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December 28, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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Subject: Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Responses to FSAR Questions
NRC Docket Nos. 50-454, 50-455,
50-456 and 50-457

Dear Mr. Denton:

This is to provide advance copies of information which will be included in the Byron/Braidwood FSAR in the next amendment. Attachment A to this letter lists the enclosures which contain new or revised FSAR information.

One (1) signed original and fifty-nine (59) copies of this letter are provided. Fifteen (15) copies of the enclosures are included for your review and approval.

Please address further questions to this office.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

Enclosures

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Attachment A

List of Enclosed Information

I. Responses to FSAR Questions:

040.89	040.106	040.115
040.92	040.107	040.116
040.96	040.108	040.119
040.101	040.109	040.120
040.103	040.112	040.122
040.105	040.114	040.123
		040.125
		040.126
		040.129
		040.130
		040.132
		040.133
		040.134
		040.139
		040.140
		040.141
		040.158
		040.159

3073N

QUESTION 040.89

"The FSAR text and Table 3.2-1 states that the components and piping systems for the diesel generator auxiliaries (fuel oil system, cooling water, lubrication, air starting, and intake and combustion system) that are mounted on the auxiliary skids are designed seismic Category I and are ASME Section III Class 3 quality. The engine mounted components and piping are designed and manufactured to DEMA standards, and are seismic Category I. This is not in accordance with the Regulatory Guide 1.26 position that the entire diesel generator auxiliary systems be designed to ASME Section III Class 3 or Quality Group C. Provide the industry standards that were used in the design, manufacture, and inspection of the engine mounted piping and components. Also show on the appropriate P&ID's where the Quality Group Classification changes from Quality Group C."

RESPONSE

All auxiliary equipment up to the engine is designed to ASME Section III. The engine and engine-mounted components are designed in accordance to DEMA Standards. The generator is manufactured in accordance to the Electrical Manufacturers Standards. All interconnecting piping between the auxiliary skids and the engine is designed in accordance to ASME.

Engine mounted piping is designed to the Cooper-Bessemer standards which are indicated as DEMA Standards. The piping furnished is ASTM A106, Grade B and is acceptable under ANSI B31.1. The piping has been evaluated for seismic and wall thicknesses are dependent on both the seismic and service conditions. The piping meets or exceeds ANSI B31.1 design requirements.

QUESTION 040.92

"Provide a detail discussion (or plan) of the level of training proposed for your operators, maintenance crew, quality assurance, and supervisory personnel responsible for the operation and maintenance of the emergency diesel generators. Identify the number and type of personnel that will be dedicated to the operations and maintenance of the emergency diesel generators and the number and type that will be assigned from your general plant operations and maintenance groups to assist when needed.

"In your discussion identify the amount and kind of training that will be received by persons in each of the above categories and the type of ongoing training program planned to assure optimum availability of the emergency generators.

"Also discuss the level of education and minimum experience requirements for the various categories of operations and maintenance personnel associated with the emergency diesel generators."

RESPONSE

Twenty-six station personnel chosen from the operating, maintenance, quality control and training departments at Byron Station have attended a one-time basic maintenance course offered by the diesel-generator vendor. Further personnel training on the diesel-generators will be provided by the station training department. In addition, diesel control and instrumentation instruction is planned for future training, the initial course offered by the vendor, and subsequent training provided by the station training department. Other training is described in Section 13.2 of the FSAR. Onsite training will be of a quality equal to the initial vendor training program.

There are no dedicated personnel assigned to the diesel generator maintenance or operation. Operation and minor maintenance and troubleshooting are performed by or under the cognizance of a licensed operator with an equipment attendant observing operation locally. Maintenance is performed under the supervision of a Maintenance Foreman. Further qualification specifications for the above personnel can be found in Subsection 13.1.3 of the FSAR.

position, no loose wires, all test loads have been removed, and all valves are in the proper position to permit a manual start of the equipment. After the unit has been satisfactorily started and load tested, return the unit to ready automatic standby service and under the control of the control room operator.

"Provide a discussion of how the above requirements have been implemented in the emergency diesel generator system design and how they will be considered when the plant is in commercial operation, i.e., by what means will the above requirements be enforced."

RESPONSE

1. Though no load operation is necessary at times (i.e., warm-up periods), surveillance procedures will be written to ensure diesel-generator operation with a minimum loading of 25% of rated load. The duration of no load operation will be maintained below the manufacturer's recommended maximum.

2. Surveillance testing is specified in Chapter 16.0 (Technical Specifications) and meets the recommendations of the diesel-generator manufacturer and applicable NRC guides. See Appendix A for further discussion of Regulatory Guide 1.108.

3. Preventive maintenance on the diesel-generators will be done in accordance with the manufacturer's recommendations. Components which repeatedly malfunction or require constant attention will be investigated as required.

   The station keeps "Work Request" files for each diesel generator and "LER" files. Review of these will identify components which repeatedly fail. Commonwealth Edison will participate in vendor programs to identify and correct troublesome components.

4. Upon completion of repairs or maintenance and prior to starting and loading the diesel generator, applicable operating procedures will be used to verify that the diesel generator is ready for operation.

QUESTION 040.96

"Identify the vital areas and hazardous areas where emergency lighting is needed for safe shutdown of the reactor and the evacuation of personnel in the event of an accident. Tabulate the lighting system provided in your design to accommodate those areas so identified. Include the degree of compliance to Standard Review Plan 9.5.1 regarding emergency lighting requirements in the event of a fire."

RESPONSE

The Control Room, Essential Safety Features Switchgear Rooms, Auxiliary Electrical Equipment Rooms, and Remote Shutdown Rooms require emergency lighting for safe shutdown of the reactor and the evacuation of personnel in the event of an accident. The Control Room is equipped with regular, essential AC and DC station battery and fixed self-contained DC 8-hour battery pack lighting. The Essential Safety Features Switchgear Rooms are equipped with regular and essential AC lighting. The Auxiliary Electrical Equipment Rooms are equipped with regular, essential AC and DC station battery lighting. The Remote Shutdown Rooms are equipped with regular, essential AC and DC station battery pack lighting.

Station access and egress routes are equipped with DC station battery and/or self-contained DC 8-hour battery pack lighting.

Question 040.95 requested that we "identify all working stations on the plant site where it may be necessary for plant personnel to communicate with the control room..."

Question 040.96 requested that we "identify the vital areas and hazardous areas where emergency lighting is needed for safe shutdown..."

