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Mr. Skovholt	1					
CLASS: (U) / PROP INFO	INPUT	NO CYS REC'D		DOCKET NO:		
		50 cys rec'd		50-220		

DESCRIPTION:
Ltr submitting description of New system for unidentified leak-rate detection for Nine Mile Point Nuclear Station Unit No. 1 W/Attachment- diagram of Nine Mile station Floor Drain Tank.

ENCLOSURES:

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ACKNOWLEDGED

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NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

300 ERIE BOULEVARD WEST
SYRACUSE, N.Y. 13202

May 4, 1972

Mr. Donald J. Skovholt
Assistant Director for Reactor Operations
Division of Reactor Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Skovholt:

Re: Provisional Operating License: DPR-17
Docket No.: 50-220

You requested that we provide the Commission with a description of the new system for unidentified leak-rate detection as installed on Nine Mile Point Nuclear Station - Unit #1.

Unidentified leakage detection has been greatly inhanced by the addition of new instruments. These consist of two separate signal channels, installed to meet the single failure criteria.

This new system is a redundant one which consists of displacers located in the dry well floor drain tank and are attached to linear differential voltage transformers (L.V.D.T.). The displacer is placed to cover the range of the sump pump float switches. Analog signal from the L.V.D.T. is then fed thru an A.C. to D.C. converter, which in turn, feed two voltage sensitive strip chart recorders. (sketch enclosed)

The sump and chart recorder scale are calibrated for a gallon-level relationship giving a gallons vs time on the recorder. The recorders are located in the control room on front panel location. This provides the plant operator with the current trend of unidentified leakage. Each indicate rate of rise of the floor drain tank level as water collects in the tank, which is proportional to inflow leakage. Any change of leakage rate results in a recorded slope change on the chart.

Using an overlay curve grid, the operator may quickly determine the flow rate or rate of change. Low flow rates (up to 1.0 gpm) can be best displayed using a chart speed of 0.1 inch per hour. Higher flow rates require a 1.0 inch per hour chart travel. This selection can be made by the operator at the recorder.

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LB

CHART SPEED	FLOW RANGE	SENSITIVITY	TIME TO DETECTION *
0.1 in./hr.	0 - 1.0 GPM	± 0.2 GPM	∿ 40 min.
1.0 in./hr.	1.0 GPM & above	± 0.5 GPM	∿ 8 min.

* Time required to record a flow rate change of sufficient detail to make an accurate measurement.

Previous to the installation of this system, sump accumulation rate was determined only by the timing of the interval between water contact with probes spaced vertically in the sump and by integrating the total volume pumped over a twenty-four hour period. Operators could detect a change in system leakage of approximately 0.2 gpm within 24 hours.

With the new system, the same change could be detected in 40 minutes using a chart speed of 0.1 inches per hour. This is the normal operating condition. Increased leakage rates would require the operator to change the recorder speed to 1 inch per hour and thereby obtain a sensitivity of approximately 8 minutes change detection time. Therefore, the operator is provided with a tool whereby he may determine change in leakage rate in a reasonable time period. This is useful in allowing some investigation as to the source of the "unidentifiable" leakage which could come from one or more of the following:

a) Dry well cooling system leakage from reactor building closed loop cooling (fresh water) into the dry well and hence to sump.

b) Primary coolant leaks not identifiable as to source and therefore to be considered as coolant boundary failures.

c) Primary coolant leaks which can be identified by manipulation of valves, isolation of equipment, etc. and therefore actually no longer "unidentifiable".

d) Leakage of containment spray system.

Obviously, (a) and (d) are not pressure boundary oriented. Leakage from these sources can readily be determined by isotopic analysis of the water being pumped from the floor drain sump. In as much as this amount now has been identified, it should not be assessed in the limitation of unidentified leakage.

Likewise, by the manipulation of valves and shutdown of parts of systems, together with appraisal of rate change in sump pump-out rate as determined from the new recorders, it would be possible to determine if certain valve packings or pump seals are leaking.

With this ability to differentiate on various means of leakage into the sump, we propose the following program: -

1. Should rate of change in "unidentified" leak-rate continuously increase at 1 gpm or greater per 24 hour day, the reactor will be started down before exceeding 3 gpm and be in a cold shut-down condition within 10 hours.

2. Should rate of change in "unidentified" leak-rate change at less than 1 gpm per 24 hour day or in a stepwise manner, determinations will be made to determine what portion of the total may be identified. This shall be subtracted from the total discharge from the floor drain sump. In no event will the total be allowed to exceed 5 gpm or an orderly shut-down of the reactor will be started and be in cold shut-down in 10 hours.

Other instrumentation would be used to assist in detecting leakage such as constant air monitoring of the dry well atmosphere, dew point determination, and batch pump-out of the sump. However, the rate of rise recording, being the most sensitive, will be the primary means of leak detection.

Over the period of operation since August 1969, the background leakage has been in the order of 0.3 gpm into the floor drain sump. Leakage into the equipment drain tank has been in the order of 4.2 gpm. Obviously, these values have deviated depending on plant condition.

On three occasions totaling 10 days and 12 hours, it was necessary to take the plant off the line to investigate increases of leakage into the dry-well.

