ARKANSAS POWER & LIGHT COMPANY
FIRST COMMERCIAL BUILDING/P.O. BOX 551/LITTLE ROCK, ARKANSAS 72203/(501) 371-7901

April 30, 1986

T. GENE CAMPBELL
Vice President
Nuclear Operations

1CAN048604

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Arkansas Nuclear Once - Unit 1
Docket No. 50-313
License No. DPR-51
Facility Operating License Amendment

Gentlemen:

By this letter we request amendment of the Technical Specifications for ANO Unit 1. This amendment is to reflect installation of Hydrogen Recombiners at ANO-1. The Hydrogen Recombiners are to be installed during refueling outage 1R7, scheduled for 10 weeks beginning August 22, 1986. Therefore, we request that the effective date of this amendment be made to support startup at the end of the outage, currently scheduled about October 22, 1986.

For ease of review, Attachment 1 provides a Technical Justification for the changes. Attachment 2 provides a No Significant Hazards Consideration. Attachment 3 provides a description of the Technical Specification changes and justification for the changes. Attachment 4 provides a complete copy of affected Technical Specification pages as they will appear when amended. Attachment 5 provides page change data.

A copy of this request is being forwarded to Mr. E. Frank Wilson, Director, Division of Environmental Health Protection, Arkansas State Department of Health.

Pursuant to 10 CFR §170.12(c), we have attached a check in full payment of the $150 application fee.

Very truly yours,

T. Gene Campbell

TGC:MGB:lw
Attachments
cc: Mr. E. Frank Wilson

A001
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Rec'd w/check #150.00

STATE OF ARKANSAS)
)
COUNTY OF PULASKI) SS

I, T. Gene Campbell, being duly sworn, subscribe to and say that I am Vice President, Nuclear Operations for Arkansas Power & Light Company; that I have full authority to execute this oath; that I have read the document numbered 1CAN048604 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

T. Gene Campbell

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this 30 day of April, 1986.

Susan K. Agatey
Notary Public

My Commission Expires:

May 7, 1993

ATTACHMENT 1

TECHNICAL JUSTIFICATION
FOR INSTALLATION OF REDUNDANT
INTERNAL HYDROGEN RECOMBINERS

TECHNICAL JUSTIFICATION

FOR INSTALLATION OF HYDROGEN RECOMBINERS

Arkansas Power & Light Company plans to improve the operability of the ANO-1 Combustible Gas Control System by installing redundant internal hydrogen recombiners. The present combustible gas control equipment consists of redundant hydrogen purge trains and electrical and hardware connections for the installation of an external hydrogen recombiner. We intend to replace the present equipment with redundant internal recombiners in order to improve the maintainability of the system. The present system is in compliance with NRC regulations. By replacing the present system we will enhance the operations of ANO-1.

ANO-1 is a Pressurized Water Reactor (PWR) with a large dry containment. The Reactor Building volume is 1.85×10^6 cubic feet. The NSSS was designed by Babcock & Wilcox. The plant was built by Bechtel Power Co. The construction permit was issued on December 6, 1968. Large dry containment designs, like ANO-1's, have a greater inherent capability to accommodate larger quantities of hydrogen than other designs because of their high design pressure and large volume.

The purpose of the Combustible Gas Control System is to provide the functional capability to assure containment integrity is maintained. The Combustible Gas Control System is required, by 10 CFR §50.44, to provide the capability to:

(1) measure hydrogen concentration in containment,

(2) mix containment atmosphere, and

(3) control combustible gas concentration in containment.

The design change proposed for ANO-1 is limited to item (3), above. We plan to change only the type of equipment used.

A single recombiner system train is capable of maintaining hydrogen concentration below concentration limits specified in the applicable regulatory guidance. Safety Guide 7 (1971) is the applicable regulatory guidance. Subsequent to the licensing of this plant, Regulatory Guide 1.7, Rev. 2 (November, 1978) was issued to change the method of computing metal-water reactions based on research findings that calculated metal-water reaction amounts to be only a fraction of one percent of the fuel cladding mass. Under Safety Guide 7, hydrogen control systems were designed for 5% of mass initial metal-water reaction. Safety Guide 7, under which ANO-1 was licensed, was clearly more conservative.

