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November 1, 1982

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

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

In order to facilitate the completion of the review of the Catawba FSAR, Duke Power Company is transmitting herewith responses, revised responses, or partial responses to the following FSAR questions:

410.21	430.55	430.62	440.48
410.33	430.56	430.63	460.04
420.8	430.57	430.79	460.06
430.13	430.60	430.86	480.2
430.54	430.61	430.104	480.18

These responses will be included in FSAR Revision 7.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

ROS/php
Attachment

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Mr. P. K. Van Doorn
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service water temperature, and the water separator removes any water condensed in the cooling process. The air receivers smooth out any pressure surges. Downstream of the air receivers, the station air headers carry station air throughout the plant.

9.3.1.2.3 Breathing Air System

Breathing air is supplied by two breathing air compressors. The compressors discharge to two water separators which remove water in the air before it flows to the two breathing air receivers which serve to smooth out the air flow. The receiver discharge lines join and supply breathing air to various locations in the Auxiliary Building and inside the Containment.

9.3.1.3 Safety Evaluation

The compressed air systems are designed to provide dependable sources of compressed air for all station uses. Sufficient redundancy is provided to give a high degree of reliability to the air supply at all times. Sufficient air receiver capacity is provided to meet system high air demand transients.

All the air compressors are normally supplied with electrical power from the station shared bus which allows them to receive electrical power from either unit. Failure of the compressed air systems will not render any safety system equipment or its function inoperable. A loss of instrument air during an accident or station blackout would cause all pneumatically operated valves in the station which are essential for safe shutdown to fail in the safe position.

Q410.20 The instrument air compressors and air dryers can be manually loaded on the blackout bus. This provision is made to facilitate shutdown, especially during a Control Room evacuation coincident with a station blackout. The reliable power source for the compressors in this case is the blackout bus, and the reliable cooling water source for the aftercoolers, intercoolers, and oil coolers is the Nuclear Service Water System.

A listing of the valves that can be operated from the Auxiliary Shutdown Complex is listed in Section 7.4.7.

9.3.1.4 Instrumentation Application

Sufficient instrumentation is provided to monitor system performance and to control the system automatically or manually under all operating conditions.

9.3.1.5 Tests and Inspections

Q410.21 The instrument air system is fully tested and inspected in accordance with appropriate recommendations of Regulatory Guide 1.80 prior to initial operation as described in Chapter 14. The air at the discharge of the air dryers is checked and verified to have an acceptable dew point. Annually, the air at the filter discharge is tested for dew point and particulate contamination. Air samples are taken at selected remote locations of the instrument air system and checked for oil and particulate matter as recommended in Regulatory Guide 1.80. Adequate operating performance monitoring assures system integrity.

1. Maintenance circuit: This circuit consists of phone jacks located throughout the plant which can be patched together to establish communication between areas as necessary.

2. Refueling circuit: This circuit consists of sound-powered phone stations connecting areas required for refueling operations.

3. Emergency circuit: This circuit consists of sound-powered phone stations connecting the auxiliary shutdown panel with areas of the plant that may require local operation during an emergency shutdown.

Q430.54 The sound powered telephone systems are powered from the diesel backed emergency AC lighting panelboards located in their respective areas. The locations of the emergency sound-powered telephone stations are indicated on Figures 9.5.2-1 through 9.5.2-16.

9.5.2.2.4 Emergency Offsite Communication

Q430.55 Emergency offsite communication independent of the PABX system is provided by public telephone lines and Duke microwave lines connected directly to specific telephones in critical areas of the station. Emergency telephones are color coded to distinguish them from the intraplant telephones. The locations of emergency public and microwave telephones are indicated on Figures 9.5.2-1 through 9.5.2-16. Additionally, a security radio system is provided in accordance with 10CFR73.55(f), and a crisis management radio system is provided in accordance with NUREG 0654.

9.5.2.3 Communication During Safe Shutdown Conditions

Q430.54 In order to achieve a safe cold shutdown, it may be necessary for plant personnel to communicate with the control room or the emergency shutdown panel from selected working stations. These work stations and the communication systems available at each station are identified in Table 9.5.2-1. The types and locations of these communication devices/stations are indicated on Figures 9.5.2-1 through 9.5.2-16.

The emergency sound-powered telephone system is the means of communication intended for use during safe shutdown conditions. Effective communication is provided by the emergency sound-powered phones in background noise levels as high as 110 dBA. PABX handsets are also available at all of the subject work stations and can be effectively used in noise levels of approximately 90 to 95 dBA.

9.5.2.4 Inspection and Testing

Q430.54 All communication systems are inspected and checked for operability after installation to assure proper operation and coverage. After a unit is operational, plant noise levels will be measured during normal and simulated accident conditions. Based on these measurements, an evaluation will be made to determine the need for sound isolation booths or noise-cancelling devices.

The communication systems are used routinely and do not require periodic testing.

9.5.3 LIGHTING SYSTEMS

The plant is provided with adequate illumination through the integrated use of normal and emergency lighting systems. These lighting systems provide illumination for normal and emergency plant operation.

9.5.3.1 Normal Lighting System

The Normal Lighting System provides general illumination throughout the plant in accordance with the illumination levels recommended by the Illuminating Engineering Society. Power to the Normal Lighting System is supplied from independent 600VAC motor control centers through individual 600-208Y/120VAC dry-type transformers located in selected areas throughout the plant. All lighting in the Reactor Building is incandescent, while incandescent, flourescent, and high intensity discharge (HID) lighting is provided for the Auxiliary and Turbine Buildings. Normal lighting panelboards and their associated transformers and motor control centers are located such that a single failure in the Normal Lighting System will not result in a total loss of illumination in any area.

9.5.3.2 Emergency Lighting Systems

9.5.3.2.1 Design Bases

The emergency lighting systems are designed to assure that adequate lighting is provided in all vital areas of the plant including essential access routes to these areas. A single failure analysis of the emergency lighting system is provided in Table 9.5.3-1.

9.5.3.2.2 Emergency 250VDC Lighting System

The Emergency 250VDC Lighting System provides emergency lighting for the control room and selected stairways and corridors throughout the plant. Voltage sensing relays automatically energize the normally deenergized emergency DC lighting system in the event of a loss of normal lighting. Power to the Emergency 250VDC Lighting System is from the 250VDC Auxiliary Power System as
Q430.57 | described in Section 8.3.2. Emergency 250VDC Lighting available for a safe shutdown condition is shown in Table 9.5.2-2.

9.5.3.2.3 Emergency 208Y/120VAC Lighting System

The Emergency 208Y/120VAC Lighting System provides emergency lighting in the following areas:

Auxiliary Building: control room, cable room and equipment room, stairs, exits, corridors, hot machine shop, fuel pool, fuel unloading area, decontamination rooms, pump and tank room areas, fan and ventilation rooms, penetration rooms, purge rooms, and diesel rooms

Reactor Building: stairs and platforms

The emergency AC lighting is divided into two independent trains (A and B) arranged such that a single failure will not result in a total loss of illumination in any area served. Voltage sensing relays automatically energize the normally deenergized emergency AC lighting in the event of a loss of normal lighting. Power to train A and B of the Emergency 208Y/120VAC Light System is from the A and B diesel-generators, respectively, through independent trains of the Essential Auxiliary Power System as described in Section
Q430.57 8.3.1. Emergency 208Y/120VAC lighting available for safe shutdown is shown in Table 9.5.2-2.