These areas are not necessarily the same, i.e., a working station requiring communication may not necessarily require emergency lighting. Therefore, the answers to both questions are correct, as is. Work areas listed in the response to Question 040.95 are provided with lighting as listed in the attached table.

TABLE Q40.96-1

VITAL AREA LIGHTING

AREA	NORMAL LIGHTING: REGULAR LIGHTING	NORMAL LIGHTING: AC ESS. LIGHTING	BACKUP LIGHTING: 125-VDC LIGHTING AND/OR BATTERY PACKS
Turbine Pedestal Areas Units 1 and 2	Yes	No	Yes
Manual Emergency Boration Valves 1CV8439 and 2CV8439	Yes	No	No
Spent Fuel Pool Areas	Yes	Yes	Yes
Diesel Generators Units 1 and 2	Yes	Yes	Yes
Relay House	Yes	No	No
Auxiliary Electrical Equipment Room Units 1 and 2	Yes	Yes	Yes
4-kV (ESF) Switchgear Room Units 1 and 2	Yes	Yes	No
Radwaste Evaporator Control Panel Area	Yes	Yes	Yes
Primary Sample Room	Yes	No	*No
Secondary Sample Room	Yes	No	No
H_2 and Stator Cooling Panel Units 1 and 2	Yes	Yes	*No

*Battery pack located within 100 feet.

A relief valve in the booster pump discharge regulates the supply to the injection pumps. A four-element duplex filter assures clean fuel to the high-pressure injection pumps. A combination differential pressure switch and indicator monitors this filter with high differential pressure annunciated on the diesel control panel. When the alarm occurs, the filter elements must be replaced.

Fuel oil supply pressure after the filter is indicated by a pressure gauge on the engine gauge panel (located on the diesel skid). A 1:1 ratio relay transmits a signal to a pressure gauge on the diesel control panel to indicate fuel oil pressure at the end of the injection pump fuel header. Low pressure in the engine fuel oil supply header will be annunciated on the diesel control panel.

Testing of the diesel engine fuel oil storage and transfer system instrumentation and controls will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the equipment manufacturer in the instruction manual.

The locations of the day tank and engine driven booster pump are as stated in the response to Question 040.22. The engine driven booster pumps have been designed and tested with the fuel supply elevation lower than the pump centerline. These pumps provide a sufficient suction lift to ensure adequate fuel supply to the injection pumps at all times.

During starting, the injection pump for each cylinder is supplied with fuel oil from a small 5 gallon day tank located on the generator end of the engine, above and between the cylinder banks. A check valve prevents drainage of this small supply tank when the diesel is not in operation.

Figure 9.5-1, Sheet 1 has been updated.

QUESTION 040.98

"The diesel generator structures are designed to seismic and tornado criteria and are isolated from one another by a reinforced concrete wall barrier. Describe the barrier (including openings) in more detail and its capability to withstand the effects of internally generated missiles resulting from a crankcase explosion, failure of one or all of the starting air receivers, or failure of any high or moderate energy line and initial flooding from the cooling system or any other plant system so that the assumed effects will not result in loss of an additional generator. (SRP 9.5.4, Part III, Item 2.)"

RESPONSE

The diesel generators are isolated from one another by a 12-inch thick wall constructed of hollow concrete blocks. The wall is seismically designed and carries a 3-hour fire rating. All piping penetrations are fire stopped. All HVAC penetrations utilize two, 1-1/2 hour fire dampers in series in the concrete wall common to the turbine building. The space between the block wall and ceiling is packed with thermofiber insulation.

The wall isolating the diesel generators is not designed to contain flooding of a diesel generator room. The high and moderate energy lines located in this room are identified in the response to Question 040.19. Five, 4-inch diameter floor drains are provided in each room. Each drain can handle 90 gpm.

There are no internally generated missiles postulated due to a crank case explosion or air receiver failure. There are twelve explosion doors in the crankcase of each engine. In addition, twelve crankcase explosion relief valves relieve a primary explosion while protecting operating personnel plus preventing entry of fresh air into the crankcase that could cause a secondary explosion. Air receivers are assumed to fail by cracking open to relieve pressure rather than fragmenting.

A 2-inch diameter Category II pipe supplies demineralized makeup water to the jacket water surge tank. A break in this line will result in a maximum flow of approximately 325 gpm which can be handled by the floor drains. All larger lines in the diesel generation are Category I moderate energy lines. The maximum size crack postulated (per Standard Review Plan) would result in leakage less than 325 gpm.

QUESTION 040.99

"Your response to request 040.16 is unacceptable. The outside fill connections and lines and the vent lines of the seven diesel oil storage supply tanks are safety related components, and as such are to be designed seismic Category I and tornado missile protected. Revise your system design accordingly."

RESPONSE

To accommodate the requirement for the vent and fill lines to maintain their integrity during design basic seismic events, additional supports will be added to the lines. The lines are protected from tornado missiles inside the auxiliary building.

The diesel oil storage tank fill and vent lines external to the buildings are not safety-related. The four 25,000 gallon diesel oil storage tanks (two 50,000 gallon tanks on Unit 2), are the only safety-related tanks which are required during a tornado. The Byron River screen house is not designed for tornados and, therefore, no credit is taken for the safety-related essential service water makeup system during tornados. The vents on all tanks are either 2 or 3 inch pipe and exit through the turbine building roof. Impact from tornado missiles will not result in loss of function of the vent. Breakage would occur prior to crimping on pipes of this size. The diesel oil storage tanks are filled from the fuel oil storage tank, rather than outside connections. The tanks would not require oil addition in the first few days after a tornado negating concern about damage to fill lines.

In the event of damage to the fill or vent lines, each tank has a capped off 4 inch line in the fill system (see Figure 9.5-1, Sheet 1). This Category I line could be opened and used as either an emergency fill or vent line if required. Additionally the overflow line (4 inch diameter) would serve to vent the tank. The portion of overflow line which penetrates the tank is Category I and could be used as a vent.

QUESTION 040.101

"Your response to request 040.15 is incomplete. Expand the FSAR to include a more explicit description of proposed protection of underground piping. Where corrosion protective coatings are being considered (piping and tanks) include the industry standards which will be used in their application. Also discuss what provisions will be made in the design of the fuel oil storage and transfer system in the use of a impressed current type cathodic protection system, in addition to water proof protective coatings, to minimize corrosion of buried piping or equipment. If cathodic protection is not being considered, provide your justification. (SRP 9.5.4, Part II, and Part III, item 4)."

