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U.S. Nuclear Regulatory Commission
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Washington, DC 20555

ATTN: Document Control Desk

Subject: **Indian Point 3 Nuclear Power Plant**
Docket No. 50-286
Response to Request for Additional Information Concerning Implementation of the Station Blackout Rule (TAC No. 68557)

Dear Sir:

Enclosed is the Authority's response to the NRC staff's Request for Additional Information (dated June 18, 1991) concerning implementation of the Station Blackout rule (10 CFR 50.63) at Indian Point 3. Please note that all calculations referred to in the enclosure are available for inspection.

If you have any questions, please contact Mr. P. Kokolakis.

Very truly yours,

Ralph E. Beedle
Executive Vice President
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Enclosure

cc: See next page

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Response to Request for Additional Information
Concerning Implementation of the Station Blackout Rule

I. Proposed Station Blackout Duration

A. Explain the plant emergency AC classification and provide a load list for achieving and maintaining a safe shutdown following a LOOP consistent with NUMARC 87-00 Supplemental Questions/Answers, Questions 3.4 and 3.5.

Indian Point 3 has three Emergency Diesel Generators (EDGs); the EDGs are standby power supplies normally available to power IP3 safe shutdown equipment. None of the EDGs is being used as the alternate AC (AAC) power supply. Only one 480v bus is necessary for safe shutdown of IP3, so only one EAC standby power supply is necessary for safe shutdown. Using Table 3-7 of NUMARC 87-00, IP3 is an EAC group A plant, since one power supply is necessary for safe shutdown, there are three EDGs (standby power supplies), and the "Appendix R" diesel is the AAC power supply.

The following equipment is necessary to achieve and maintain safe shutdown (hot shutdown) following a LOOP:

1. One charging pump
2. One component cooling pump
3. Two service water pumps
4. Motor Control Center loads (for example, diesel auxiliaries and supporting systems)

B. Does the plant have an EDG reliability program which conforms to the guidance of RG 1.155 Section 1.2 and NUMARC 87-00, Appendix D?

The Authority's EDG reliability program at IP3 follows the guidelines recommended by RG 1.155 and NUMARC 87-00, Appendix D. The following are some of the characteristics of the IP3 EDG reliability program:

1. IP3 has a unit EDG target reliability of 0.975. Establishing a unit target reliability follows the guidance of the revised Appendix D to NUMARC 87-00, but does not follow the RG 1.155 recommendation (RG 1.155 recommends establishing individual EDG target reliabilities).

2. The objective of the diesel surveillance testing and monitoring program is to ensure that the EDGs meet or exceed the target reliability of 0.975. Surveillance testing of the EDGs includes:

    a. Recording whether or not start and load attempts are successful, and calculating actual diesel reliability.

b. Periodic recording of many parameters during diesel functional testing, including such things as jacket water pressure, individual cylinder temperatures, and service water flow.

c. If any diesel fails to start or carry load, a Significant Occurrence Report (SOR, as described in plant procedures) is initiated.

d. Diesel test data is entered into a diesel trend data base.

e. If a countable failure is recorded during testing, the surveillance procedure instructs that corrective action should be taken using the guidelines of NUMARC 87-00.

3. Preventive maintenance (PM) is performed on the EDGs as required by IP3 technical specifications. Performing PM, as well as any necessary corrective maintenance, helps to ensure that the EDG target reliability is maintained. Countable diesel failures trigger corrective action following the guidelines of NUMARC 87-00, which as a minimum requires performing a root-cause analysis.

4. As previously stated, the information and data collection and trending done during diesel testing helps to ensure that the EDG target reliability is achieved.

5. The procedures governing the IP3 diesel reliability program specify who is responsible for the individual portions of the program, and require informing plant management if a countable diesel failure is recorded.

II. Alternate AC Power

A. Demonstrate that the use of the Appendix R diesel as an alternate AC power source complies with the guidance of Appendix B of NUMARC 87-00. In particular, address items B.3, B.8 and B.13.

Each of the following numbered items, 1 through 13, describe how use of the Appendix R diesel generator follows the guidance of NUMARC 87-00, Appendix B, items B.1 through B.13:

1. The Appendix R diesel is not categorized as a safety-related component; it was procured and installed as QA Category M equipment. Category M equipment is non-safety-related equipment to which the Quality Assurance Program must be applied. Application of QA program requirements may be modified so that only selected criteria or selected portions of criteria are applied to Category M equipment.