A single internal recombiner unit has almost twice the hydrogen removal capability of a single train of the hydrogen purge system, originally designed as the equipment needed to maintain hydrogen concentration below Safety Guide 7 limits. The hydrogen purge system train processes 50 cfm of hydrogen/air mixture at 100% efficiency (the ANO-1 S.A.R. gave credit for a design rate of 45 cfm). The internal recombiner system processes 100 cfm of hydrogen/air mixture at 95% efficiency.

An appropriate margin of 0.5 v/o is set between the limiting concentration limit and the concentration limit at which the hydrogen recombiners will be actuated. Safety Guide 7 did not address this issue. Regulatory Guide 1.7 states that a lower flammability limit of 4 volume percent hydrogen in air or steam/air atmospheres is well established and is adequately conservative. The ANO-1 FSAR has always taken credit for actuation at 3.5 v/o and this will not change, despite the larger capacity of the hydrogen recombiners and the elimination of purge delay and purge duty cycles.

The internal recombiners are designed to be capable of withstanding all related environmental conditions imposed on them, without loss of function. The primary characteristic of internal recombiners is that they are basically passive systems. They are Westinghouse Model B Electric Hydrogen Recombiners with a conservative structural design. They thermally recombine hydrogen and oxygen by use of electric heating coils. Westinghouse's environmental qualification program consisted of a series of tests. These tests include aging in steam for one year, high temperature test, overpressure tests (for containment leak test), irradiation tests, and long term operation simulating post-LOCA duty. The test results are documented in Westinghouse Proprietary Reports WCAP-7709-L, Supplements 2 and 3, and WCAP-9346. See also WCAP-7709-L and Supplements 1, 4, 5, 6, and 7. These reports were submitted to the NRC by Westinghouse, Inc.

To demonstrate that the recombiner will function in the pressurized steam environment, components which might be affected by rapid depressurization and by high pressure steam were tested. These components were: heaters with junction boxes, electrical junction boxes, thermocouples on heaters, thermocouple junction boxes and interconnecting leads, electrical cabling, a typical door panel, and louvers. These components were shown to withstand differential pressures without loss of function.

The analysis included testing of aging mechanisms such as radiation, seismic and vibration conditions, thermal aging and thermal cycling and showed that aging parameters did not affect the ability of the recombiners to function after a LOCA. The inherently passive, rugged design showed itself suitable for long-term applications.

Spray tests were used to qualify the louvers. The spray tests demonstrated that the recombiner will operate satisfactorily in a post-LOCA Reactor Building Spray environment for an extended period of time. Spray tests on a prototype unit were performed at a pH of 10 for ten days, with no adverse operational effects or damaging spray residue noted. Details of this and other tests were reported in the referenced test reports and were submitted to the NRC for review. Design, fabrication, and erection of the internal recombiner installation is to be in conformance with Environmental Qualification Group B. The design will be designated Seismic Class I. Performance tests will be conducted on the hydrogen recombiners periodically, as required by Technical Specification 4.12. The recombiner installation is designed to permit periodic inservice inspection and operability testing. Instrumentation is provided to monitor the recombiners under normal and accident conditions. This instrumentation permits a determination that the recombiner is performing its intended function or

that the recombiner is malfunctioning. The instrumentation will have readout and alarm capability in the control room.

With the replacement of the hydrogen purge equipment with hydrogen recombiners, the capability for controlled purging of containment to aid in post-accident cleanup was considered. The guidance provided in Regulatory Guide 1.7, Rev. 2 (November, 1978) is a suggestion that:

> "The purge or ventilation system may be a separate system or part of an existing system. It need not be redundant or be designated Seismic Category I (see Regulatory Guide 1.29), except insofar as portions of the system constitute part of the primary containment boundary or contain filters."

Engineering analysis found that the reactor building purge system supplies the controlled purge capability to meet the guidance of Regulatory Guide 1.7, Rev. 2 (November, 1978).