RESPONSE

Underground piping in the diesel oil system is cleaned, blasted and coated with high density polyethylene X-TRU-Coat formulation or cleaned, blasted, primed and wrapped with Royston Greenline Accessory Wrap. Test points are provided for buried piping. Periodic tests will be made on the outdoor piping to monitor corrosion.

The internal surfaces of the six diesel oil storage tanks have been cleaned and coated with Mobil Series 78 for corrosion protection in accordance with Regulatory Guide 1.137 and ANSI-N195.

The need for a cathodic protection system is determined by measuring current flow between a buried pipe and the surrounding soil. This current flow is measured by using the test points on the pipe, a volt meter and a galvanic half cell. If the current flow indicates corrosion, an impressed current type of cathodic protection system is used to reduce current flow between the pipe and the surrounding earth. A cathodic protection survey has been made for Byron Station and a cathodic protection system will be added to protect underground piping.

QUESTION 040.103

"In Section 9.5.4 you do not state that diesel fuel oil is available from local distribution sources. Identify the sources where diesel quality fuel oil will be available and the distances required to be travelled from the source(s) to the plant. Also discuss how fuel oil will be delivered onsite under extremely unfavorable environmental conditions such as flooding. (SRP 9.5.4, Part III, Item 5b)."

RESPONSE

The principle fuel oil distributor utilized by Commonwealth Edison has many local outlets within 75 miles of the site. Fuel oil is purchased and allocated 1 year in advance of delivery. Access to the site is not limited to a single direction. Therefore plans to account for unfavorable environmental conditions are not necessary.

The principle fuel oil distirbutor utilized by Commonwealth Edison has many local outlets within 75 miles of the sites. Fuel oil is purchased and allocated 1 year in advance of delivery, however, fuel oil is available on an emergency basis from numerous suppliers.

Access to the sites under extremely unfavorable environmental conditions, such as flooding, is available by several alternate paths. Since the Byron site is located approximately 200 feet above the Rock River and the Braidwood site is approximately 5 miles from the Kankakee River, there is little potential for flooding conditions to develop that will cut off all access to the sites.

Other extremely unfavorable environmental conditions such as tornados would not be long lasting and any necessary access routes could be opened in a short period of time. Onsite diesel oil storage is sufficient to allow operation of each diesel generator for well over a week under partial load conditions. This is more than adequate time to replenish the diesel oil supply under the most unfavorable environmental conditions.

QUESTION 040.104

"Your response to request 040.19 is incomplete. Provide a discussion on the measures that will be taken in the design of the diesel generator facility to protect the safety related systems, piping and components from the effects of high and moderate energy line failure to assure availability of the design generators when needed. In addition provide a discussion on the effects of a main steam or main feed line break in the steam tunnel or a break in the circulating water line and resulting flooding of the turbine building on the operation of the diesel generators and their auxiliary systems. (SRP 9.5.4, Part III, Item 8 SRP 9.5.5, Part III, Item 4, SRP 9.5.6, Part III, Item 5; SRP 9.5.7, Part III, Item 3; SRP 9.5.8, Part III, Item 6c)."

RESPONSE

The flooding of the turbine building due to any internal or external causes will have no effect on diesel generator operation. The doors to the main oil storage rooms are watertight. The maximum flood level in the turbine building is below grade which ensures that the diesel generators will remain dry and operable.

As discussed in response to Question 040.19, the exhaust stack is the only high energy line in the diesel generator room. The maximum release from moderate energy line breaks can be handled by the drain system. Line breaks in the steam tunnel will not affect the diesel generators because the steam tunnel is designed to prevent steam or water releases from entering the auxiliary building. The analysis of a postulated break in the main steam tunnel is included in Section C3.6. Pipe whip restraints have been added as requested to prevent structural damage to the steam tunnel in the event of a line break.

QUESTION 040.105

"Section 9.5.4.1 emergency diesel engine fuel oil storage and transfer system (EDEFSS) does not specifically reference ANSI Standard N195 'Fuel Oil Systems for Standby Diesel Generators.' Indicate if you intend to comply with this standard in your design of the EDEFSS; otherwise provide justification for non-compliance. (SRP 9.5.4, Rev. 1, Part II, item 12)."

RESPONSE

The subject standard will be complied with except as discussed in the responses to Questions Q040.99 and Q040.106.

We comply with Regulatory Guide 1.137, Position C2.

Excluding vent and drain lines, all fuel oil piping is designed to ASME Section III Class 3 requirements in the diesel generator rooms and fuel oil storage tank rooms.

QUESTION 040.106

"You state in Section 9.5.4 of the FSAR that the 500 gallon 'day tank storage will provide for 72 minutes running time for each engine when loaded to its nameplate rating.' The seven day storage tanks have a total capacity of 50,000 gallons per diesel with a technical specification limit of no less than 47,000 gallons in the tanks. It appears that there is insufficient supply of diesel oil for 7 days of operation at rated load as required by SRP 9.5.4. Provide the results of an analysis to show that your present seven day diesel oil storage supply system will last seven days. (SRP 9.5.4, Rev. 1, Part II, item 10; Part III, item 5.b)."

RESPONSE

The capacity of the storage tanks is based upon Regulatory Guide 1.137, Paragraph C, Item C, method 2, the time dependent loads of the diesel generator.

The diesel oil storage tanks were sized based on a post-LOCA condition in which the diesel generators experienced the following loading: 100% for 2 hours, 75% for 48 hours, and 50% for 118 hours. Using the fuel consumption numbers provided by Cooper-Bessemer, the diesel will consume approximately 37,000 gallons of diesel fuel in one week based on this loading. A review of the diesel fuel oil consumption reveals the engine can operate for 5 days at rated load or 7 days at 75% load with the technical specification limit of 47,000 gallons in the tanks.

QUESTION 040.107

"Your response to request 040.17 is incomplete. You did not fully respond to the request for procedure for testing newly delivered fuel, periodic sampling and testing of on-site fuel oil (including interval between tests), interval of time between periodic removal of condensate from fuel tanks and periodic system inspection. Provide the requested information. (SRP 9.5.4, Part III, items 3 and 4)."

RESPONSE

Diesel-Generator Fuel Oil will be sampled monthly in accordance with a Commonwealth Edison Company procedure already established. Procedures will be written to ensure that fuel oil is sampled upon delivery and that the system is inspected and that condensate is removed from the storage tanks in compliance with applicable NRC guides. Compliance with regulatory guides is discussed in Appendix A.

Periodic sampling will be in accordance with Regulatory Guide 1.137.