2. The Appendix R diesel design did not consider protection against the effects of design basis or seismic events.

3. The Appendix R diesel is physically separated from the EDGs, installed in its own building on the 15 foot elevation. The building meets the New York State Uniform Building Code, and can withstand a 120 mph wind velocity, and a 40 psi roof live load.

4. The 6.9kv, 600v, and instrumentation and control cables of the Appendix R diesel meet the original plant separation criteria. Class 1E transfer switches are used where alternate and normal feeds to shutdown loads meet. The Appendix R diesel supplies power to existing buses that meet the original plant separation criteria.

5. The Appendix R diesel supplies the existing safety-related 480v buses through the 6.9kv system. The EDG breakers can only be closed when the 480v supply breakers are open, so the EDGs are isolated when the Appendix R diesel is supplying the 480v buses. The Appendix R diesel uses a dedicated DC system that is independent of the other plant DC systems.

6. There are three breakers between the Appendix R diesel and the safety-related 480v buses; two of the breakers are on the 6.9kv side and are non-safety-related. The third breaker is on the 480v side and is a safety-related breaker.

7. The 6.9kv tie-in from the Appendix R diesel to the gas turbine bus is through the normally open Appendix R diesel generator output breaker. (See Figure 1 for a simplified IP3 electrical distribution schematic.) The Appendix R diesel has no auto-start capability, and must be manually started and loaded onto the gas turbine bus.

8. (a) The Appendix R diesel has its own independent battery and battery chargers, so it can operate under a complete loss of all other plant DC power sources.

   (b) The starting air for the Appendix R diesel is from a self-contained starting air system. The starting air system contains both a diesel driven and an electric air compressor, and an air storage tank. Power for the electric compressor has ties to the preferred (6.9kv) system, but there are at least two breakers (one safety-related and one or more non-safety-related) between the feeds from the EDGs and the feed to the air compressor.

   (c) The Appendix R diesel underground fuel oil storage tank (4000 gal.) and the day tank are independent from the EDG fuel oil system. The independent Appendix R diesel fuel oil system also contains a fuel oil transfer pump, strainers and filters.

   (d) The Appendix R diesel is not identical to the EDGs; it is from the same manufacturer, but is a different model and size, and has a different electrical generator than the EDGs.

(e) Weather induced events or single failure events can not cause failure of both the EDGs and the Appendix R diesel because: (1) the EDGs are housed in separate Category I concrete bunkers, and the Appendix R diesel is housed in a code structure; (2) the EDGs are normally in standby, and if operating, are independent of the offsite power system (except during testing); and (3) there are interlocks that prevent the EDGs and Appendix R diesel from being automatically connected to the IP3 electrical distribution system at the same time.

(f) The Appendix R diesel generator installation is a self contained package that is designed to operate upon a complete loss of power, AC and/or DC. The package contains a starting air compressor, batteries, a battery charger, jacket water heater, lube oil heater, fuel oil pump and lube oil pumps, and necessary filters and strainers.

(g) The Appendix R diesel is covered under the IP3 work request system, and post-maintenance testing of the Appendix R diesel is controlled by the IP3 Retest Program.

9. Calculations have been performed to verify that the Appendix R diesel can carry the necessary loads (within voltage and frequency limits) to achieve hot shutdown. The calculations were based on the IP3 coping duration of four hours.

10. The Appendix R diesel undergoes a one-hour full load test quarterly, and a two-hour load test is performed each refueling outage.

11. Appendix R diesel corrective maintenance (CM) is performed when the need for CM is determined based on the results of testing, walkdowns, or material condition inspections. Plant procedures are currently being developed to require periodic and refueling outage inspections of the Appendix R diesel and supporting equipment.

12. The Authority demonstrated, by timing the starting of the Appendix R diesel, and using a time-line study to simulate an SBO condition, that the Appendix R diesel can power shutdown loads within one hour. The periodic testing loads the diesel to between 2450 and 2500kw, which is greater than the shutdown load.

13. The AAC system has both standby components and on-line components (the 6.9kv and 480v buses). The Authority's reliability goal for the Appendix R diesel is 0.95.