1. Leakage to the equipment drain tank increased to 9.8 gpm in a six day period. Two shut-off valves in recirculating coolant loops were found to have stem packing leaks. All ten similar valves stem packing was replaced.

2. Leakage to the equipment drain tank increased to 12.6 gpm in twelve days. This was again found to be recirculating loop valve packings.

3. Leakage to the floor drain sump, "unidentified", increased to 3.7 gpm in a 13 day period. Two 1" valves were blowing by the packing. All small valves in the dry well were serviced.

The new rate-of-rise detection and recording instrumentation allows a much improved system of appraising leakage into the dry well. It enhances the possibility of identifying the previously unidentified leakage and better appraises trends. Leakage into the equipment drain tank has always been "identified" and therefore, present limits adequate. We believe that with this knowledge, our approach to limiting operation with respect to primary coolant leakage is quite conservative.

Lower limits could well restrict plant operation at crucial power demand periods yet would not increase the safety to the general public as evidenced by the increased ability for leak detection analysis.

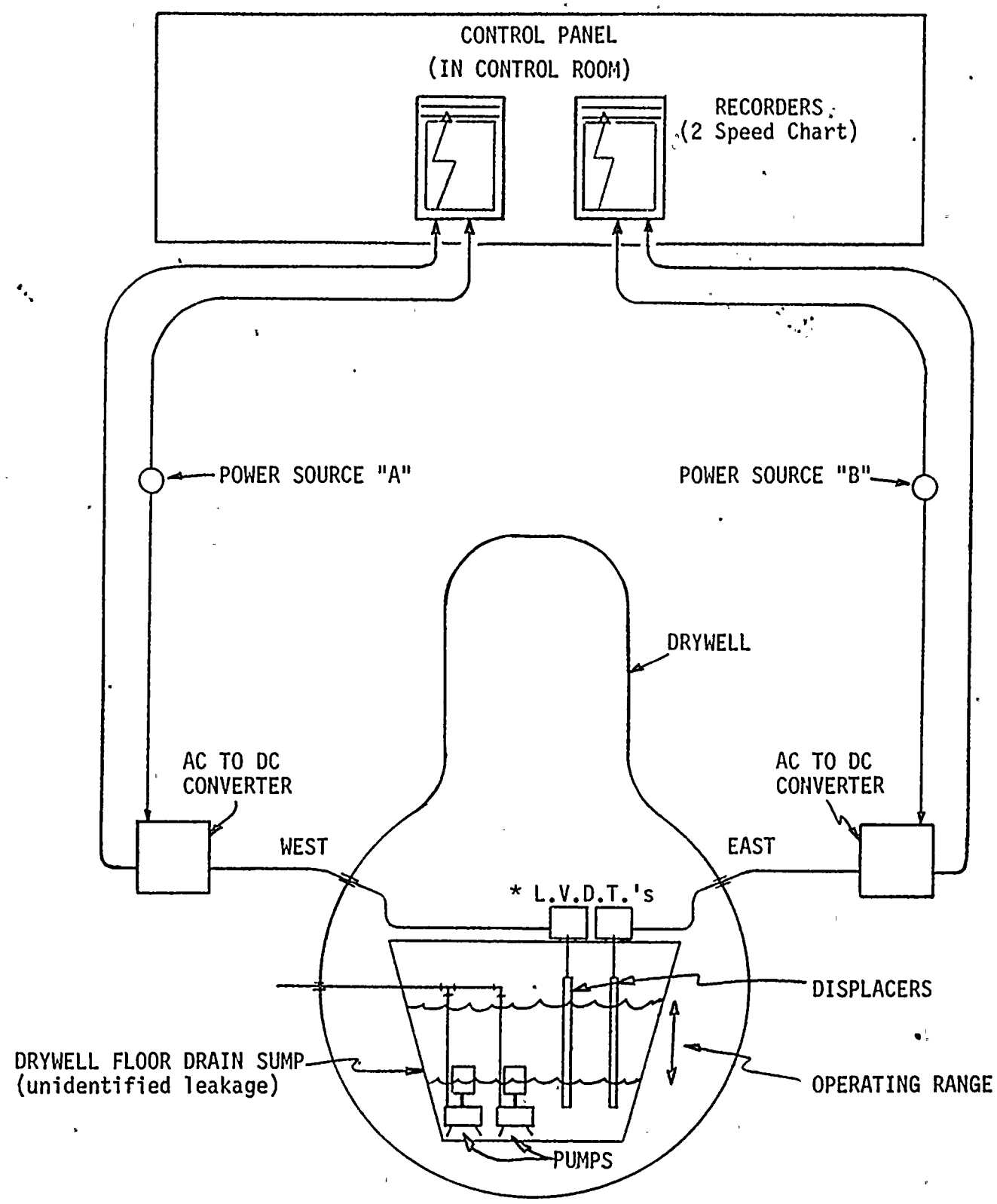
In the near future, as well as present, continuous reliable power is essential to the well being of the people.

Very truly yours,

F. J. Schneider

F. J. Schneider
Vice President - Operations

Enclosure



* L.V.D.T. (Linear Variable
Differential Transformer)

NINE MILE POINT NUCLEAR STATION
FLOOR DRAIN TANK

RATE-OF-RISE INSTRUMENTATION FOR
UNIDENTIFIED LEAKAGE DETECTION