QUESTION 040.108

"Assume an unlikely event has occurred requiring operation of a diesel generator for a prolonged period that would require replenishment of fuel oil without interrupting operation of the diesel generator. What provision has been made in the design of the fuel oil storage fill system to minimize the creation of turbulence of the sediment in the bottom of the storage tank. Stirring of this sediment during addition of new fuel has the potential of causing the overall quality of the fuel to become unacceptable and could potentially lead to the degradation or failure of the diesel generator."

RESPONSE

A filter has been provided on the fill lines to the diesel oil storage tanks. The filters are rated 5 micron, 98% removal. In addition, filters have been provided on the discharge of each diesel oil storage tank transfer pump. The rating of those filters is also 5 micron, 98% removal.

Diesel oil will be trucked on site immediately whenever a prolonged run is anticipated. The diesel oil tanks are top filling tanks which will be maintained full by transfer from the tank trucks to minimize turbulence at the bottoms of the tanks.

QUESTION 040.109

"Your failure modes and effects analysis for the diesel generators fuel oil system and the other diesel generator auxiliary systems is incomplete or non-existent. Expand and/or provide a failure mode and effects analysis for these systems. Include in the analysis failures of pumps, tanks, instrumentation and controls. Show that a failure of the piping between subsystems (engine cooling water jacket, lube oil cooler, and engine air intercooler) does not cause total degradation of the diesel generator systems."

RESPONSE

All subsystems are completely independent for each diesel generator. Failure of a subsystem for one diesel generator does not affect the operation of the other diesel generator.

The jacket water cooler transfers heat from the closed loop water system of the engine to the essential service water system. A tube rupture would casse essential service water to enter the jacket water system of the engine since the service water system operates at a higher pressure. The consequences of this tube rupture would be that additional water would be placed in the jacket water system, perhaps in sufficient quantities, to cause the volume to expand to the point of overflowing the standpipe. Providing the overflow does not exceed the room drain capacity, there will be no problem.

The lube oil cooler interfaces the lubricating oil of the engine with the closed loop jacket water system. If a tube were to rupture, oil would enter the jacket water system due to the higher operating pressure of the oil systems. Small quantities of oil in the jacket water system will have no detrimental effect. The oil sump low level alarm will indicate excessive leakage from the lube oil system.

Failure of a diesel system such as lube oil or cooling water, does not affect the operation of the other diesel.

QUESTION 040.112

"Indicate the measures to preclude long-term corrosion and organic fouling in the diesel engine cooling water system that would degrade system cooling performance, and the compatability of any corrosion inhibitors or antifreeze compounds used with the materials of the system. Indicate if the water chemistry is in conformance with the engine manufacturers recommendations. (SRP 9.5.5, Part III, Item 1c.)"

RESPONSE

A chemical additive will be used to control corrosion of the diesel engine cooling water system. The diesel engine cooling water corrosion inhibitor to be used at Byron will be NALCO 39L which contains nitrites, borates, and silicates. This product is also in use at La Salle County and Quad-Cities Stations.

Procedures are being developed that will include operator actions required to prevent harmful effects to the diesel engine. They will be available for onsite review prior to plant operation.

Testing of the diesel engine cooling water system instrumentation and controls will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the equipment manufacturer in the instruction manual.

The procedures are not fully developed but will include the engine manufacturer's supplied recommendations.

The diesel engine cooling water system instrumentation and controls will be tested monthly during Technical Specifications required surveillance testing.

QUESTION 040.114

"Describe the provisions made in the design of the diesel engine cooling water system to assure that all components and piping are filled with water. (SRP 9.5.5, Part III, Item 2)."

RESPONSE

The jacket water standpipe contains an adequate supply of water for circulation through the system. A level controller on the standpipe maintains a sufficient supply of makeup water from the demineralized water flushing system. The standpipe also contains a sight glass and low level alarm.

The top of the standpipe is approximately 20 inches above the cooling water outlet piping to provide for proper deaeration and thermal expansion. The velocity in the standpipe of 0.65 feet per second is within the limits specified by Cooper-Bessemer for deaeration. The thermal expansion of 12.5 inches can be accommodated within the 20 inch vertical measurement.

QUESTION 040.115

"The diesel generators are required to start automatically on loss of all offsite power and in the event of a LOCA. The diesel generator sets should be capable of operation at less than full load for extended periods without degradation of performance or reliability. Should a LOCA occur with availability of offsite power, discuss the design provisions and other parameters that have been considered in the selection of the diesel generators to enable them to run unloaded (on standby) for extended periods without degradation of engine performance or reliability. Expand your PSAR/FSAR to include and explicitly define the capability of your design with regard to this requirement. (SRP 9.5.5, Part III, Item 7)."

RESPONSE

The time limitation for operating a diesel generator at rated speed and no load is 3000 hours per year.

See also the response to Question 040.93.

The diesel generators will be run for 1 hour at 25% load following each 8 hours of continuous no load operation.

QUESTION 040.116

"You state in section 9.5.5 each diesel engine cooling water system is provided with an expansion tank to provide for system expansion and for venting air from the system. In addition to the items mentioned, the expansion tank is to provide for minor system leaks at pump shafts seals, valve stems and other components, and to maintain required NPSH on the system circulating pump. Provide the size of the expansion tank and location. Demonstrate by analysis that the expansion tank size will be adequate to maintain required pump NPSH and make up water for seven days continuous operation of the diesel engine at full rated load without makeup, or provide a seismic Category I, safety class 3 make up water supply to the expansion tank."

RESPONSE

Each diesel generator utilizes a 590 gallon jacket water standpipe designed for system thermal expansion and deaeration.

The diesel generator manufacturer's operation experience indicates the 590 gallon standpipe is adequately sized for 7 days continuous operation of the diesel without makeup to the jacket water system. The actual leakage from the jacket water system will be determined during station performance testing. If the leakage observed exceeds the required capacity of the standpipe for the 7 days of operation, a backup supply from the Category I essential service water system can be added. This is, however, undesirable since essential service water does not meet the manufacturers water quality standards.

The makeup water is supplied from the Category II demineralized water supply.

Water can also be added manually should the Category II demineralized water supply be unavailable. Adequate NPSH will be available to the jacket water pump at all times.

A sight glass and low level alarm are provided on the standpipe.

QUESTION 040.119

"Describe the instrumentation, controls, sensors and alarms provided for monitoring the diesel engine air starting system, and describe their function. Describe the testing necessary to maintain a highly reliable instrumentation, control, sensors and alarm system and where the alarms are annunciated. Identify the temperature, pressure and level sensors which alert the operator when these parameters exceed the ranges recommended by the engine manufacturer and describe any operator actions required during alarm conditions to prevent harmful effects to the diesel engine. Discuss system interlocks provided. Revise your FSAR accordingly. (SRP 9.5.6, Part III, item 1)."

