2H-54, Sh. 1

FIGURE 10.2-4, Rev. 49

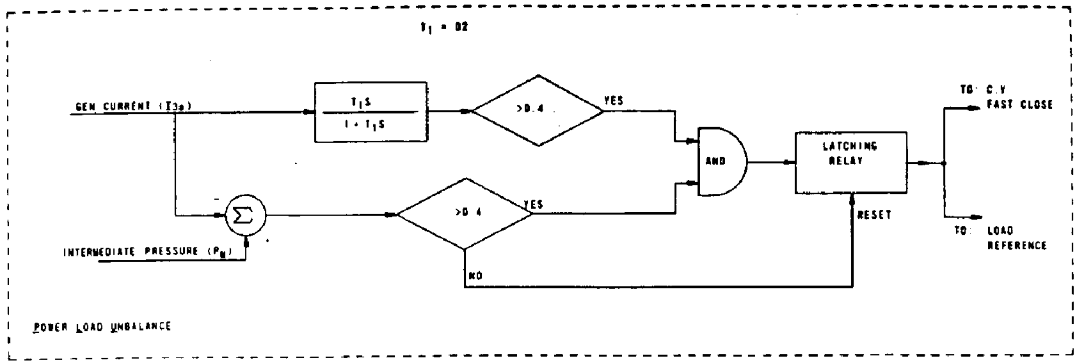
AutoCAD Figure 10_2_4.doc

THIS FIGURE HAS BEEN
REPLACED BY DWG.
M2J-101, Sh. 5

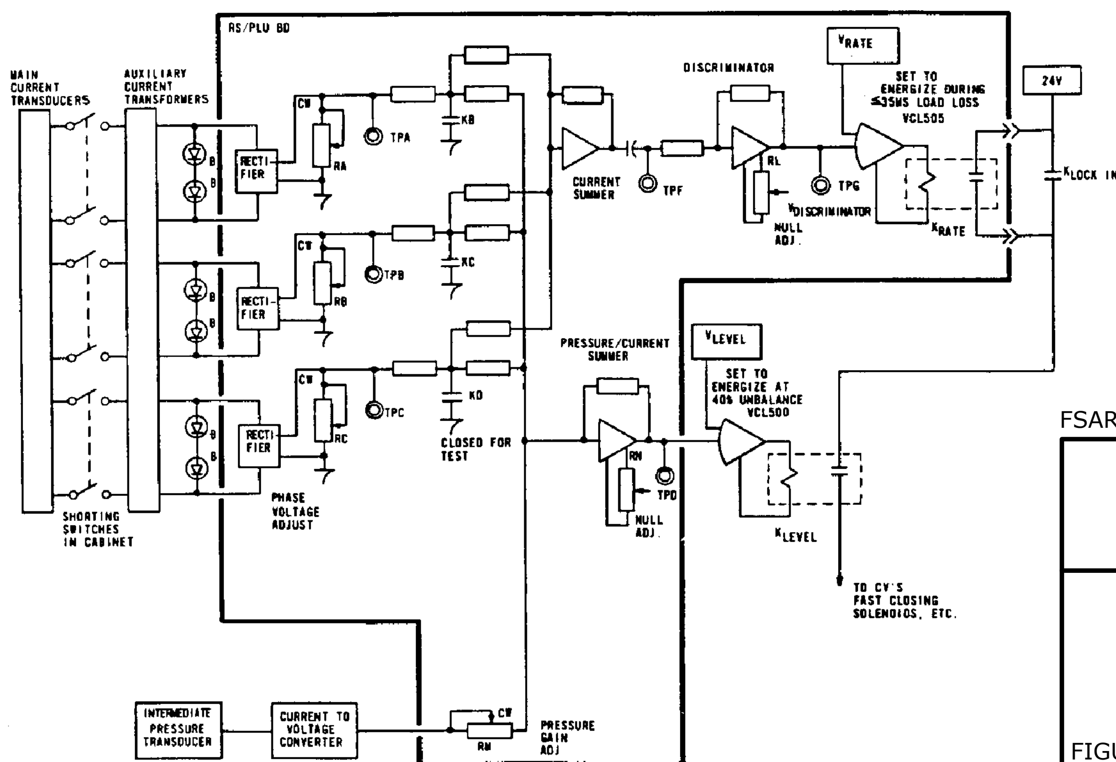
FSAR REV. 65

SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 & 2 FINAL SAFETY ANALYSIS REPORT
Figure 10.2-5 replaced by dwg. M2J-101, Sh. 5 FIGURE 10.2-5, Rev. 55

AutoCAD Figure 10_2_5.doc



Rate-Sensitive P/L Unbalance Control Logic



Rate-Sensitive Power/Load Unbalance Circuit

FSAR REV.65

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UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

RATE SENSITIVE POWER/LOAD
UNBALANCE CIRCUIT

FIGURE 10.2-6, Rev 49

AutoCAD: Figure Fsar 10_2_6.dwg

THIS FIGURE HAS BEEN
REPLACED BY DWG.
M-133, Sh. 1

FSAR REV. 65

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2
FINAL SAFETY ANALYSIS REPORT

Figure 10.2-11 replaced by dwg.
M-133, Sh. 1

FIGURE 10.2-11, Rev. 50

AutoCAD Figure 10_2_11.doc