The hydrogen recombiner installation will meet the design, quality assurance, redundancy, energy source and instrumentation requirements for an engineered safety feature. In addition, the internal recombiners will not themselves introduce safety problems that may affect containment integrity. The internal hydrogen recombiners were designed, maintained and will be installed in accordance with the appropriate quality assurance guidelines. The system is redundant. Each recombiner is powered by a separate engineered safety feature (ESF) bus. Electrical power to the recombiners is diesel backed. The recombiner installation will be designed to withstand the maximum earthquake without loss of function. The design for the recombiners will locate them in the Reactor Building at Elevation 426 feet. (See Figure 1). The location of the recombiners on top of the steam generator cavities is in accordance with the manufacturer's guidance. ("Westinghouse Electric Hydrogen Recombiner, Model B, Technical Manual" prepared for Nuclear Projects No. 1 & 4, Washington Public Power Supply System, May, 1980). This location keeps the recombiners in the air flow paths above the hydrogen sources (i.e. reactor vessel, reactor coolant system, etc.), but away from high-velocity air streams. The recombiner units will be located opposite from each other in the Reactor Building in order to maintain redundancy.

Although we are replacing hydrogen control equipment, ANO-1 will not change the means by which it achieves hydrogen measurement and mixing, which are further requirements of 10 CFR §50.44. Hydrogen measurement will be obtained by Hydrogen Samplers. Hydrogen mixing will be obtained by Reactor Building Spray and Reactor Building Cooling Units. As part of the design change, we did review the adequacy of the Hydrogen Samplers and Reactor Building Spray to meet measurement and mixing requirements and did assure ourselves, once again, that these systems met Combustible Gas Control requirements. For example, an outside engineering consulting firm was retained to independently evaluate containment atmosphere mixing. The firm reported that the present method of using the Reactor Building Spray System and the Reactor Building Cooling Units meets the need for post-LOCA containment mixing, referring also to natural convection paths through the steam generator cavities in ANO-1's large dry containment. This conclusion is, of course, consistent with the findings of Sandia National Laboratories'

"Light Water Hydrogen Manual" (NUREG/CR-2726, Rev. 3, August, 1983) which discusses containment mixing in accordance with the RALOC code, and finds that:

> ". . . observation of sprays in operation and intuition tell us that mixing due to sprays may be quite rapid. The sprays entrain air, inducing bulk mass motion, and create both large and small-scale turbulence. Complete mixing should occur within a few minutes." (page 2-25).

and:

> "In any case, it is clear that . . . if substantial forced convection . . . [is] present, the degree of stratification and its duration will not be extensive." (page 2-26).

Electric hydrogen recombiners are installed in a number of plants around the country, including ANO-2. A survey of the industry showed that at least eight other plants had internal recombiners. The Standard Technical Specifications include specifications for Westinghouse Internal Recombiners. The industry has had good maintenance experience with its recombiners because of their simple, rugged design.

The Westinghouse Model B Electric Hydrogen Recombiner (see Figure 2) consists essentially of a thermally insulated vertical metal duct with metal-sheathed electric resistance heaters provided to heat a continuous flow of containment air (containing a low concentration of hydrogen) up to a temperature which is sufficient to cause a reaction between hydrogen and oxygen. The recombiner operates in the range of 1150 to 1400 °F. Hydrogen and oxygen recombine at approximately 1135 °F.

Air and its contained hydrogen enter the recombiner and flow up through the heated section and out the top by natural convection. The intake of the recombiner is located only on one side and the exhaust ports are located above and on the other three sides of the recombiner. The arrangement of intake and exhaust ports serves to ensure that for downflow air currents external to the recombiner, there would be little tendency for recirculation of the recombiner process gases (from the exhaust back into the intake).

No circulation fans are required and the desired flow rate of air is established by providing the proper size inlet flow area through an orifice plate at the bottom of the recombiner. Thus, with the air flow rate regulated by a fixed orifice and with the supply of electric power determined by a control station outside the reactor building, controls are not needed inside the reactor building. Heat added to the reactor building air by the recombiner is removed by reactor building systems already available for other much larger heat loads so that the reactor building air temperature will remain essentially unaffected by the recombiner.

