Consumers Power Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

July 20, 1972

Regulatory File Cy.

Mr. John F. O'Leary, Director
Directorate of Licensing
United States Atomic
Energy Commission
Washington, DC 20545

Re: Docket No 50-155
License No DPR-6
Proposed Tech Specification Change 33

Dear Mr. O'Leary:

Transmitted herewith are three (3) executed and thirty-seven (37) conformed copies of a request for change to the technical specifications of License No DPR-6, Docket No 50-155, issued to Consumers Power Company on May 1, 1964 for the Big Rock Point Nuclear Plant.

This proposed change (No 33) stems from the in-depth review of the Big Rock Point Plant liquid poison system which was conducted as a result of the recent difficulties encountered when performing annual testing of the explosive valves. These difficulties were reported by letter to the Directorate of Licensing, dated May 11, 1972.

Yours very truly,

Robert L. Haueter

RBS/wl

Robert L. Haueter
Electric Production Superintendent -
Nuclear

CC: BHGrier, USAEC

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Regulatory File Cy.

CONSUMERS POWER COMPANY

Docket No 50-155

Request for Change to the Technical Specifications

Change No 33

License No DPR-6 Dated 7-20-72

For the reasons hereinafter set forth, the following changes to the technical specifications of License No DPR-6 issued to Consumers Power Company on May 1, 1964 for the Big Rock Point Nuclear Plant are requested:

I. Changes

Change the last sentence of Section 5.2.3 to read as follows: "One squib primer and trigger assembly from the equalizing line shall be removed and test-fired at least every 12 months. These shall be tested on an alternate basis insuring valve replacement every two years. One squib primer and trigger assembly from the remaining five units shall be removed and test-fired at least every 12 months. These shall be tested on an alternate basis insuring valve replacement every five years. The tests will consist of monitoring of the input firing current and shearing of the integral inlet cap."

II. Discussion

The poison system consists of a spherical phenolic lined 850-gallon storage tank containing a solution of sodium pentaborate (19%-30% by weight), an injection line from the tank to the reactor primary system, a pressure equalizing line from the steam drum to the tank and a pressurization line between the bank of 2,000 psig nitrogen bottles and the tank.

The pressurization line and equalizing line each have two full capacity valves in parallel, and the injection line has three half-capacity valves in parallel. This valve arrangement provides redundancy for all valves, reducing the probability of system failure due to valve failure.

The explosive charge is provided with two electrically fired primers per valve, each of which is energized from a different d-c circuit, and either of which is designed to shear the integral inlet cap. Two parallel circuits supply all of the seven explosive valves so that an external failure or internal breaking of a circuit due to staggered firing will not prevent all valves from being energized. Also, each individual line to the 14 primers is fused so that a short circuit in an element during firing will not disturb the remainder. In the normal position, all elements are connected in series, including the control relays and each circuit is monitored continuously. An open circuit failure in any part of a circuit causes an alarm to be annunciated in the main control room. Also in the procurement of the valves, destructive tests are performed in which the energy output of sample primers is monitored and checked against a standard. This insures that the energy output is sufficient to shear the integral cap. In addition, the Big Rock Point Plant will test-fire and shear an integral cap before any primers from a new lot of primer charge materials are installed into the system. Therefore, the probability of system failure due to valve failure becomes infinitesimally small.

The poison tank is not pressurized during normal system operation to allow easy access for sampling and chemical additions (if required) to keep the sodium pentaborate solution (poison) within the specified limits. Upon initiation of the poison valves admitting full 2,000 psig, nitrogen pressure to the poison tank, poison is forced into the reactor within a few seconds; however, if the primary system is at full operating pressure, the nitrogen volume will be insufficient for forcing out more than a few gallons of solution. The driving force for the remaining volume is achieved from the static head due to the elevated position of the tank and the head across the recirculating pumps. If both recirculating pumps are down, a valve on the injection line into the pump suction is closed by an interlock on the pump motor breakers and poison is forced directly into the reactor through a check valve.