RESPONSE

A panel on each air tank contains a local pressure gauge, a pressure switch to start the motor-driven air compressor when the air tank pressure declines to 240 psig and stop the compressor at 250 psig, and a pressure switch to annunciate low starting system air pressure (175 psig) on the diesel control panel. The air compressors can also be manually started by a control switch on the diesel control panel. A duplex pressure gauge on the diesel control panel monitors the starting air pressure supplied to the engine for both left and right banks of the air start valves.

The only interlock on this system is discussed in the response to Question 040.120 under "Starting Air Controls."

Testing of the diesel engine air starting system instrumentation and controls will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the equipment manufacturer in the instruction manual.

A low pressure alarm is provided on the diesel control panel but is not specifically annunciated in the control room. Annunciation in the control room indicates a problem with the diesel generator system but individual alarms are not provided. A high pressure alarm is not provided.

Testing of air start instrumentation is performed during the Technical Specifications monthly surveillance of the diesel generators.

QUESTION 040.120

"Expand your description of the diesel engine starting system. The FSAR text should provide a detail system description of what is shown on Figure 9.5.3. The FSAR text should also describe: 1) components and their function, 2) instrumentation, controls, sensors and alarms, and 3) a diesel engine starting sequence. In describing the diesel engine starting sequence include the number of air start valves used and whether one or both air start systems are used."

RESPONSE

General

The engine is started using compressed air (250 psi), furnished by two separate motor driven air compressors mounted on the starting air skid. Each compressor pumps air through a check valve past a relief valve through a refrigerant type air dryer into an air tank. This is a dual system with either half capable of starting the engine.

Compressed air from the starting air tanks is applied to the starting air control valves, on the engine, which are controlled by starting air solenoid valves. When the starting air control valves open, starting air is supplied to both banks of air start valves and air distributors. One start valve is located in each cylinder head and all are controlled by the air distributors.

Normally both starting air control valves open simultaneously and air is taken from both tanks. If a malfunction occurs and one of the control valves fail to open, the crossover piping will admit air to the other bank of cylinders. As the air tanks lose pressure, the compressors start to replenish the air supply. If both compressors are inoperative, the air tanks have sufficient capacity to provide four starts with the existing pressure in the tanks.

Each individual air tank has sufficient capacity to provide for four starts.

On each side of the engine a line with a check valve is connected from the turbocharger air discharge to the starting air header at the front of the engine. The purpose of this is to continuously purge the piping to prevent the possibility of an explosion from a leaky air start valve and to prevent condensation of moisture in the air start piping on the engine. This warm turbocharger air vents continuously through the orificed check valves and out the vent port in the starting air control valve.

The piping between the air start valve and the air control valve is continuously purged with air from the turbocharger discharge. This air is diesel combustion intake air which has been heated and compressed. This air is filtered low humidity air ranging in temperature between 200° and 300° F. The purging will eliminate the possibility of an explosion due to a leaky air start valve and also prevent any condensation buildup in the air start piping while the engine is running. When this air is cooled to ambient temperature, the relative humidity would be less than 100% and, therefore, this system will not introduce condensation into the air start piping.

A revised drawing will be provided to show all valves, interlocks, etc.

Starting Air Controls

Air applied to the starting air control valve is blocked but flows out an alternate port through a check valve to the manual control air valves. If all four shut-off valves are open, control air flows through the shuttle valve to the engine controls and shutdowns and through filters to the interlock valves. If the turning gear is disengaged, these interlock valves are open and air flows to the solenoid valves. If these solenoid valves are activated, air flows through them and a shuttle valve, thus admitting air to the distributors and air start valves in each cylinder head.

When the starting signal is turned off, air vents from the distributors and cylinder heads through the orificed check valves and out the vents in starting air control valves.

Air Compressors

A panel on the air tank contains a pressure gauge, pressure switches to start and stop the compressor automatically, test valves and connections and shutoff valves The compressors can also be started by manually setting the switch on the local control panel to the "HAND" position.

Each compressor is driven by a 15 hp motor and delivers 32.2 cfm to the 96 ft^3 air tank. Due to the interconnecting piping, both tanks should be depleted at the same rate. Therefore, both compressors will start to replenish the air supply at approximately the same time. The pressure switches on each air tank panel start the compressor at 240 psi falling and stops it at 250 psi. Pressure relief valves are set at 265 psi.

Air Dryer

An air dryer is located between the compressor and the air tank and runs continuously. Lights on the control panel show whether the dryer is running or stopped. These dryers remove all moisture from the air before it enters the tank. This dryer is the refrigerated type and contains a heat exchanger with two blowers, a separator and an air dryer with two motors. Three moisture traps are provided in the dryer, one for each piece of equipment.

During the Technical Specifications monthly surveillance, the bottom drains on the air receivers will be opened to check for condensate.

Starting Air Control Valve

This valve is air operated with a single inlet and a double outlet. Air from the tanks must be applied to this valve at all times in order to supply the engine control system and the automatic starting system. The outlet is normally closed, by a spring, until starting is required. Control air is then applied to the top of the piston which overpowers the spring and unseats the valve to admit starting air to the distributor and air start valves.

When the engine starting sequence has been completed and control air is removed from the valve, spring force seats the valve and unseats the passage to the vent.

Starting Air Distributors

The air distributors act as timers to open and close the air start valves in each cylinder head. The distributors are driven off the forward end of the camshafts by a splined shaft and a flexible coupling.

The bronze distributor body has an air inlet port that is connected to the end of the starting air header on its particular bank. Ports on the body are connected to the air starting valves according to the firing order of the engine. A steel rotor inside the body turns at engine speed. Annular grooves on the rotor are designed to connect with the ports on the distributor body to admit air to the proper port. The inlet port is in position to admit pressure to the top port on the distributor body. As the rotor turns, the next port on the body is uncovered by the groove on the rotor. After each port is closed by the rotor, it is vented. The starting air valves close as air is vented from the distributor through the distributor bracket as the distributor rotor continues to rotate.

QUESTION 040.122

"For the diesel engine lubrication system in Section 9.5.7 provide the following information: 1) define the temperature differentials, flow rate, and heat removal rate of the interface cooling system external to the engine and verify that these are in accordance with recommendations of the engine manufacturer; 2) discuss the measures that will be taken to maintain the required quality of the oil, including the inspection and replacement when oil quality is degraded; and 3) describe the capability for detection and control of system leakage. (SRP 9.5.7, Part II, Items 8a, 8b, 8c, Part III, Item 1)."