9.5.3.2.4 Emergency 8 Hour Battery Lighting

The Emergency 8 Hour Battery Lighting System is provided specifically for
Q430.57 station illumination and access/egress for safe shutdown of the plant and for any other emergency situations that may arise. This emergency lighting is provided in the following areas:

Diesel Generator Rooms: general room coverage

Auxiliary Building: primary sample sink, auxiliary feedwater pump room, HVAC control panels, switchgear room, electrical penetration room, selected instruments, selected valves, selected stairs and corridors, Auxiliary
Q430.56 Shutdown Panel Rooms, and Fuel Pool area

Control room annex: area near NC and NV panels

Control room: area over vertical control panels

Turbine Building: 6.9 KV switchgear room

Service Building: instrument and station air compressors, instrument air dryers

The 8 Hour Battery Lighting System consists of individual 200 watt, self-contained, sealed lead calcium battery units. The units are normally on continuous charge from the unit normal auxiliary power system. Upon loss of normal voltage these are energized. Means are provided to test each light-
Q430.57 ing unit individually. Emergency 8 Hour Battery Lighting available for a safe shutdown condition is shown in Table 9.5.2-2.

9.5.4 DIESEL GENERATOR ENGINE FUEL OIL SYSTEM

9.5.4.1 Design Bases

The Diesel Generator Engine Fuel Oil System is designed to provide for the storage of a seven-day supply of fuel oil for each diesel generator engine and to supply the fuel oil to the engine, as necessary, to drive the emergency generator. The system is designed to meet the single failure criterion, and to withstand the effects of natural phenomena without the loss of operability.

the pressurized fuel oil return from the bypass headers to the day tank. The main circulation headers are fitted with a relief valve which prevents the engine fuel oil pressure from exceeding 40 psig and which discharges back to the day tank.

The day tank is surrounded by a fire wall which serves as a containment in the event of leaks or ruptures. The containment drain line is isolated by a normally closed, solenoid-operated valve. A high level signal from a level transmitter located within the containment opens this valve, allowing the oil to drain to the suction side of the lube oil transfer pump which is simultaneously activated and delivers the oil to a waste oil storage tank.

Duke Power complies with Regulatory Guide 1.137 positions c.2.a - c.2.h to ensure the initial and continuing quality of fuel oil is maintained on site. Fuel oil purchased by Duke Power meets classification 2D of ASTM D975 upon delivery. Prior to the addition of new fuel oil to the storage tanks,
Q430.63 on-site samples are taken to verify that the specific gravity, viscosity, water and sediment are within limits. Analysis of the additional properties of the fuel oil listed in ASTM D975 are completed within two weeks to ensure compliance of the purchase specification. An inspection program outlined in the Technical Specification ensures that the quality of the fuel oil stored on site is maintained.

To prevent settling, stratification and deterioration of the fuel oil during extended periods, a system is provided to recirculate or transfer filtered fuel oil. Four fuel oil tanks (two half capacity storage tanks per redundant diesel) are centrally located and integrally connected with normally closed isolation valves and check valves to prevent backfilling and possible con-
Q430.61 tamination of fuel oil between tanks. A manually operated, positive displacement recirculation pump takes suction from the flush mounted sample connection on the bottom of the storage tank and discharges the fuel oil at a
Q430.67 rate of 25 gpm through a simplex filter with alternate bypass line to the storage tank fill connection. The simplex filter has a particle removal rating of 25 microns. The filtering and recirculation process is performed on a tank by tank basis with the frequency of operation dependent on the results of the fuel oil inspection program outlined in the Technical Specification. Since two half capacity storage tanks are provided per diesel, one tank will be aligned to supply fuel oil to its respective diesel while isolating the second tank through administrative control. The contents of the isolated storage tank would be filtered and recirculated. Prior to realigning the tank to its respective diesel, a period of not less than 24 hours is required to allow any stirred sediment to settle.

Should the recirculation system be operating in the event of a LOCA, a redundant, safety related interlock is provided to shutdown the recirculation
Q430.62 pump to prevent possible stirring of sediment. A redundant safety related interlock is also provided to shutdown the recirculation pump should the fuel oil in the storage tanks drop below Technical Specifications level to preclude loss of fuel oil in the event of a recirculation system pipe rupture.

Fuel oil amenders are added as necessary to extend oil life by preventing oxidation, stratification, etc. A sample is used to inspect the oil for water content or degradation and if degradation is determined, the oil may be pumped out for disposal. Accumulated water in the fuel oil storge tanks
Q430.67 will be removed by the recirculation system through a sample connection provided on the recirculation pump discharge as required by the Technical Specifications.

If deleterious amounts of algae are found, the tank will be drained and cleaned by contracted professional industrial tank cleaning personnel.

The day tank vent and fuel oil storage tank vents which are exposed outdoors, are protected from tornado missiles due to the construction of the vents using
Q430.60 heavy gauge pipe. Should a tornado missile strike the vent the pipe will bend without crimping to relieve the impact load. The day tank vent termi-
Q430.68 nates 4 feet above grade elevation and the fuel oil storage tank fill and vent lines terminate 3 feet and 1'-7" respectively above grade elevation to prevent entrance of water. Each fill connection is provided with a locking dust cap and each vent line is down turned. The storage tanks can be filled and vented through the manway should the fill or vent lines become impaired.

9.5.4.2.2 Component Descriptions

Fuel is recirculated within the storage facility to prevent deterioration at the rate of 25 gpm at 32 psi by a recirculation pump. The pump is driven by a 3 HP, 575 volt, 3 phase, 60 Hz motor whose power source is the 600 VAC Unit Normal Auxiliary Power Supply (Section 8.3.1.1.1.5).

The fuel oil booster pump is designed to deliver fuel oil to the engine during the startup period (approximately 11 seconds) at 8 gpm. The pump is driven by a 2 HP, 120 volt DC motor whose power source is the 125VDC Diesel Essential Auxiliary Power System (Section 8.3.1.1.3.11).

9.5.4.2.3 Instrumentation and Alarms

Each diesel generator engine is provided with sufficient instrumentation to monitor the operation of the fuel oil system. All alarms are seperately annunciated on the local diesel engine control panel which also signals a general diesel trouble alarm in the control room. There are two redundant safety related interlocks provided on the fuel oil recirculation system. One interlock is provided to shutdown the recirculation pump in the event of a
Q430.58 LOCA. The second interlock is provided to shutdown the recirculation pump should the fuel oil level in the storage tanks drop below Technical Specifications level. The fuel oil system is provided with the following instrumentation and alarms:

Fuel oil storage tanks -

- Low level and high level annunciators
- Tech spec low-low level alarm
- Level indication, 0-100%
- The capability for use of a stick gauge to measure the fuel oil level

Fuel oil recirculation filter -

Inlet and outlet pressure indication

Fuel oil day tank -

Fuel oil transfer valve control
High level alarm
Low level alarm
Level indication

Fuel oil strainers - (Engine-driven pump and motor-driven booster pump)

Q430.58 High differential pressure alarm - Alerts the operator to take corrective action by manually switching over to the alternate clean strainer
Inlet and outlet pressure indication

Fuel oil filter -

High differential pressure alarm - Alerts the operator to take corrective action by manually switching over to the alternate clean filter.
Differential pressure indication
Outlet pressure indication
Low fuel oil pressure alarm

Day tank retaining wall -

High and low level drain valve and lube oil transfer pump control
High-high level alarm

The periodic testing and maintenance of all diesel fuel oil system instruments is controlled by the Preventive Maintenance Recall program. This program insures that instruments are periodically calibrated and tested, assuring reliability.