The electric hydrogen recombiner uses conventional type electric resistance heaters sheathed with Incoloy-800. These heaters have been designed to operate with the same sheath temperatures as commercial heaters, but at power densities much lower than normal. Each bank consists of 60 individual heating elements. Operation of the unit is virtually unaffected if a few

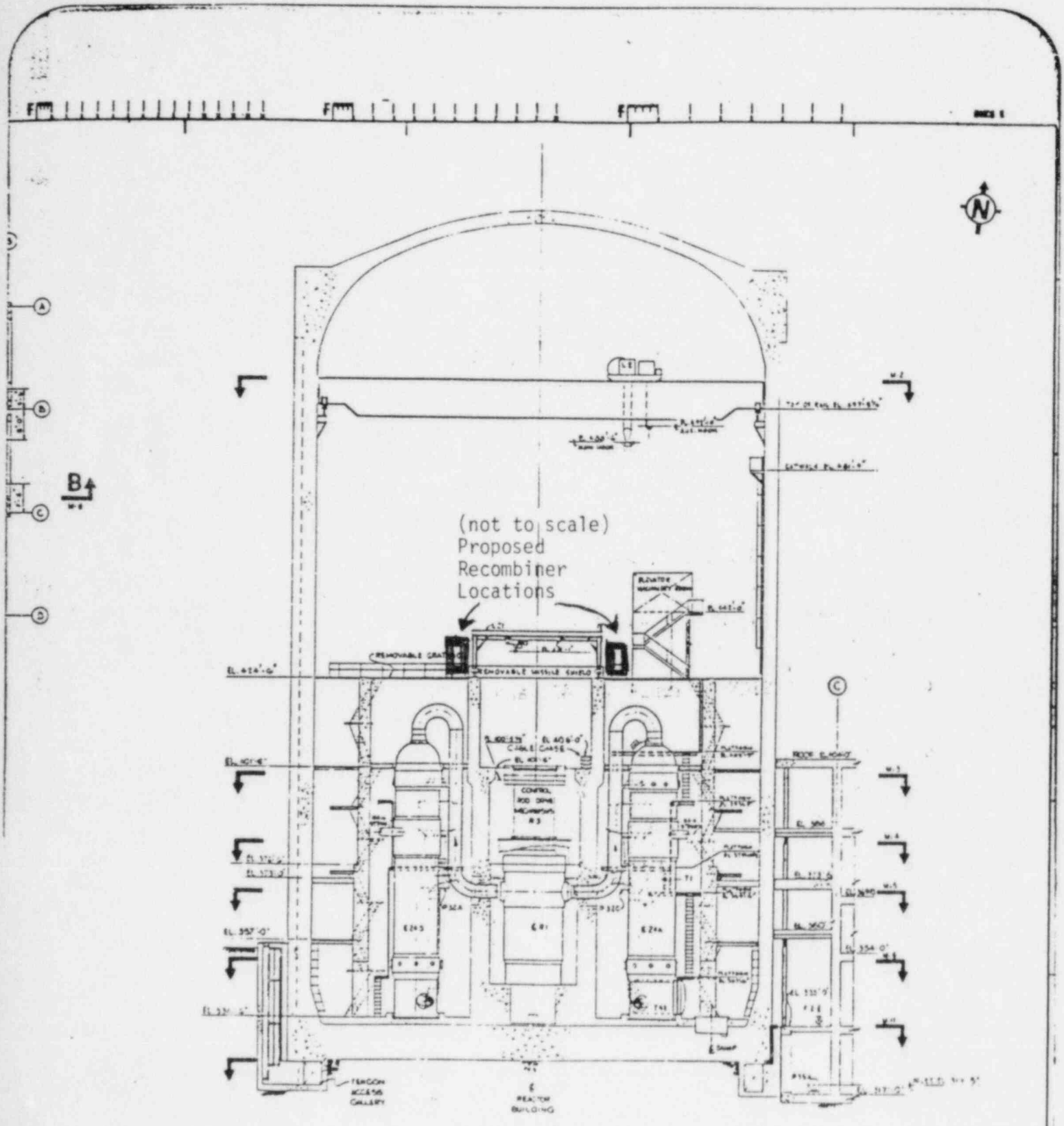
individual heating elements fail to function properly. (See Table 1).

The major structural components are manufactured primarily of 300-series stainless steel. Incoloy-800 is used for the heater sheaths and for other parts such as the heater duct, which operates at high temperature.