RESPONSE

The lube oil coolers utilize jacket water for cooling. The jacket water enters at approximately 130° F and exits at approximately 160° F. The lube oil coolers have 1958 ft^2 of surface area, an overall heat transfer coefficient of 61 Btu/hr-ft^2-°F, and a log mean temperature difference of 20.38° F. The heat removal rate is approximately 2.44×10^6 Btu/hr.

Diesel lube oil will be sampled and analyzed monthly in accordance with the recommendations in the diesel generator instruction book.

Lube oil leakage is observable via sight glass, low level alarm, visual observation of floor and jacket water samples.

QUESTION 040.123

"What measures have been taken to prevent entry of deleterious materials into the engine lubrication oil system due to operator error during recharging of lubricating oil or normal operation. (SRP 9.5.7, Part III, Item 1c)."

RESPONSE

Oil addition to the diesels will be directed by station personnel who have been trained as described in Question 040.92. This training will include emphasis on the cleanliness requirements for lube oil addition. The manufacturers requirements in this area will be included to ensure proper maintenance of the diesels.

will be automatically tripped when the pressure drops to 30 psig if the engine is being operated in test mode. The turbocharger lube oil pressure switch trip function is bypassed during emergency operation.

Pressure gauges are located on the engine gauge panel to monitor lube oil pressure to the engine and turbocharger.

Testing of the diesel engine lubrication oil system instrumentation and controls will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the equipment manufacturer in the instruction manual.

The full-flow lube oil filter containes 146 replaceable elements which operate in parallel to give the required capacity and degree of filtration. The elements are 16 micron and are nominally 2-11/16 inches in diameter and 27 inches long. During normal running conditions with the lube oil at operating temperature the pressure drop through the filter will be approximately 5 psi. The elements are replaced when the differential pressure reaches 20 psi. A high pressure alarm is set at a differential of 25 psi.

Two oil strainers are mounted on the auxiliary skid in the oil header downstream of the filter. The strainers prevent any foreign particles such as pipe scale, weld slag, rust, or debris from a ruptured oil filter from entering the engine. Each strainer element is a 150 mesh wire screen made of 304 Stainless Steel.

Lube oil system instrumentation and controls will be tested during Technical Specifications monthly surveillance of the diesel generators.

QUESTION 040.125

"Expand your description of the diesel engine lube oil system. The FSAR text should include a detail system description of what is shown on Figure 9.5-4. The FSAR text should also describe; 1) components and their function, 2) instrumentation, controls, sensors and alarms, and their set points, and 3) a diesel generator starting sequence for a normal start and a emergency start. Revise your FSAR accordingly."

RESPONSE

General

The primary purpose of the lubrication system is to lubricate bearings and other moving parts. Other functions performed by the oil system are; keeping engine warm to enhance immediate start-up, cooling the pistons, and keeping the inside of the engine clean by preventing rust and corrosion.

Two oil pumps serve this system, a full capacity main pump and a circulation and prelube pump.

When the engine is not operating, and during startup, the circulation pump furnishes oil to keep the engine warm and to pre-lube it.

When the engine is running, the engine-driven oil pump takes oil from the sump and pumps it to a thermostatic valve. This valve directs oil through and/or around the oil cooler as the the temperature of the oil dictates. Check valves prevent oil from flowing back through the circulating pump. After leaving the thermostatic valve and/or cooler, the oil flows through a filter, strainers and to the engine main header.

A small header, off the inlet end of the main header (at the forward end of the engine) supplies oil to the turbocharger, rocker arm headers, camshaft bearing headers, air distributors and to the forward camshaft bearing on the right bank. The camshaft drive gear on both banks receive oil from the camshaft bearing headers at the drive end. Oil from all these points with the exception of the turbocharger drains back to the sump by gravity. Oil from the turbocharger is returned to the engine sump by drain piping.

Ratio relays transmit signals to the oil pressure gauges on the local gauge panel.

The engine internal oil header runs the length of the engine. From this header flexible lines supply oil to the main bearing caps. From the main bearings oil flows through drilled passages in the crankshaft to the connecting rod bearings,

QUESTION 040.126

"Provide the source of power for the diesel engine prelube oil pump, lube oil drain tank transfer pump, and motor characteristics, i.e., motor hp, operating voltage, phase(s) and frequency. Also provide the pump capacity and discharge head. Revise your FSAR accordingly."

RESPONSE

The source of power and motor characteristics for the diesel engine prelube oil pump and lube oil drain tank transfer pump are as follows:

Diesel Generator A

	Source of Power	Characteristics
Prelube Oil Pump	Motor Control Center 131X4 (1AP26E)	15 hp, 460-V, 3 phase, 60 Hertz

Diesel Generator 1B

	Source of Power	Characteristics
Prelube Oil Pump	Motor Control Center 132X4 (1AP28E)	15 hp, 460-V, 3 phase, 60 Hertz

The lube oil drain tank transfer pump serves both Diesel Engine 1A and 1B. It is fed from Motor Control Center 134Y1(1AP52E). The pump motor is 7.5 hp, 460-V, 3 phase, 60 Hertz.

Circulating (prelube) oil pump: 120 gpm, 50 psig.
Lube oil drain tank transfer pump: 25 gpm, 75 psig.

The lube oil drain tank and pump are shown in Figure 9.5-1, Sheet 4. A revised P&ID of this equipment will be issued. This system is designated Safety Category II and is completely isolated from each diesel as shown in Figure 9.5-1, Sheet 1.

The 3000 gallon lube oil drain tank, pump and purifier is shown on revised Figure 9.5-1, sheet 4. The equipment is located in the Turbine Building at elevation 357 feet 6 inches and is designated Safety Category II. The equipment is isolated from each diesel as shown in Figure 9.5-1, Sheet 1.

The purifier is designed to filter the lube oil to remove all particulate matter 10 microns and larger. A water separator removes all free water. The unit is designed in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code.

The lube oil drain tank is equipped with heaters to maintain the lube oil at 150° F. A level switch in the tank automatically stops the pump on low level.

QUESTION 040.129

"Describe the instrumentation, controls, sensors and alarms provided in the design of the diesel engine combustion air intake and exhaust system which alert the operator when parameters exceed ranges recommended by the engine manufacturer and describe any operator action required during alarm conditions to prevent harmful effects to the diesel engine. Discuss systems interlocks provided. Revise your FSAR accordingly. (SRP 9.5.8, Part III, item 1 & 4)."