9.5.4.3 Safety Evaluation

The Diesel Generator Engine Fuel Oil System is a Duke Class C piping system with the exception of the Fuel Oil Recirculation System and the fuel oil storage tank fill line strainer which are Duke Class G piping systems. The Fuel Oil Recirculation System and the fuel oil storage tank fill line strainer are separated from the essential Diesel Generator Fuel Oil System by normally closed Duke Class C isolation valves. A Duke Class G flexible rubber hose
Q430.62 is used to connect the Duke Class G fill line strainer to the Duke Class C fuel oil storage tank fill lines. The diesel engine and engine mounted components are constructed in accordance with IEEE-387. The off engine essential equipment and components and the nonessential (i.e., Fuel Oil Recirculation System equipment and components are designed in accordance with the requirements of the codes listed in Table 3.2.2-2. The fuel oil system is designed

Q430.62 and constructed in compliance with ANSI Standard N195, except in regards to an overflow line from the day tank, the flame arrestors on the storage tanks, and excluding all references to fuel oil transfer pumps. Flame arrestors have not been provided on the fuel oil storage tank vents or on the day tank vents. Based on sections 30 & 37 of the NFPA fire codes, No. 2 diesel fuel oil is a Class II combustible liquid (minimum flash point 125°F) which does not require installation of flame arrestors for either buried tanks or tanks installed inside of buildings.

Q430.63 Each diesel generator unit is housed separately in a Seismic Category I structure which forms one half of the Diesel Building, and the units themselves are fully independent and redundant for each nuclear unit. The results of a failure modes and effects analysis are presented in Table 9.5.4-1.

The fuel oil storage capacity is based on continuous operation of the diesel generator engines at rated load for a period of seven days. A 10 percent margin in storage capacity is provided to preclude the necessity of refilling the tanks following routine performance testing. The exterior of carbon steel tanks and other underground carbon steel components is sandblasted to a SSPC-SP10-63, near white metal blast cleaning. A coal tar epoxy coating which meets the requirements of Corps of Engineers Specification C-200 and Government Specification MIL-P-23236 is applied to exterior surfaces at a dry film thickness of 16 mils. This coal tar epoxy is also applied to the exterior of stainless steel piping. In addition to being coated, the external surfaces of buried metallic piping and tanks are protected from corrosion by an impressed current cathodic protection system in accordance with NACE Standard RP-01-69 (1972 Revision).

Q430.61

The interior of the fuel oil storage tanks are not coated since the presence of fuel oil will act as a deterrent to internal corrosion. Requirements outlined in the Technical Specifications assure that the fuel oil storage tanks are maintained essentially full to provide a seven day supply. During surveillance intervals for sampling the fuel oil in the storage tanks outlined in the Technical Specifications, any accumulated water or sediment detected will be removed via the Fuel Oil Recirculation System. Based on worst meterological data (see FSAR Table 2.3.2-1), approximately 2 pounds of water (~ 1 quart) will condense per tank per year due to normal tank breathing (i.e., the volume displaced by fuel oil will be replaced with air-water vapor when fuel oil is consumed during normal monthly testing of the diesel). The fuel oil storage tanks are set at a level above the normal ground water table.

Q430.61

Diesel fuel oil 2D, as specified by ASTM D975, is normally delivered to the site by private carriers using 8,000 gallon tankers licensed by the ICC. Pipeline terminals are located in Greensboro, Salisbury, and Charlotte, North Carolina, and Spartanburg, South Carolina with suppliers also located in York, Rock Hill, and Gaffney, South Carolina. In addition, Duke Power owns two 6,000 gallon tankers which are stored full of oil at the Toddville Warehouse in Charlotte. Diesel fuel oil would be available on one day's notice from the above sources. In case of adverse weather conditions, one additional day for delivery might be required. Therefore, if additional diesel fuel oil were ordered on the third day following a loss of offsite power event, additional supplies could be onsite by the fifth day. In the event of a probable maximum flood, however, it is postulated that all Catawba River bridges leading to the site would be impossible and delivery by truck would be impassable. The Catawba railroad spur, though, is laid out above the probable maximum flood level and fuel oil could be delivered by rail.

Q430.66 During normal operation of the diesel any accumulated sediment in the bottom of the fuel oil storage tanks is prevented from entering the supply line to the day tank since the outlet connection is raised 6 inches above the storage tank floor. During the addition of new fuel oil, degradation or failure of the diesel generator engine due to stirring of sediments is prevented by a two tank system. Two half capacity fuel oil storage tanks per redundant diesel provide the ability to operate the diesel off one tank while isolating and filling the adjacent tank. Prior to the addition of new fuel oil either during an accident or when "topping-off" the fuel oil storage tank, the diesel would be aligned to one tank while the tank to be filled would be isolated through administrative control. After filling the storage tank, a period of not less than 24 hours must be allotted to allow sediment to settle prior to realigning the tank to its respective diesel. In the event of an accident (blackout or LOCA), a sufficient reserve of fuel oil will be maintained to allow the diesel to operate off one storage tank while refilling the adjacent fuel oil storage tank, allowing for a 24 hour settling period.

To minimize the chances of a fire in the fuel oil system, piping is routed such that it is remote from other piping and equipment with potentially hot surfaces and from any source of open flame or sparks. The fuel oil day tank is surrounded by a wall which serves as a fire barrier and the redundant diesel engines are separated by three feet of steel-reinforced concrete.

There are no high energy lines within the Diesel Building and all moderate energy lines are properly supported and restrained to prevent damage to safety-related systems, piping and components resulting from line failure.

9.5.4.4 Tests and Inspections

System components and piping are tested to pressures designated by appropriate codes. Inspection and functional testing are performed prior to initial operation; thereafter the system will be tested in accordance with the Technical Specifications.

The starting air receiver tanks also supply air at reduced pressure to the engine control panel instrumentation. Air enters the engine control panel where it is filtered and a self-contained pressure regulator maintains constant pressure of 60 PSI for the diesel automatic safety shutdown system. The automatic safety shutdown system is made up of a network of vent on fault pneumatic devices which monitor the engines parameters, tripping the engine when a manufactures recommended temperature, pressure, overspeed, or vibration setpoint has been exceeded. There are two types of engine trips. Group "A" trips are active only during the periodic testing of the diesel to prevent damage to the engine and are locked out during the emergency mode (i.e., blackout or LOCA) allowing the engine to continue to run. Group "A" trips include and are activated upon; low lube oil pressure, low left and right turbocharger oil pressure, high crankcase pressure, excessive engine vibration, high lube oil temperature, high temperature main bearings, and high-high jacket water temperature. Group "B" trips remain active during the emergency mode to shutdown the engine should a setpoint be exceeded.
Q430.79 Group "B" trips include and are activated upon; engine overspeed, low-low lube oil pressure, and generator differential. The low-low lube oil pressure trip contains redundant (two out of three) logic which must be affected to activate a diesel shutdown. The penumatic logic for Group "A" and "B" trips consumes negligible volume, operating on pressure rather than flow capacity. Sufficient air pressure remains available for operating the pneumatic logic following five successive start attempts. In addition, the starting air compressors, air dryers, aftercoolers piping and valves are Seismic Category I, seismically qualified to remain operable following a design basis earthquake. The starting air compressors and air dryers receive Class 1E power from their associated diesel.