The primary purpose of nitrogen pressurization is to insure positive displacement of poison solution only when the reactor recirculation system is static; that is, both recirculation pumps off such as during refueling when there is no initial driving head to establish a siphon through the discharge dip tube in the poison tank. Sufficient pressurized nitrogen is available to displace the entire poison solution from the tank without benefit of siphon for system operating pressures up to 350 psig. However, at any operating pressure with natural or pumped recirculation flow, a minimum of nine feet friction loss through the reactor will establish siphon through the injection line and empty the poison tank even without benefit of nitrogen pressurization.

The top outlet arrangement of the poison injection connection was selected to avoid precipitation of sodium pentaborate in contact with external piping and valves. The resulting siphon required is three feet when the tank is full and nine feet when the tank is empty. Integrity of this siphon, once established, is assured by the small size of the injection line (three inches). Air in-leakage is improbable under any circumstances as the associated piping and flanges are designed for 2,000 psig pressure.

Within the first five minutes, sufficient solution is introduced into the primary system to produce a boron concentration of 1,300 ppm. This is equivalent to -16% $\Delta k/k$, which is more than adequate to reduce power level to zero by offsetting the effect of decreasing voids. Injection of the remaining solution raises the boron level to 2,000 ppm which produces -25% $\Delta k/k$ and is sufficient to hold the core subcritical even after it has cooled completely and with all control rods removed.

The test firing of one primer and trigger assembly from the equalizing line every 12 months will provide a maximum in-service inspection period of two years for the equalizing line units. The units installed in the equalizing line experience the highest ambient temperatures of the seven assemblies installed. The remaining five units will be tested on a one-per-year basis. This testing program will insure that no units exceed an in-service life of five years, which is well

within the manufacturer's recommended life for the service conditions experienced. The test firing will include shearing of an integral ini cap. This will demonstrate that the force developed by the charge is sufficient to actuate the poison system.

The life of the primers is conservatively based on the attached chart provided by the Conan Corporation. The values on this chart were developed, based on short life span testing of primers, and extrapolated to predict lower temperature - longer life relationships. A temperature monitoring program is in progress at Big Rock Point to determine the precise environmental temperatures that the primers experience. Current results show that the primers in the equalizing line experience a temperature of about 101°F while the warmest of the other five squib valves experiences a temperature of about 95°F.

In the event a primer were to fail if it were called on to operate, it could be replaced with a new unit during plant operation in a short time period. These primers are accessible during plant operation.

III. Conclusions

Based on our review, which is summarized above and in our letter of May 11, 1972, we have concluded that the liquid poison system is now a capable and reliable system and meets all criteria of initial plant design and the Final Hazards Summary Report. The testing programs implemented will ensure continued adherence to these criteria.