RESPONSE

One temperature indicator and one resistance temperature detector are located in each of the two intake inlet manifolds. The resistance temperature detectors are connected to the temperature meter on the diesel control panel. A temperature test well is also located in each intake manifold.

Thermocouples are used to monitor the exhaust temperature out of each cylinder and exhaust temperature in and out of the turbocharger. The thermocouples are connected to a temperature meter on the diesel control panel.

Inlet manifold pressure and turbocharger outlet pressure are displayed by a pressure indicator on the diesel control panel.

The combustion air intake and exhaust system has no interlocks or alarm instrumentation.

Testing of the diesel engine air intake and exhaust system instrumentation will be done on a periodic schedule and, where applicable, in accordance with maintenance and test recommendations made by the equipment manufacturer in the instruction manual.

The air intake and exhaust system instrumentation will be tested during the Technical Specifications monthly surveillance of the diesel generators.

QUESTION 040.130

"Show by analysis that the distance of the SAT's from the D.G. Building Air Intake Structures is adequate to assure a clean air supply in case of a fire at the SAT's. Regulatory Guide 1.120 states that SAT's should be located a minimum distance of 50 feet from any safety related building, but this may not be sufficient for the diesel generator building air intakes, due to adverse environmental or meteorological conditions."

RESPONSE

The transformers are all a minimum of 50 feet horizontally and 70 feet vertically from the nearest diesel air intake structures opening on the roof of the Auxiliary Building.

As stated in Subsection 9.5.8 of the FSAR, 40% excess air is supplied to each diesel generator. Therefore, an extraordinarily large quantity of smoke and noncombustible gases would be required to affect the diesel performance. In addition, each transformer is protected by an automatic water spray deluge system to further reduce generation of any combustion products.

The louvered openings which face the transformers pass only half of the air flow which is required for train A. The environmental conditions which could transport the combustion products of a transformer fire to these openings would preclude the possibility of their reaching the air intake for train B. Also, the same environmental conditions would cause significant dilution of the combustion products such that diesel operation on train A would be unaffected. In addition, the diesel is supplied with 40% excess air which requires that more than 80% of the air flowing into the intake be noncombustible in order to affect the diesel performance. The intake velocity of these louvered openings is less than 500 fpm further reducing the likelihood of such an event affecting diesel performance.

QUESTION 040.132

"Show by analysis that a potential fire in the diesel generator building together with a single failure of the fire protection system will not degrade the quality of the diesel combustion air so that the remaining diesel will be able to provide full rated power."

RESPONSE

The diesel-generator building combustion and cooling air intakes are located on the roof of the Auxiliary Building. The room exhausts are directed into the Turbine Building. The combustion air is piped directly to each diesel so there is no mixing of combustion air and room air in the diesel-generator rooms. Combustion products from a fire in any diesel-generator room will have no effect on the operation of any diesel generator.

Operation of the CO_2 fire protection system will likewise have no effect on diesel generator operation.

The diesel generator air intakes (combustion and ventilation air) are completely independent for the two redundant diesel generators. The air intakes on the auxiliary building roof are separated. In the event of complete failure of an intake fire damper, the diesel generator room vent fan could continue to run until the diesel generator was shut down or until closure of exhaust fire dampers caused an increase in exhaust pressure. When the fan is tripped, the motor operated intake dampers automatically close. As a result, it is not possible for the smoke and CO_2 to travel out the air intake.

QUESTION 040.133

"Experience at some operating plants has shown that diesel engines have failed to start due to accumulation of dust and other deliterious material on electrical equipment associated with starting of the diesel generators (e.g., auxiliary relay contacts, control switches - etc.). Describe the provisions that have been made in your diesel generator building design, electrical starting system, and combustion air and ventilation air intake design(s) to preclude this condition to assure availability of the diesel generator on demand.

"Also describe under normal plant operation what procedure(s) will be used to minimize accumulation of dust in the diesel generator room, specifically address concrete dust control. In your response also consider the condition when Unit 1 is in operation and Unit 2 is under construction (abnormal generation of dust)."

RESPONSE

Air filters are provided in the combustion air intakes. Louvered enclosures on the roof of the auxiliary building will minimize the dust reaching these filters. The diesel-generator room HVAC system air intake is also located on the roof (in the same louvered enclosure) but is not equipped with filters.

Most of the diesel engine generator control equipment, located in the diesel engine generator room, is mounted on the engine generator control cabinet, which is a NEMA Type 12 (dust tight) enclosure. The remaining control equipment (level switches, thermostats, weatherproof, NEMA 4 (dust tight), and NEMA 7 "Explosion proof" (Class I, Division 1, Group D) enclosures.

All major construction in Unit 2 (which would generate concrete dust) will be complete before Unit 1 goes into operation. The diesel engine generator local control panel will be cleaned of dust prior to operation.

Thus, due to the outside location of the ventilation air intake, the control equipment enclosures, the short time interval between the Unit 1 and 2 schedule, and the general house cleaning, accumulation of dust (from Unit 2 construction or from any other source) on electrical device contacts is not anticipated.

QUESTION 040.134

"Figures Q040.30-1, Q040.30-2 and Q040.30-3 show that the diesel engine combustion air intake openings start at as low as elevation 478'-9" and go the approximately elevation 500: Figure 1.2-1 shows that the safety valve room roof is at elevation 416'4", the safety valve penthouse roof is at elevation 496'-0" and the turbine building roof is at elevation 534'. A steam line break or the opening of one or more safety valves may release steam to the outside in the area of the safety valve room and/or penthouse. Since these rooms are located in close proximity to the diesel generator air intakes and below the intake openings, it appears that diesel generator operation could be degraded by steam entering the combustion intakes by flow path and/or confinement due to environmental or meteorological conditions. Show by analysis that the diesel engine combustion intake system and the diesel engine will not be affected by a discharge of steam from these structures."

RESPONSE

Figures Q040.134-1 and Q040.134-2 in conjunction with Figure Q040.131-1 more clearly illustrate the locations of the relief valve vent stacks in relation to the diesel-generator combustion air intakes. The relief valve vents are above the air intakes and do not discharge directly toward the intakes. Diesel operation will not be degraded. Also, the louvers will act as baffles to keep most of the moisture from entering the intakes.

As can be seen in Figures Q40.134-1 and Q40.134-2, the relief valve stacks are located approximately 31 feet from the air intakes. The stacks are 28 inches in diameter and 1/2 inch thick. A tornado missile will not impart damage on these stacks which would affect diesel generator operation.