Relief valves on the compressor discharge line and on the air receiver tanks protect the starting air system from overpressurization.

9.5.6.2.2 Component Descriptions

The starting air compressors are driven by 8.7 HP, 575 volt, 3 phase, 60 Hz motors which are powered from the 600 VAC Essential Auxiliary Power Supply (Section 8.3.1.1.2.2). Each compressor discharges 24 scfm at 265 psia and the heat of compression is removed by a water-cooled aftercooler at the rate of 8600 Btu/hr. The nuclear service water system (Section 9.2.1) provides cooling water on the tube side at 12.25 gpm, accepting a temperature increase from 88°F to 89.6°F.

To minimize the accumulation of moisture, the diesel engine starting air system is equipped with a multi-stage drying and filtering unit located in line between the aftercooler and the receiver tank. The air is first thrown through a cyclone-type moisture separator and is filtered before entering one of two alternating dessicant drying towers (alternating between active and regeneration cycles). The air is then filtered a second time before entering the receiver tank.

To minimize fouling of the starting air valves or filters with contaminants, drip-traps are provided on the cyclone-type moisture seperator and the air tanks the vent and fill lines terminate 3 feet and 1'-7" respectively above grade elevation. The fill connection is provided with a locking dust cap and the vent is down turned.

Each diesel is provided with a 700 gallon capacity lube oil sump tank. The sump tank has a normal operating volume of 600 gallons and is equipped with a low level alarm which is set approximately 6¼ inches below the normal operating level. From the low level alarm point to the minimum operating level there are approximately 460 gallons. With an established oil consumption rate of 1.2 gallons per hour at full load, this volume is sufficient to operate the diesel in excess of seven days without requiring replenishment. When the lube oil consumption rate at full load exceeds 2.5 gallons per hour, overhaul of the diesel is required.

Should it become necessary to make additions of lube oil to the diesel, lube oil is available in an 8,000 gallon storage tank located underground and outside the Diesel Building. A manually operated, positive displacement clean
Q430.62 lube oil pump takes suction from the storage tank and discharges lube oil through a simplex filter (particle removal rating of 17 microns) to the in-
Q430.86 tended diesel. The pump suction is raised 6 inches above the storage tank floor to prevent any accumulated water from entering the diesel lube oil sump tank. Accumulated water in the bottom of the storage tank is removed through a sample connection flush on the bottom of storage tank.

The lube oil in the clean lube oil storage tank is inspected monthly to determine the purity of the oil. Parameters monitored include viscosity, neutralization number, and percentage of water. Any accumulated water detected in the bottom of the storage tank will be removed. If degradation of the oil is detected, the oil may be pumped out for disposal.

Algaecides are added to the lube oil to deter the presence of algae growth in the clean lube oil storage tank. If deleterious amounts of algae are detected, the tank will be drained and cleaned by contracted professional industrial tank cleaning personnel. Sodium hyperchlorite or its equivalent would be used during cleaning to erodicate the algae growth.

Lubricating oil leakage is detected by:

1. Routine surveillance
Q430.81 2. Low lube oil sump levels alarm
3. Low lube oil pressure and alarm

System leakage into the lube oil system through the jacket water is minimized by the normal operating pressure of the lube oil being higher than the jacket water pressure. Oil leakage from the diesel is collected in a sump in the diesel room.

Q430.86 The truck fill connection for clean lubricating oil is locked and is keyed differently from other fill connections. Administrative controls govern the issuance of this key.

Q430.54

TABLE 9.5.2-1

COMMUNICATIONS AVAILABLE FOR TRANSIENT AND ACCIDENT CONDITIONS

Location	Expected Noise Utilizing A Weighting db Levels[3]	PABX Telephone (95dBA)[1,2]	Sound-Powered Telephone - Emergency Circuit (110dBA)[1]	Sound-Powered Maintenance Circuit (110dBA)[1]	PA System (95dBA)[1]	PA via PABX Telephone (95dBA)[1,2]	Microwave Dispatch Phone (76dBA)[1]
Auxiliary feedwater pump turbine panel	95db	X	X	X		X	
Auxiliary shutdown panel rooms	70db	X	X			X	X
Control room	62db	X	X	X	X	X	X
Diesel generator rooms	105db	X	X	X		X	
Fuel pool area	76db	X	X	X		X	
HVAC equipment room control panels	70db	X	X			X	
Instrument air compressors	90db	X	X			X	
Switchgear and motor control center rooms	70db	X	X	X		X	
Valves 1ND26, 1ND27, 1ND60, & 1ND61 in the Residual Heat Removal System	95db	X	X			X	
Valves 1KC56A and 1KC81B in the Component Cooling Water System	96db	X	X			X	
Valves 1VQ15B, 1VQ16[illegible], & 1VQ13 in the Containment Air Release and Addition System	94db	X	X			X	
Reactor Coolant System Pressure Gage	100db	X					
Primary Sample Sink	75db	X	X			X	
Electrical Penetration Room	75db	X	X			X	
Control Room Annex	62db	X	X			X	
6.9 KV Switchgear Room	75db	X	X			X	
RC Temperature H&C Connection Box	70 db	X	X				
Residual Heat Removal heat exchanger outlet temperature	90db	X	X				

NOTES: 1) Maximum noise level capabilities of equipment. 2) Telephones equipped with transistor amplifier and noise cancelling transmitter. 3) Noise levels result of measurements taken at comparable plants. 4) After a unit is operational, plant noise levels will be measured during normal and simulated shutdown conditions. Sound isolation booths or noise cancelling devices will then be added as necessary. 5) Hand Held Radios are available to plant personnel.

Q430.57

TABLE 9.5.2-2

COMMUNICATIONS AND LIGHTING AVAILABLE FOR SAFE SHUTDOWN OF PLANT

Location	PABX Telephone	Sound-Powered Telephone - Emergency Circuit	Sound-Powered Maintenance Circuit	PA System	PA via PABX Telephone	Microwave Dispatch Phone	Emergency 8-Hour Battery Lighting	Emergency 208Y/120VAC Lighting	Emergency 250VDC Lighting
Auxiliary feedwater pump turbine panel	X	X	X		X		X	X	X
Auxiliary shutdown panel rooms	X	X			X	X	X	X	X
Control room	X	X	X	X	X	X	X	X	X
Diesel generator rooms	X	X	X		X		X	X	X
Fuel pool area	X	X	X		X		X	X	X
HVAC equipment room control panels	X	X			X		X	X	X
Instrument air compressors	X	X			X		X		X
Switchgear and motor control center rooms	X	X	X		X		X	X	X
Valves 1ND26, 1ND27, 1ND60, & 1ND61 in the Residual Heat Removal System	X	X			X		X	X	X
Valves 1KC56A and 1KC81B in the Component Cooling Water System	X	X			X		X	X	X
Valves 1VQ15B, 1VQ16A, & 1VQ13 in the Containment Air Release and Addition System	X	X			X		X	X	X
Reactor Coolant System Pressure Gage	X	X					X	X	X
RC Temp. H&C Connection Box	X	X					X	X	X
Residual Heat Removal heat exchanger outlet temperature	X	X					X	X	X

floor as is the turbine trip mechanism. However, the distance between the trip mechanism and the high energy lines is sufficient to prohibit any unacceptable pipe whip or jet interactions. Thus, no turbine bypass system high energy line failure can adversely affect or negate operation of the turbine speed controls in regard to the overspeed trip function.