III. Decay Heat Removal

A. How will the AFW turbine-driven pump control valve be powered under SBO conditions?

The AFW turbine-driven pump (ABFP 32) steam supply pressure control valve and speed control valves are serviced by the instrument air system. In the event of low pressure in the instrument air system, air is automatically supplied to the instrument air system from the service air system. The air system pressure at the speed control valve is also backed up by automatic operation of nitrogen cylinders that can supply gas pressure to the valves. The steam pressure control and speed control valves can also be aligned locally, if required, by using manual handwheels.

B. How will secondary steam relief be accomplished during an SBO event? FSAR Figure 10.2-2 indicates that there is a normally closed manual valve upstream of each PORV. If PORVs are to be used for steam relief, when will these valves be opened and will habitability be of a concern?

Relief of steam is performed using the atmospheric steam dump valves, also called PORVs (MS-PCV-1134 through MS-PCV-1137). The atmospherics are serviced by the instrument air system. In the event of low pressure in the instrument air system, air is automatically supplied to the instrument air system from the service air system. Each of the atmospherics have two backup supplies, a common nitrogen supply, and dedicated nitrogen bottles that can be lined up through a quick disconnect fixture. The atmospherics can be operated from the local control station, with no habitability concerns. The valves upstream (MS-3-1 through MS-3-4) of the atmospherics are administratively controlled in the open position, as indicated on drawing 9321-F-20173, Revision 33. The FSAR appears to indicate that the valves are closed, but this is only due to reduction of drawing 9321-F-20173. The inner portion of the valve was blackened by the reduction of the drawing.

IV. Battery Calculations

A. Demonstrate that the station batteries have adequate capacity to meet station blackout loads for one hour consistent with NUMARC 87-00 Section 7.2.2.

A battery capacity calculation was performed following the methodology of NUMARC 87-00, section 7.2.2. The calculation reviewed the battery ampere-hours (amp-hrs) necessary to meet SBO loads for one hour, and compared the results to the battery manufacturers capacity curves. The calculation included a temperature correction based on the lowest electrolyte temperature recorded in the previous five years. Design margin and age compensation factors were derived using IEEE standard 485-1983. The results of the calculation are shown in the table that follows. Batteries 31, 32, 33, and 34 have sufficient capacity to supply the required loads for one hour following an SBO event.

	Battery 31	Battery 32	Battery 33	Battery 34
One hour battery capacity (amp-hrs)	1105	1105	213	255
Capacity req'd to meet SBO loads for one hour	642	521	68	110
Percent of capacity needed to meet SBO loads for one hour	58	47	32	43

B. What loads, if any, will be stripped from the batteries to meet the required one hour of coping in response to a SBO?

The IP3 battery capacity calculations verified that the batteries have sufficient capacity to meet station blackout loads for one hour without stripping any loads.

V. Loss of HVAC

A. Explain the method used to identify dominant areas of concern (DAC), including a list of those areas that were considered.

To identify the dominant areas of concern, the IP3 operating procedures were reviewed to determine the equipment that may be operated for safe shutdown of the plant, and the location of this equipment. These equipment areas were then reviewed using the three factors given in NUMARC 87-00 (contains equipment required early in an SBO to remove decay heat, contains significant heat generators, and has no means of heat removal without operator action following an SBO). The areas considered were:

1. the Central Control Room,
2. the Control Building,
3. the Auxiliary Boiler Feedwater Pump Building,
4. the Auxiliary Boiler Feedwater Pump Room,
5. the Service Water Pump Pit,
6. the Primary Auxiliary Building, and
7. the Containment.

B. Describe the method used to calculate the temperature rise in the control room and AFW pump room. Include the initial temperatures assumed as well as any other quantifying assumptions.

The method used to calculate the temperature rise in the control room and the AFW pump room was the method prescribed in NUMARC 87-00, Section 7.2.4. For the AFW pump room, an initial temperature of 90°F was assumed. The

operating temperatures for the main steam lines were assumed to be 500°F at the inlet of the turbine, and 240°F at the turbine exhaust. For the control room, an initial room temperature of 78°F was assumed. A maximum of eight people were assumed to occupy the control room for the first four hours of an SBO event. The control room doors were assumed to remain closed during the first hour of an SBO. The Appendix R diesel generator and therefore air conditioning are assumed to be operating one hour after the SBO.