The recombiners are designed to sustain all normal loads and accident loads, including seismic loads and temperature and pressure transients from a loss of coolant accident. The recombiners are designed for a lifetime consistent with that of the reactor plant. All materials used in the recombiners are selected to be compatible with the environmental conditions inside the reactor containment during normal operation or during accident conditions. Performance tests assure that the recombiners are operable under operating conditions much more severe than those postulated at ANO-1.

The proposed design change is expected to improve the operability of the Combustible Gas Control System at ANO-1. Because the Hydrogen Recombiners are to be installed during refueling outage 1R7, scheduled for 10 weeks beginning August 22, 1986, we are requesting review of these Technical Specification changes to support this schedule.

CONT. BLDG. SIDE VIEW



SECTION E-E

FIGURE 1

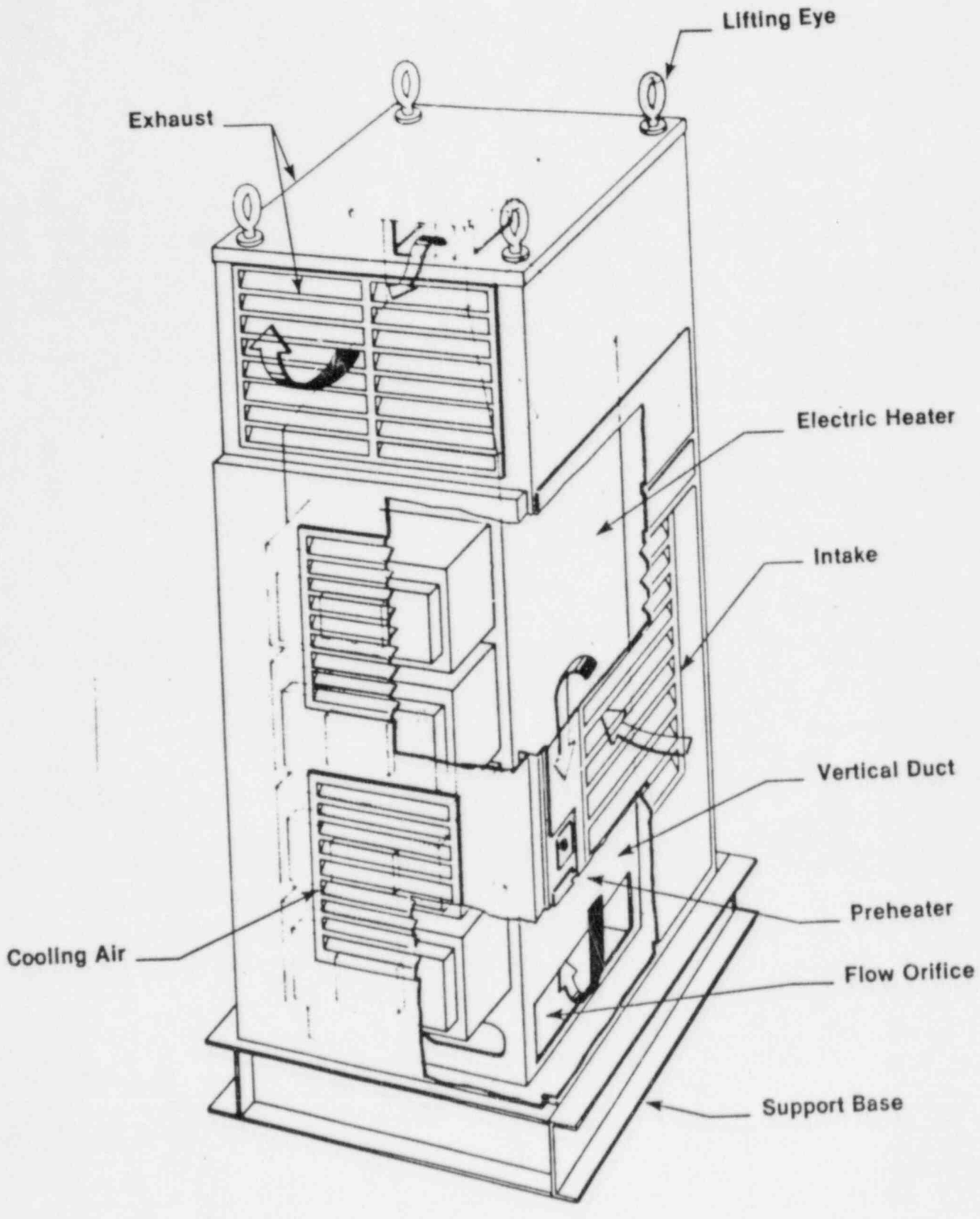


Figure 1-3. Model B Electric Hydrogen Recombiner - Cutaway

FIGURE 2

TABLE 1

ELECTRIC HYDROGEN RECOMBINER
MODEL B TYPICAL PARAMETERS

Power (Maximum)	75 KW
Power (Nominal)	50 KW
Capacity (Minimum) At 1 atmosphere	100 cfm
Heaters	
Number	4
Maximum Heat Flux	7.9 watts/in^2
Maximum Sheath Temperature	1550 °F
Gas Temperature	
Inlet	80 to 155 °F
In Heater Section	1150 to 1400 °F
Exhaust	about 50 °F above ambient
Materials	
Outer Structure	300-Series S.S.
Inner Structure	Incoloy-800
Heater Element Sheath	Incoloy-800
Dimensions	
Height	8 ft.
Width	3.9 ft.
Depth	4.6 ft.
Weight	4500 lb.

ATTACHMENT 2

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Description of amendment request:

Arkansas Power & Light Company proposes to change the Combustible Gas Control System in ANO-1 from a system based on a redundant Hydrogen Purge System (with capability to install an external hydrogen recombiner) to a system based on a redundant Internal Hydrogen Recombiner System as the means for controlling combustible gas concentrations in containment following a postulated LOCA.

To reflect this change, AP&L proposes to amend Specification 3.14, "Hydrogen Purge System" and Specification 4.12, "Hydrogen Purge System Surveillance" to be consistent with the "Standard Technical Specifications for Babcock and Wilcox Pressurized Water Reactors," NUREG-0103 (Rev. 4, Fall, 1980) for atmospheric containments as applicable to Westinghouse Electric Hydrogen Recombiners (pages 3/4 6-32J and B 3/4 6-5J). Conforming changes will be made to the Table of Contents. The proposed amendment request described herein does not involve a Significant Hazards Consideration under 10 C.F.R. §50.92(c).