10.4.4.4 Inspection and Testing

Q430.104 Proper operation of the condenser dump valves and the atmospheric dump valves is verified during each unit startup and shutdown. A dynamic test of the steam dump control system is performed during the startup sequence. The condenser dump valves are individually cycled on a quarterly basis if the interval since the last unit startup exceeds 92 days.

10.4.4.5 Instrumentation Application

The steam dump system, during normal operating transients, is automatically regulated by the reactor coolant system to maintain the desired reactor coolant temperature. Following a transient condition, the operator may place the bypass to the condenser in the main steam pressure control mode for a more precise control capability. The control sequence for the TBS is arranged for preferential operation of the bypass to the condenser to conserve condensate. All of the instrumentation for this system is operating instrumentation and none is required for safe shutdown of the reactor.

10.4.5 CONDENSER CIRCULATING WATER SYSTEM

10.4.5.1 Design Bases

The Condenser Circulating Water System supplies cooling water to the main and feedwater pump turbine condensers to condense the turbine exhaust steam. The rejected heat from the condensers is dissipated to the ambient surroundings by the cooling towers while meeting all applicable chemical and thermal effluent criteria.

10.4.5.2 System Description

The Condenser Circulating Water System is a closed loop cooling system consisting of the following:

a) Three round mechanical draft cooling towers

b) Three main condenser shells

c) Two feedwater pump turbine condensers

d) Four condenser circulating water pumps

e) Piping, valves, and instrumentation

410.33

Recommendation GS-4

Emergency procedures for transferring to alternate sources of AFW supply should be available to the plant operators. These procedures should include criteria to inform the operator when, and in what order, the transfer to alternate water sources should take place.

Response

Transfer of the auxiliary feedwater supply from the normal to the safety grade assured supply occurs automatically. The instrumentation and controls utilized in the switchover logic are safety grade.

Recommendation GS-5

The as-built plant should be capable of providing the required AFW flow for at least two hours from one AFW pump train, independent of any AC power source.

Response

The auxiliary feedwater system at Catawba is capable of automatic initiation and of providing the required flow for 2 hours independent of any AC power source. This is accomplished by means of the turbine-driven auxiliary feedwater pump and DC powered instrumentation and controls.

Recommendation GS-6

The licensee should confirm flow path availability of an AFW system flow train that has been out of service to perform periodic testing or maintenance as follows:

(1) Procedures should be implemented to require an operator to determine that the AFW system valves are properly aligned and a second operator to independently verify that the valves are properly aligned.

(2) The licensee should propose Technical Specifications to assure that, prior to plant startup following an extended cold shutdown, a flow test would be performed to verify the normal flow path from the primary AFW system water source to the steam generators. The flow test should be conducted with AFW system valves in their normal alignment.

Response

(1) Procedures used to manipulate valves which are important to safety of the auxiliary feedwater system require that such valves be manipulated by one operator and independently verified by another operator. (See response to TMI Item I.C.6 in Table 1.9-1).

(2) Prior to unit startup following any modifications or repairs to the Auxiliary Feedwater System (CA) which could degrade the flow path and at least once per refueling cycle, the CA System is given either a manual or an automatic initiation signal in order to verify the normal flow path.

Response:

TMI-2 Action Plan Item II.E.1.2 Part 2 "Auxiliary Feedwater System Flowrate Indication," Section Changes to Previous Requirements and Guidance states:

The requirements for Westinghouse (W) and Combustion Engineering (C-E) plants have been relaxed to require only a single-channel flow indication, instead of redundant channels. This single channel need not be seismically qualified nor need it be powered from a Class 1E power source.

The auxiliary feedwater flow indication requirements have been relaxed for PWRs with U-tube steam generators because flow indication is of secondary importance in assuring steam generator cooling capability for steam generators of this design.

The auxiliary feedwater flow indication for the Catawba Nuclear Station follows the requirements as set forth in NUREG-0737. Single channel monitoring and indication is provided in the control room for each steam generator loop auxiliary feedwater flow. High reliability battery-backed power sources for the instrumentation are selected in conformance with auxiliary systems branch technical position 10-1. Failure of one power source will not cause a loss of flow indication to all steam generators.

420.8 During our review of the UHI system, we have been concerned with the adequacy of instrumentation and control features provided. These concerns are centered on the following characteristics of this system:

1. Termination of injection by the UHI system is effected automatically by the use of local level switches. This makes surveillance of the system difficult if not impractical during power operation and therefore greatly reduces the confidence in its ability to perform its required safety function.

2. The valves used to terminate upper injection utilize accumulators to effect automatic fast closure. Manual closure is only provided by the use of the hydraulic oil pump, closing one valve at a time. The hydraulic oil pump is not safety grade and valve closure by this means is a slow process.

3. Level indication is only provided for the accumulator surge tank and not for the accumulator itself.

The basic concern with this design is that the total emphasis appears to consider only the large break LOCA and not other potential events. For small and intermediate break LOCA's, steam generator tube ruptures and overcooling events it would appear that with better control and indication features in the design of the UHI system a significant improvement could be provided for the operator to cope with these events.

The agrument for not providing safety grade manual closure of the termination valves, is that the transient is so fast that operator action would not be possible. While this may be true for a large break LOCA, perhaps operator action to prevent operation of the UHI system might be important for severe overcooling transients or for steam generator tube rupture accidents where it might be a goal to prevent the UHI system from maintaining reactor coolant system pressure.

Providing level indication would appear to be useful for all events to either confirm discharge of the UHI accumulator or not, whichever may be desired. With present designs a relative indication of level can be inferred from pressure indication. This in itself would be one means to provide diversity as a backup means to terminate injection.

The level switches used to automatically terminate UHI injection are differential pressure indicating switches which sense the height of water in the accumulator. Since the sensing connections are on the water accumulator which is water solid, level indication is normally pegged full scale. This further reduces the ability to perform surveillance to confirm that indication is normal. It would have been preferable if level transmitters had been used with an indicating range that extends to the normal water level in the surge tank. This would permit surveillance to confirm that the readings of all channels are normal and thus provide greater confidence in the systems operability. McGuire Unit 1 LER 82-13 confirms to an extent the problems noted with present systems.

The following questions summarize concerns that ICSB has on the adequacy of the design of UHI systems.

1. What is the safety significance of the automatic termination of UHI injection for a large break LOCA? Should diverse means be provided to terminate injection and/or should the design be modified to improve surveillance capabilities?

2. Should features be provided to insure a safety grade means to manually close valves to block UHI system operation for events other than a large break LOCA? Further, should plant procedures be revised to include specific instruction for their use, such as ATOG?

3. Should a direct indication of water level be provided for UHI accumulators as a means to confirm the safety actions of the system or for use in events other than large break LOCA?

We would like to discuss your response to the above questions and any other comments relative to this issue which you may have based on the concerns and our interpretation of this subject noted above.