The digital controller positions the throttle and governor valves by means of electro-hydraulic servo loops. In the event of a partial load drop, the interceptor valves are closed by energizing a solenoid valve on the appropriate valve actuators. The digital controller receives three feedbacks from the turbine: speed, generator megawatt output, and first stage pressure which is proportional to turbine load.

The primary objective of the overspeed protection controller (OPC) is to prevent excessive turbine overspeed such that a turbine trip is avoided. The OPC system consists of three parts: Close interceptor valves (CIV), load drop anticipation (LDA) and overspeed control.

The first part, CIV or fast valving, provides an improved margin of stability during a partial load loss, such as a system fault. The CIV function is based on a mismatch between turbine mechanical power and electrical load. A pressure transducer, located at the low pressure inlet zone, is provided to indicate turbine mechanical power. A three-phase watt transducer provides generated kW information. These two quantities are compared. If they differ by an adjustable preset amount and neither transducer has failed, or an external contact that requests CIV be closed, the protective logic is actuated which causes the interceptor valves to close in approximately 0.15 seconds. If the generator breaker remains closed, this condition is detected as a partial load loss. The interceptor valves remain closed for a period of time (adjustable from 0.3 to 1.0 seconds). After the time delay, the protective logic is reset and the interceptor valves reopen. If the external contact remains closed, CIV action cycles again. If a power mismatch initiated the CIV, the turbine pressure and kilowatt transducers must be approximately equal before the CIV circuit is capable of being triggered on mismatch again. Closing the interceptor valves provides a momentary reduction in generator output and aids in maintaining power system stability.

The second part, LDA or overspeed, controls overspeed in the event of a full load separation (main generator breaker open). This action is initiated prior to an actual overspeed condition. When the turbine pressure is greater than 30% or the turbine pressure signal is failed low and the breaker opens, the DEH reference (speed or load setpoint) is set to rated speed, and the LDA is set, requesting OPC action. All governor and interceptor valves are then rapidly closed. Load drop anticipator reset is determined by the speed being less than 103% and an elapsed time of 5 seconds following breaker opening.

QUESTION 040.139

"Provide a discussion of the inservice inspection program for throttle-stop, control, reheat stop and interceptor steam valves and the capability for testing essential components during turbine generator system operation. (SRP 10.2, Part III, items 5 and 6)."

RESPONSE

There is no inservice inspection program for non-safety-related components. The term "inservice inspection" is used only to refer to the programs which pertain to safety-related systems.

The recommendation for weekly stroking of the valves in question (SRP Section 10.2) will not be implemented on Byron/Braidwood. Although the valves in question could be operated during an accdient, no credit is taken for operability of these valves in any safety analysis. Failure of these valves will not affect the safe shutdown capability of the plant. Operation of these valves while the plant is at power may result in unnecessary transient loadings on the turbine generator system or reactor trips. To increase the reliability of these valves, operability will be checked as part of the normal turbine generator startup procedure.

Maintenance will be performed on these valves as recommended by the manufacturer. If difficulties are encountered during turbine startup testing, maintenance schedules will be revised to increase reliability.

QUESTION 040.140

"In section 10.2.3.6 you discuss in-service inspection and exercising of the main steam turbine stop and control and reheater stop and intercept valves. You do not discuss the in-service inspection, testing and exercising of the extraction steam valves. Provide a detail description of: 1) the extraction steam valves, and 2) your inservice inspection and testing program for these valves. Also provide the time interval between periodic valve exercising to assure the extraction steam valves will close on turbine trip."

RESPONSE

The extraction steam valves fall under ANSI B31.1 rules which do not require inservice inspection or testing. A description of the extraction steam valves can be obtained from the response to Questions 040.34 and 040.138.

See the discussion on inservice inspection in response to Question 040.139.

The extraction steam valves are not safety-related components. No credit is taken for these valves in any safety analysis. Failure of these valves will not affect the safe shutdown capability of the plant.

The extraction steam valves will be tested and maintained per normal operating procedures and recommended maintenance schedules. The Standard Review Plan does not recommend testing or periodic maintenance of these valves.

QUESTION 040.141

"Provide a complete list of turbine generator protective trips. Separate these trips into two categories, 1) those that will trip the turbine due to mechanical faults, and 2) those that will trip the turbine due to generator electric faults."

RESPONSE

All turbine generator protective trips are shown on the "Turbine Trip Protection Block Diagram" (6/20E-1-4026B).

Drawing 6/20E-1-4026B, Revision A was transmitted to Robert Giardina (NRC) by Sargent & Lundy (B. G. Treece) letter dated December 1, 1981.

QUESTION 040.158

"In Section 10.4.4 you have not discussed tests and initial field inspection nor the frequency and extent of inservice testing and inspection of the turbine by-pass system. Provide this information in the FSAR. (SRP 10.4.4, Part II)."

RESPONSE

The turbine bypass system (referred to as the steam dump system in this FSAR) falls under ANSI B31.1 rules which do not require inservice inspection and testing. Initial field inspections are performed in accordance with good construction practices. Tests, being written to demonstrate system operation prior to start-up, are not included in the FSAR because the system is not safety-related.

See the discussion on inservice inspection in response to Question 040.139.

The turbine bypass system is not a safety-related system and no credit is taken for use of this system in any safety analysis. The Standard Review Plan (Section 10.4.4) lists as criteria for acceptability of the turbine bypass system (TBS) only that:

a. Failure of the TBS to operate will not preclude operation of any essential systems; and

b. Failure of the TBS high energy piping will not have adverse effects on safety-related systems or components that may be located close to the system.

The turbine bypass system meets these criteria.

QUESTION 040.159

"Provide the results of an analysis indicating that failure of the turbine by-pass system high energy line will not have an adverse effect or preclude operation of the turbine speed control system or any safety related components or systems located close to the turbine by-pass system. (SRP 10.4.4, Part III, item 4)."

RESPONSE

The failure of the turbine bypass high energy lines or any other high or moderate energy line will have no appreciable effect on the Turbine Speed Control System. A description of the turbine speed control system is provided in our response to Question 040.33.

The turbine bypass (steam dump) lines are located along J-line above elevation 426 feet 0 inch, next to the condenser.

The location of the turbine speed control sensors are on elevation 451 feet 0 inch on the turbine. A line failure may affect the electrical or hydraulic portions of the overspeed trip devices however, failure of the hydraulic portion will automatically trip the turbine. The mechanical overspeed trip device will not be affected by any line break.

There are no safety-related systems inside the turbine building.