Both the existing system and the Internal Hydrogen Recombiner System are in compliance with the regulatory requirements of 10 C.F.R. §50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors." Both systems are consistent with associated regulatory guidance:

- Regulatory Guide 1.7 (Rev. 2, November, 1978) and Safety Guide 7 (1971), as applicable.
- General Design Criteria 41, 42, and 43.
- Standard Review Plan 6.2.5, as applicable.

The Combustible Gas Control System is not being changed for regulatory reasons, but is being changed due to considerations of maintainability. No changes are being made to the required capabilities for mixing or measuring combustible gases.

BASIS FOR NO SIGNIFICANT HAZARDS DETERMINATION

The proposed change does not involve a significant hazards determination because operation of ANO-1 in accordance with this change would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   Installation of internal hydrogen recombiners improves hydrogen removal capability while minimizing the consequences of a postulated Loss of Coolant Accident (LOCA). The proposed system change will affect the type of equipment used to meet the regulatory requirement for control of combustible gas concentration in containment (10 C.F.R. §50.44(b)(3)). The proposed system, consisting of hydrogen

recombiners, is comprised of components which have been given a degree of regulatory preference.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

   As discussed in detail in the Technical Justification, the hydrogen recombiners have been environmentally qualified, they are to be installed in locations which will ensure their effectiveness and no negative impact on other safety-related equipment, and they will be consistent with regulatory requirements relating to Combustible Gas Control Systems.

3. Involve a significant reduction in a margin of safety.

   The proposed equipment change is from a type of system which allows controlled release of combustible gas from containment to a type of system that does not result in a release from containment. (10 C.F.R. §50.44 (h) (2)). The recombiner system has been given regulatory preference because of its characteristic of not generating releases during a postulated LOCA. The recombiner system proposed to be installed has greater hydrogen removal capability than the current purge system, in the event that it should be used. Although both systems meet the regulatory requirements, the proposed system is an improvement on the system currently in place.