Response

UHI injection will be terminated automatically due to the shutting of isolation valves when the water level in the UHI accumulator reaches a predetermined setting. The isolation valves are designed with an adequate degree of separation and redundancy to assure valve closure and isolation even if the limiting single failure were presumed to occur. Such a design basis is adequate for the large break LOCA, since a double failure must be postulated to arrive at a situation in which isolation of UHI fails to occur; no other means to terminate injection of UHI water need be provided. If one were to postulate a multiple failure situation such that UHI injection were not terminated automatically following a large break LOCA event, added UHI water entering the reactor vessel would affect the calculated peak clad temperature (PCT). The impact on PCT could be either beneficial or negative, depending upon the assumption made regarding fluid mixing in the upper head of the reactor vessel.

For events other than large break LOCA it is unnecessary or deleterious to block UHI system operation. UHI system water injection capability is quite useful in minimizing the core uncovery which is predicted to occur following small break LOCA events. The UHI system pressure will not be reached during a design basis steam generator tube rupture (SGTR) transient; therefore no UHI injection will occur during the post-rupture transient. During the recovery procedure following an SGTR the controlled system depressurization specified together with an assumption of loss of offsite power leads to actuation of UHI. However, UHI water injection will not significantly impede RCS depressurization because the water injected will be accommodated by a raisng of the water level in the pressurizer. Thus, isolation of UHI following a SGTR is not necessary and represents no safety problem.

Sensitivity studies have shown that plant integrity is maintained if UHI is on during a steamline or feedline break. A safety grade means to manually close or block UHI System discharge valves is not required for these events, nor should the plant procedures be revised. Operation of the UHI System is unnecessary for non-LOCA events. Thus, direct UHI accumulator water level indication is unnecessary.

430.12 (8.3) It has been noted during past reviews that pressure switches or other devices were incorporated into the final actuation control circuitry for large horsepower safety-related motors which are used to drive pumps. These switches or devices preclude automatic (safety signal) and manual operation of the motor/pump combination unless permissive conditions such as lube oil pressure are satisfied. Accordingly, identify any safety-related motor/pump combinations which are used in the Catawba design that operate as noted above. Also, describe the redundancy and diversity which is provided for the pressure switches or permissive devices that are used in this manner.

Response:

A review of all pressure switches and other devices incorporated into the final actuation control circuits for large horsepower safety-related motors has shown that, with the exception of the Containment Spray Pump motors, there are no pressure switches or permissive devices used in such a way that would preclude automatic (safety signal) and manual operation of pump/motor combination.

The interlocks associated with the Containment Spray Pumps are discussed in Section 7.6.5, Containment Pressure Control System.

430.13 (6.3, 8.3) Identify all electrical equipment, both safety and non-safety, that may become submerged as a result of a LOCA. For all such equipment that is not qualified for service in such an environment provide an analysis to determine the following:

1. The safety significance of the failure of this electrical equipment (e.g. spurious actuation or loss of actuation function) as a result of flooding.

2. The effects of Class 1E electrical power sources serving this equipment as a result of such submergence, and

3. Any proposed design changes resulting from this analysis.

Response:

See the response to Question 440.48.

In addition address the following:

(a) Discuss the means for detecting or preventing growth of algae in the clean lube oil storage tank. If it were detected, describe the methods to be provided for cleaning the affected storage tank.

(b) Provide an explicit description of proposed corrosion protection for the underground piping and lube oil storage tank. Where corrosion protective coatings are being considered for the piping and tanks (both external and internal) include the industry standards which will be used in their application. Also discuss what provisions will be made in the design of the lube oil storage and transfer system in the use of an 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.

(c) Figure 9.5.7-2 of the FSAR shows that the diesel generator clean lube oil storage tank is provided with an individual fill and vent line. Indicate where these lines are located (indoor or outdoor) and the height these lines are terminated above finished ground grade. If these lines are located outdoors discuss the provisions made in your design to prevent entrance of water into the storage tank during adverse environmental conditions.

(d) Assume an unlikely event has occurred requiring operation of a diesel generator for a prolonged period that would require replenishment of lube oil in the sump without interrupting operation of the diesel generator. What provisions have been made in the clean lube oil transfer system design from the underground clean oil storage tank to the engine sump to prevent carryover of sediment, water, and scale that may accumulate in the clean lube oil storage tank. What provisions have been made for the removal of accumulated sediment, water, and other deleterious material that may collect at the bottom of the storage tank.

430.86 Response:

See revised Section 9.5.7.2.1 and 9.5.7.3.

Catawba Nuclear Station has implemented the recommendations of IE Circular 80-05 concerning the additions of lube oil to an operating Diesel Generator (D/G) engine as follows:

1. A station operating procedure addresses addition of makeup oil to the D/G engine. This procedure emphasizes that the D/G may be operating during the lube oil addition. Specific steps are also incorporated that require the operator to verify that the

appropriate lube oil sump tank level changes as expected during the makeup process. The operating procedure has a section for receiving lube oil which includes the verification of lube oil type and quality through oil sample analysis. Sign off steps in the procedure require the operator to have the procedure on hand during all D/G lube oil evolutions. The procedure is filed in the control room area to ensure proper administrative controls.

2. Catawba Nuclear Station's Non-Licensed Operator (NLO) qualification program requires the operator to conduct several D/G lube oil operations, and pass oral and written exams before being a "qualified operator" for the D/G and it's support systems. The qualification tasks consist of: a) receiving D/G lube oil on site from a tank truck; b) draining and filling a lube oil system; c) transferring used lube oil from the used lube oil storage tank to a tank truck; and d) makeup to a lube oil system during diesel operation.

3. All piping between the Clean Lube Oil Storage Tank and the D/G Lube Oil Sump Tanks is permanent. The valves which must be operated during the makeup process are clearly identified in the operating procedures and in the plant.

4. Procedures and training will be provided as appropriate.

5. See Section 9.5.7.2.1.

430.87
(9.5.8)
RSP

Figure 9.5.4-3, 9.5.4-6, and 9.5.4-7 show an open ended diesel generator exhaust pipe extending out of the D/G building wall, with no protection from tornado missiles. We require tornado missile protection of the diesel generator exhaust stack. Comply with this position.

Response:

See revised Section 10.4.1.3.

430.104 (10.4.1) In Section 10.4.4.4 you have discussed tests and initial field inspection but not the frequency and extent of inservice testing and inspection of the turbine bypass system. Provide this information in the FSAR. (SRP 10.4.4, Part II.)

Response:

See revised Section 10.4.4.4.

430.105 (10.4) Provide the results of a failure mode and effects analysis to determine the effect of malfunction of the turbine by-pass system on the operation of the reactor and main turbine generator unit. (SRP 10.4.4, Part III, Item .)

Response:

See revised Section 10.4.4.3.

430.106 (10.4.4) Assure that a high energy line failure of the turbine by-pass system will not have an adverse effect or preclude operation of turbine speed controls or any safety-related components or systems located close to the turbine bypass system. (SRP 10.4.4, Part III, Item .)

Response:

See revised Section 10.4.4.3.

440.48 Response:

The maximum post-accident flood level inside containment has been determined to be elevation 570'0". The only safety related control room instrumentation below this elevation are the reactor coolant loop elbow flow rate instruments. This instrumentation provides both control room indication and a reactor trip (on low flow in any one loop) neither of which is required after an accident (no operator actions taken on indication, and reactor trips due to safety injection signal).