VI. Containment Isolation

A. Explain how IP3 plans to provide for containment integrity, consistent with the RG 1.155. The staff finds the information provided in Table 5.2-3 of plant FSAR insufficient for review (i.e., piping diameters are missing).

Assurance that appropriate containment integrity can be maintained was determined by using the guidance of RG 1.155 and NUMARC 87-00, section 7.2.5. All containment isolation valves were identified, and then it was determined which valves could be excluded from consideration based on the five criteria specified in RG 1.155. The only valves excluded as being less than three inches in diameter were valves 1814A, B, and C. All of the "valves of concern" (valves that can not be excluded based on the five RG 1.155 criteria) can be operated independent of the EDGs and also have some means of valve position that is independent of the Emergency AC system.

B. Explain any deviations from the NUMARC 87-00 and RG 1.155 containment isolation valve exclusion criteria as your March 29, 1990 submittal is unclear in this area.

The containment isolation valve exclusion criteria used for the IP3 containment integrity assessment did not deviate from the NUMARC 87-00 or Regulatory Guide 1.155 criteria.

VII. Reactor Coolant Inventory

A. Describe the method used to assess reactor coolant system inventory for one hour following onset of a SBO.

To assess reactor coolant inventory for one hour following initiation of the SBO event, the following leakages were assumed: seal leakage of 25 gpm per RCP, 10 gpm identified leakage (the maximum tech. spec. limit), 0.3 gpm per SG primary to secondary leakage (the maximum tech. spec. limit), and 120 gpm letdown flow, assumed to be isolated after 10 minutes (an equivalent letdown "leakage" of 20 gpm over one hour). This assumed IP3 inventory loss during an SBO was then compared to the "Loss of all AC Power" analyses performed by Westinghouse to support the Westinghouse Owners' Group Emergency Response Guidelines (ERGs), to determine whether the core would remain covered.

B. What primary system reactor coolant pump (RCP) leak rate was assumed?

As stated above, consistent with NUMARC 87-00, a leak rate of 25 gallons per minute per Reactor Coolant Pump was assumed.

C. What are the conditions of the reactor coolant system at the end of the SBO event?

IP3 will use the Appendix R diesel (available within one hour of the start of the SBO event) to power a positive displacement charging pump to cope with an SBO. Once charging flow is commenced (after about one hour), the subsequent inventory loss will be substantially offset. Therefore, the core will remain covered, and sufficient inventory will remain to maintain core cooling under natural circulation.

VIII. Provide the following three pieces of information:

A. Reliability data for the last 20, 50, and 100 starts of the emergency diesel generators and the Appendix R diesel generator.

Based on recent (7-31-91) unit reliability calculations, the combined performance of all three EDGs is:

1 failure in the last 20 demands
2 failures in the last 50 demands
3 failures in the last 100 demands

The IP3 EDG performance is within the NUMARC 87-00 exceedance trigger values (3 failures in 20 demands, 4 failures in 50 demands, and 5 failures in 100 demands) for a target reliability of 0.975. The most recently calculated individual EDG reliabilities over the last 100 start and load demands are: EDG 31, 98%; EDG 32, 98%; EDG 33, 99%. For the Appendix R diesel, there have been no failures over 12 starts and loads.

B. A list of the Station Blackout loads (including their kw loading values and quality assurance classification) that will be powered by the Appendix R diesel generator.

The following are Station Blackout loads that may be powered by the Appendix R diesel generator when bringing the plant to the hot shutdown condition. (The kw loading values are approximate.)

1. One charging pump (150 kw, QA category I)
2. One component cooling pump (224kw, QA category I)
3. Two service water pumps (280kw each, QA category I, M or Non-Category I, depending on specific pumps)

4. MCC-36A, MCC-36B, and MCC-36C (240kw, QA category I)

5. MCC-37 (67kw, QA category I)

6. MCC-39 (131kw, QA category I)

C. A list of the containment isolation valves not excluded under Section 3.2.7 of Regulatory Guide 1.155.

The following valves were not excluded under section 3.2.7 of Reg. Guide 1.155:

1. CB-3, CB-4: 80 foot air lock manual valves
2. CB-5, CB-6: 95 foot air lock manual valves
3. MOV-885A and 885B: RHR suction from containment sump
4. MOV-888A and 888B: RHR supply to high head pumps
5. 869A and 869B: containment spray line valves
6. MOV-850A, 850C, and 851A: SI pump discharge valves
7. MOV-1835A and 1835B: BIT discharge valves
8. MOV-743 and 1870: RHR miniflow valves
9. MOV-744: RHR discharge valve
10. MOV-222: RCP seal return valve

IP-3 ELECTRICAL DISTRIBUTION

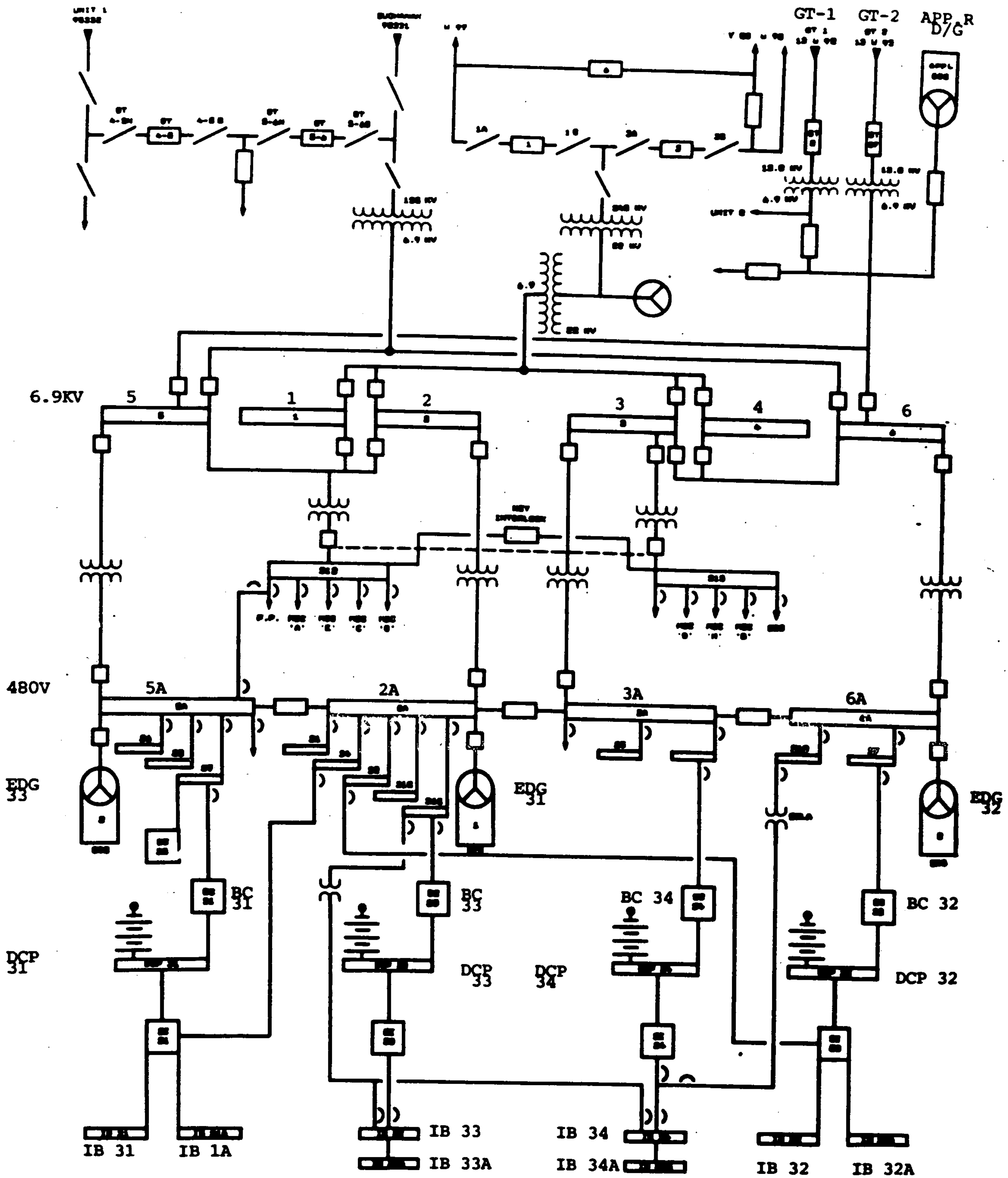

FIGURE 1