This proposed amendment is most like Example (vi) in that the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan, except that in fact it involves an improvement in the equipment which reduces the probability or consequences of a previously-analyzed accident and it does not involve a reduction of a safety margin.

Based on the above, we conclude that this change involves no significant hazards consideration.

ATTACHMENT 3

DESCRIPTION OF CHANGES
AND JUSTIFICATION FOR CHANGES TO ANO-1
TECHNICAL SPECIFICATIONS

1. SPECIFICATION 3.14 HYDROGEN PURGE SYSTEM

Change:

Change Specification 3.14 to conform with Standard Technical Specifications for Hydrogen Recombiners at page 66e. Change Bases at 66e and 66f.

From:

3.14 HYDROGEN PURGE SYSTEM

Applicability

Applies to the operating status of the hydrogen purge system.

Objective

To ensure that the hydrogen purge system will perform within acceptable levels of efficiency and reliability.

Specification

3.14.1 Two independent circuits of the hydrogen purge system shall be operable whenever reactor building integrity is required with the following performance capabilities:

a. The results of the in-place cold DOP and halogenated hydrocarbon tests at design flows (±10%) on HEPA filters and charcoal adsorber banks shall show ≥ 99% DOP removal and ≥ 99% halogenated hydrocarbon removal.

b. The results of laboratory carbon sample analysis shall show ≥ 90% radioactive methyl iodide removal at a velocity within ± 20% of system design, 0.15 to 0.5 mg/m^3 inlet methyl iodide concentration, ≥ 70% R. H. and ≥ 190F.

c. Fans shall be shown to operate within ± 10% design flow.

d. The pressure drop across the combined HEPA filters and charcoal adsorber banks shall be less than 16 inches of water at system design flow rate (±10%).

e. Each system inlet heater shall be shown to operate at rated power.

f. Hydrogen concentration instruments shall be operable.

3.14.2 If the requirements of Specification 3.14.1 cannot be met, the system shall be returned to operable status within 30 days or the reactor shall be placed in the hot shutdown condition within the next 6 hours.

To:

3.14 HYDROGEN RECOMBINERS

Applicability

Applies to the operating status of the hydrogen recombiner systems.

Objective

To ensure that the hydrogen recombiner systems will perform within acceptable levels of efficiency and reliability.

Specification

3.14.1 Two independent hydrogen recombiner systems shall be operable whenever reactor building integrity is required.

3.14.2 With one hydrogen recombiner system inoperable, restore the inoperable system to operable status within 30 days or the reactor shall be placed in the hot shutdown condition within the next 6 hours.

3.14.3 Hydrogen concentration instruments shall be operable.

3.14.4 With one of two hydrogen concentration instruments inoperable, restore the inoperable analyzer to OPERABLE status within 30 days or be in at least hot shutdown within the next 6 hours.

Bases

The hydrogen recombiner systems are designed to operate as necessary to limit the hydrogen concentration in the reactor building following a Loss of Coolant Accident.

The system is composed of two redundant, 100% capacity Internal Electrical Hydrogen Recombiners, manufactured by Westinghouse.

Justification:

The B&W Standard Technical Specification reads:

ELECTRIC HYDROGEN RECOMBINERS - W

LIMITING CONDITION FOR OPERATION

3.6.5.2 Two independent containment hydrogen recombiner systems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTION:

With one hydrogen recombiner system inoperable, restore the inoperable system to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours.

The revised ANO Technical Specification simply changes this Standard Technical Specification into ANO-1 format. The restriction from the current ANO-1 Technical Specification, to be in hot shutdown, is used instead of the less restrictive "hot standby" of the Standard Technical Specifications. No change is made to that portion of the Technical Specification requiring operability of the hydrogen concentration instruments.

2. SPECIFICATION 4.12 HYDROGEN PURGE SYSTEM SURVEILLANCE

Change: Change Specification 4.12 to conform with Standard Technical Specifications for Hydrogen Recombiners at page 109b. Change Bases at pages 109b and 110.

From:

4.12 HYDROGEN PURGE SYSTEM SURVEILLANCE

Applicability

Applies to the surveillance of the hydrogen purge system.

Objective

To verify an acceptable level of efficiency and operability of the hydrogen purge system.