A list of safety related solenoid valves in containment that are below maximum flood elevation is presented in Table Q440.48-1. These solenoids perform one of two functions; namely, controlling air to air diaphragm operated valves and providing air to the lower personnel air lock inflatable seals. All of the air diaphragm operated valves are designed to assume their safety position on loss of air. All of the solenoids controlling the air supply are designed to vent the air diaphragm on loss of power. Therefore, even if control of these solenoid valves is lost the air operated valve will assume its correct position. The solenoids which supply air to the lower personnel air lock seals are designed to fail in the position which supplies air to the seals. None of these valves are required to be repositioned to perform short or long term ECCS functions.

A list of active valves in containment that are below maximum flood elevation is presented in Table Q440.48-2. In this evaluation it was discovered that two valves were required to be raised above flood elevation (the two valves -- 1NW46A and 1NW110B provided sealing water for several containment isolation valves). The valves which will potentially be flooded are, except as noted, electric motor operated. These are assumed to fail in the position they are in when flooded. There is sufficient time for the ones which receive a safety signal to stroke to their safety positions before being flooded. None of these valves are required to be repositioned to perform short or long term ECCS functions.

Table Q440.48-1

SAFETY RELATED SOLENOID VALVES INSIDE CONTAINMENT BELOW ELEVATION 570'0"

Solenoid Valve	Functional Description
CN1NVSV0010	Controls air to valve 1NV1A Letdown Isolation
CN1NVSV0020	Controls air to valve 1NV2A Letdown Isolation
CN1NVSV0320	Controls air to valve 1NV32B Charging Isolation
CN1NVSV0390	Controls air to valve 1NV39A Charging Isolation
CN1NVSV0370	Controls air to valve 1NV37A NV Auxiliary Pressurizer Spray
CN1NVSV0520	Controls air to valve 1NV52A RCP #1 Seal Leakoff Isolation
CN1NVSV0630	Controls air to valve 1NV63B RCP #1 Seal Leakoff Isolation
CN1NVSV0740	Controls air to valve 1NV74A RCP #1 Seal Leakoff Isolation
CN1NVSV0850	Controls air to valve 1NV85B RCP #1 Seal Leakoff Isolation
CN1NVSV1010	Controls air to valve 1NV101A RCP #1 Seal Bypass
CN1NVSV1020	Controls air to valve 1NV102A RCP #1 Seal Standpipe Makeup
CN1NVSV1070	Controls air to valve 1NV107B RCP #1 Seal Standpipe Makeup
CN1NVSV1120	Controls air to valve 1NV112A RCP #1 Seal Standpipe Makeup
CN1NVSV1170	Controls air to valve 1NV117B RCP #1 Seal Standpipe Makeup
CN1NVSV1220	Controls air to valve 1NV122B Excess Letdown Isolation
CN1NVSV1230	Controls air to valve 1NV123B Excess Letdown Isolation
CN1NVSV1240	Controls air to valve 1NV124B Excess Letdown Control Valve
CN1NVSV1241	Controls air to valve 1NV124B Excess Letdown Control Valve
CN1NVSV1250	Controls air to valve 1NV125B Excess Letdown Flowpath
CN1NCSV0580	Controls air to valve 1NC58A Prt Spray Valve

Table 440.48-2

ACTIVE VALVES INSIDE CONTAINMENT BELOW ELEVATION 570'0"

Valve Number	Valve Function
1BB149B	BB Tempering Line Containment Isolation
1BB150B	BB Tempering Line Containment Isolation
1NC196A	NCP Motor Oil Fill Line Containment Isolation
1ND1B	NC to ND Suction Isolation Valve
1ND2A	NC to ND Suction Isolation Valve
1ND36B	NC to ND Suction Isolation Valve
1ND37A	NC to ND Suction Isolation Valve
1NV1A	Letdown Isolation (air operated)
1NV2A	Letdown Isolation (air operated)
1NV10A	Letdown Orifice Selection & Containment Isolation (air operated)
1NV11A	Letdown Orifice Selection & Containment Isolation (air operated)
1NV13A	Letdown Orifice Selection & Containment Isolation (air operated)
1NV37A	NV Auxiliary Pressurizer Spray (air operated)
1NV122B	Excess Letdown/Isolation (air operated)
1NV123B	Excess Letdown/Isolation (air operated)
1NV89A	Seal Water Return Containment Isolation (air operated)
1RN429A	RN Return Header Containment Isolation
1RN484A	RN Return Header Containment Isolation
1WL805A	NCDT Discharge Containment Isolation
1WL825A	Containment Floor & Equip Sump & II Sump Containment Isolation
1WL876A	Vent, Unit Condensate Drain Containment Isolation
1VQ16A	Containment Air Addition & Release Containment Isolation
1KC429B	KC Equipment Drain Header Containment Isolation
1NC54A	Prt Sample & Vent Containment Isolation

Table 440.48-2 (continued)

ACTIVE VALVES INSIDE CONTAINMENT BELOW ELEVATION 570'0"

Valve Number	Valve Function
1NI95A	NI Test Header Containment Isolation
1NI266A	UHI Test Header Containment Isolation
1NI267A	UHI Test Header Containment Isolation
1NM6A	Pzr Sample Containment Isolation
1NM72B	Cold Leg Accumulator Sample Containment Isolation
1NM75B	Cold Leg Accumulator Sample Containment Isolation
1NM78B	Cold Leg Accumulator Sample Containment Isolation
1NM81B	Cold Leg Accumulator Sample Containment Isolation
1NM187A	Steam Generator Sample Containment Isolation
1NM190A	Steam Generator Sample Containment Isolation
1NM197B	Steam Generator Sample Containment Isolation
1NM200B	Steam Generator Sample Containment Isolation
1NM207A	Steam Generator Sample Containment Isolation
1NM210A	Steam Generator Sample Containment Isolation
1NM217B	Steam Generator Sample Containment Isolation
1NM220B	Steam Generator Sample Containment Isolation
1NI54A	Cold Leg Accumulator Isolation Valves
1NI65B	Cold Leg Accumulator Isolation Valves
1NI76A	Cold Leg Accumulator Isolation Valves
1NI88B	Cold Leg Accumulator Isolation Valves

460.4 **Response:**

Catawba Nuclear Station uses continuous air samplers to monitor radioactive iodines and particulates contained in the plant gaseous effluent. The monitors utilize silver zeolite cartridges for iodine sampling to minimize interference from high levels of noble gases. The particulate sample media is 0.3 micron filter paper. Normally samples will be analyzed using on-site laboratory equipment, but should this equipment be unavailable, portable instrumentation with energy discrimination for iodine will be used. All detectors are shielded so that plant personnel can remove samples and replace the sampling media without exceeding legal limits. Also, portable pigs provide the shielding necessary during sample transportation to the shielded sample storage area. In addition, personnel collecting samples via portable samplers will be provided survey instruments to monitor exposure rates in areas where samples are being collected. All of the above precautions insure that radiation exposures will not exceed the limits prescribed in General Design Criteria 19.

The sample nozzles used for isokinetic sampling of the unit vent stack for radiation monitoring were provided by General Atomic Co., the supplier of the monitor. General Atomic has stated that the maximum error due to anisokinetic sampling of the nonlinear stack velocity profile is five percent or less. This conclusion was drawn from from test data taken in accordance with ANSI N13.1-1969, Appendix A. The isokinetic sampling system at Catawba is similar to the system used at McGuire Nuclear Station.