CONSUMERS POWER COMPANY

By R. A. Fanley
Vice President

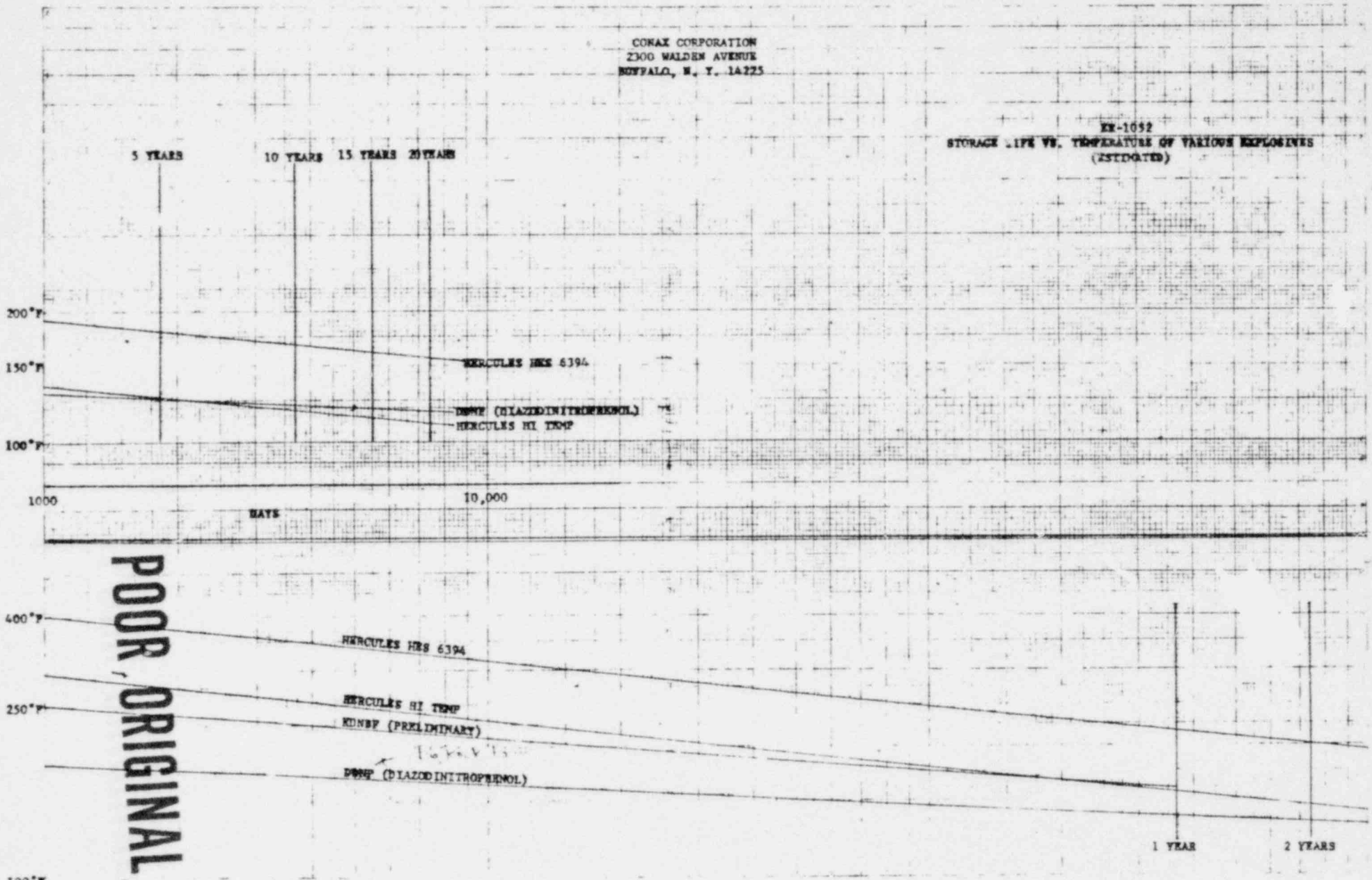
Date: July 20, 1972

Sworn and subscribed to before me this 20th day of July 1972.

Marion Y. VanAtkin
Notary Public, Jackson County, Michigan
My Commission Expires October 14, 1974

CONAX CORPORATION
2300 WALDEN AVENUE
BUFFALO, N. Y. 14225

EX-1052
STORAGE LIFE VS. TEMPERATURE OF VARIOUS EXPLOSIVES
(ESTIMATED)



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Consumers Power Co. Jackson, Michigan 49201 Robert L. Haueter	7-20-72	7-24-72	X			

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Mr. John F. O'Leary	1 signed	39		SENT AEC PDR ✓ SENT LOCAL PDR

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DESCRIPTION: Ltr trans the following:

ENCLOSURES: Request for Change No. 33 to Tech Specs for Lic. DPR-6 notarized 7-20-72 w/attchmt.....

(3 Orig & 37 conf'd cys encl rec'd)

PLANT NAMES: Big Rock Plant

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