Specification

4.12.1 At intervals not to exceed 18 months, the following conditions shall be demonstrated:

a. The pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 16 inches of water at system design flow rate (± 10%).

b. Each system inlet heater unit operates at rated power.

4.12.2. a. The tests and sample analysis Specification 3.14.1.a,b,&c. shall be performed at intervals not to exceed 18 months or after every 720 hours of system operation and following significant painting, fire or chemical release in any ventilation zone communicating with the system.

b. Cold DOP testing shall also be performed after each complete or partial replacement of a HEPA filter bank or after any structural maintenance on the system housing.

c. Halogenated hydrocarbon testing shall also be performed after each complete or partial replacement of a charcoal adsorber bank or after any structural maintenance on the system housing.

4.12.3 Each circuit shall be operated at least 10 hours each month.

4.12.4 Hydrogen concentration instruments shall be calibrated once every 18 months with proper consideration to moisture effect.

To:

4.12 HYDROGEN RECOMBINERS SURVEILLANCE

Applicability

Applies to the surveillance of the hydrogen recombiner systems.

Objective

To verify an acceptable level of efficiency and operability of the hydrogen recombiner systems.

Specification

4.12.1 Each hydrogen recombiner system shall be demonstrated OPERABLE:

a. At least once per 6 months by verifying during a recombiner system functional test that the minimum heater sheath temperature increases to greater than or equal to 700°F within 90 minutes. Upon reaching 700°F, increase the power setting to maximum power for 2 minutes and verify that the power meter reads greater than or equal to 60 KW.

b. At least once per 18 months by:

1. Performing a CHANNEL CALIBRATION of all recombiner instrumentation and control circuits,

2. Verifying through a visual examination that there is no evidence of abnormal conditions within the recombiner enclosure (i.e., loose wiring or structural connections, deposits of foreign materials, etc.), and

3. Verifying the integrity of the heater electrical circuits by performing a resistance to ground test following the above required functional test. The resistance to ground for any heater phase shall be greater than or equal to 10,000 ohms.

4.12.2 Hydrogen concentration instruments shall be calibrated once every 18 months with the proper consideration to moisture effect.

Bases

The OPERABILITY of the recombiners for the control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit is capable of controlling the expected hydrogen generation associated with 1) zirconium-water reactions, 2) radiolytic decomposition of water, and 3) corrosion of metals within containment. The hydrogen recombiner systems are consistent with the recommendations of Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA", Rev. 2, November 1978.

Justification:

The B&W Standard Technical Specifications read:

4.6.5.2 Each hydrogen recombiner system shall be demonstrated OPERABLE:

a. At least once per 6 months by verifying during a recombiner system functional test that the minimum heater sheath temperature increases to greater than or equal to 700°F within 90 minutes. Upon reaching 700°F, increase the power setting to maximum power for 2 minutes and verify that the power meter reads greater than or equal to 60 KW.

b. At least once per 18 months by:

1. Performing a CHANNEL CALIBRATION of all recombiner instrumentation and control circuits,

2. Verifying through a visual examination that there is no evidence of abnormal conditions within the recombiner enclosure (i.e., loose wiring or structural connections, deposits of foreign materials, etc.), and

3. Verifying the integrity of the heater electrical circuits by performing a resistance to ground test following the above required functional test. The resistance to ground for any heater phase shall be greater than or equal to 10,000 ohms.

The Standard Technical Specifications Bases read:

3/4.6.5 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit (or the purge system) is capable of

controlling the expected hydrogen generation associated with 1) zirconium-water reactions, 2) radiolytic decomposition of water, and 3) corrosion of metals within containment. These hydrogen control systems are consistent with the recommendations of Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment following a LOCA," March 1971.

The hydrogen mixing systems are provided to ensure adequate mixing of the containment atmosphere following a LOCA. This mixing action will prevent localized accumulations of hydrogen from exceeding the flammable limit.

The revised ANO Technical Specification simply changes this Standard Technical Specification into ANO-1 format. The revised bases are the same as the applicable portion of the Standard Technical Specification Bases modified to be pertinent to the hydrogen recombiner system. The reference to Regulatory Guide 1.7 has been updated to acknowledge the issuance of Revision 2. No change is made to that portion of the Technical Specification requiring calibration of the hydrogen concentration instruments.