There are two radiation monitors that utilize absorbers at Catawba. One monitor draws its sample from containment and the other monitor samples air from the unit vent stack. Since both monitors draw samples from large volumes of air with little moisture content, degradation of the absorbers is not expected to be a problem. Installation of these monitors is similar to the installation at McGuire Nuclear Station.

460.5 (Table 1.9-1) In Item II.D.1.1, "Integrity of Systems Outside Containment..," the containment atmosphere sampling and reactor coolant (post-accident) sampling systems should be included in the systems to be leak tested. Commit to provide initial leak rate measurement results to the staff. Also a summary description of the test procedures and the acceptance criteria used, should be submitted to NRC and implemented prior to full power license.

Response:

The post-accident sampling panel is part of the Nuclear Sampling System, and is included in the list in Table 1.9-1, item III.D.1.1.

The Containment Hydrogen Sample and Purge System has been included in the list of systems to be leak tested in Table 1.9-1, item III.D.1.1. The results of the leak test will be available for NRC review, since they will be documented in the completed procedure. The descirption of the test procedure used, and acceptance criteria, will be available prior to beginning power escalation testing.

460.6 (Table 1.8-1) Table 1.8-1 indicates that Catawba design is in compliance with the requirements of Regulatory Guide 1.140 with the exceptions of C.2.b, C.3.1, and other sections. For position C.2.b, describe and justify your alternate approach to the design. For position C.3.1, include the justification for non-compliance.

Response:

See revised Table 1.8-1.

460.7 (Tables 1.8-1 11.2, 11.3, 11.4) Table 1.8-1 indicates that Regulatory Guide 1.143, Rev. 1, 10/79 (formerly Branch Technical Position ETSB II-1, Rev. 1), "Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-Water-Cooled Nuclear Power Plants" is not applicable to Catawba. This is not acceptable. Compare your design of liquid, gaseous and solid radwaste systems to each position in Regulatory Guide 1.143 and list the items of non-compliance and the justification for it for the purpose of evaluating your design.

Response:

See revised Table 1.8-1.

460.8 (11.2) In Section II.2.3 for estimating the liquid releases, credit is taken for waste evaporator and condensate demineralizer in processing the floor drain tank contents. From the description of the floor drain tank subsystem operation (11.2.2.7.1.5) it is not clear that evaporator and condensate demineralizers will be used frequently. Full credit may not be taken unless both of these pieces of equipment are used continuously. Similarly, the full credit should not be taken for waste evaporator condensate demineralizer for processing waste collected by waste evaporator feed tank. Please justify your assumption.

Response:

Catawba Nuclear Station anticipates never having to process the contents of the floor drain tank using the waste evaporator or waste evaporator condensate demineralizer, to meet effluent requirements.

480.2 Response:

a. Design provisions have been made to facilitate periodic inspection and operability testing of the containment spray system as described in Section 6.2.2.4. The testing of the Containment Air Return and Hydrogen Skimmer System is discussed in Section 9.4.10.4. The testing of the ice condenser is discussed in Section 6.7.19.

b. All of the piping, valves, pumps, and additional equipment which form the pressure boundary of the containment spray system are purchased and fabricated in accordance with the applicable edition of the ASME Boiler and Pressure Vessel Code, Section III, Class 2. In addition the system is designed to meet the requirements of General Design Criteria 38, 39, and 40 of Appendix A of 10CFR50. The system design also complies with NRC Regulatory Guides 1.1, 1.26, 1.29, and 1.82 as described in Table 1.8-1.

   The codes used to design the ice condenser are given in Sections 6.7.1.1.2 and 6.7.16. The Containment Air Return and Hydrogen Skimmer System is discussed in Section 9.4.10.

c. Delay time for the initiation of the Containment Spray System is the result of the time required to generate a P-signal (containment high-high pressure). Signal generation time is discussed in Section 7.3.1.2.6.

   Delay time for operation of the system is the result of pump startup time, valve stroke time and if offsite power is lost, the delay associated with the startup of the emergency diesels and loading the various equipment onto the diesel supplied busses (discussed in Section 8.3.1.1.3). The spray ring header isolation valves are electric motor operated and have a stroke time of ten seconds.

   The delay time for the containment air return fan system is described in Section 9.4.10.2.

   There are no delay times associated with the ice condenser system since it starts functioning once the doors are opened by lower containment pressure.

d. Equipment qualification of components in the containment heat removal systems is discussed in Section 3.11.

e. 1. The Containment Air Return and Hydrogen Skimmer System is described in Section 9.4.10 and shown schematically in Figure 9.4.10-1.

   2. Refer to Section 9.4.10.

3. The Containment Air Return Fans are shown in Figure 9.4.10-5. These fans circulate air from upper containment and discharge it through the floor into lower containment.

f. The containment recirculation intake screens are described in Section 6.2.2.2 and in the response to question 440.26 and 440.31. The containment recirculation intake screens are designed to meet Regulatory Guide 1.82 as described in Table 1.8-1.

g. The outer screen of the recirculation sump assembly is made of standard grating (approximately 1" x 3/16" bearing bars at 1" clear spacing). The fine inner screen is sized to preclude particles larger than 1/8" diameter from passing through. This ensures that particles large enough to result in flow blockages in the core are not drawn into the ECCS (see position on Regulatory Guide 1.82 in Table 1.8-1). The fine screen is attached to a frame which in turn is bolted to the inside of the steel angle forming the base of the assembly. In this way there will be no gap between the base and the fine screen.

h. The potential for plugging the intake screens with debris is discussed in the response to question 440.26(5).

i. Refer to response to question 440.26 (5.3.C).

480.3
(6.2.3.2)
(AR)

The review of this section cannot be completed until after the information identified as "later" in Table 6.2.3-3 is submitted. Either provide this information or provide a schedule for submittal of the information.

Response:

See revised Table 6.2.3-3.

480.4
(6.2.1.1.2)

Discuss the design features which prevent the release of fluids from high energy lines into the annulus between the primary and secondary containments or provide an analysis to demonstrate the ability of the containment to withstand the effects of rupture of the largest high energy line within the annulus.

Response:

All high energy penetrations consist of the "Hot Penetration" assembly as described in Section 3.6.2.4.

480.5
(6.2.1.1.3.1)

FSAR Table 6.2.1-4 describes the structural heat sinks used in the analysis of long-term containment pressure response to LOCAs.

Response:

See revised Table 6.2.3-1.

480.18 (6.2.6) Table 6.2.4-1 indicates that many containment isolation valves will not be Type C leak tested. For each valve, provide your rationale for not including it in the local leak rate (Type C) testing program.

Response:

The justification for performing or not performing a local leak rate (Type C) test is discussed in Table 6.2.4-1.

480.19 (6.7.15) Provide a table which shows the location of each of the resistance thermometers within the ice condenser ice bed and indicate the alarms and/or displays to which each is connected. Describe the types of temperature recording equipment and indicate the physical location of the recording equipment (inside or outside of the control room). For recording stations outside the control room discuss the accessibility of the station to control room personnel during normal plant operations.

Response:

See revised Section 6.7.15.2 and revised Figure 6.7.15-1 and -2.

480.20 (6.2.5) Describe the measures to be taken at the Catawba station to control the substantial amounts of hydrogen that would be produced by an accident involving a severely degraded reactor core and a zirconium-water reaction of up to 75% of the active cladding. Compare these measures with those taken at the McGuire Nuclear Station.