Consumers
Power
Company

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March 24, 1982

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Operation Reactor Branch No 5
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 -
PALISADES PLANT - SEP TOPIC III-3.C,
INSERVICE INSPECTION OF
WATER CONTROL STRUCTURES

By letter dated February 22, 1982, the NRC issued an SER for SEP Topic III-3.C for the Palisades Plant. This SER was based on a topic evaluation (SAR) developed and previously submitted by CP Co letter dated December 21, 1981.

With minor exceptions, we agree with the NRC conclusions in the SER. The following comments are provided as a direct response to the three conclusion summary statements in the February 22, 1982 letter:

1. In conclusion one, the staff has recommended that plant watertight doors be included in the water control structure inspection program. These doors were not addressed in the CP Co SAR.

   Inspections of the Palisades watertight doors are already required by the plant preventive maintenance program (Periodic Activity Control Sheet MSM12 M035). These inspections are currently being performed annually, a frequency which is considered to be fully adequate to detect and correct deterioration in a timely manner. Palisades, therefore, is in conformance with this staff recommendation.

2. In conclusion two, the staff recommends that a water control structure (ie, intake crib, pipe and concrete structures) inspection program be formalized to require routine periodic inspections and documentation of each inspection. To ensure that this issue is viewed in its proper perspective, several points should be discussed.

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First, as noted in the SAR, the intake pipe and structure were originally sized for full circulating water flow of approximately 390,000 gpm. In 1973-74, cooling towers were constructed, the circulating water pumps were removed and the dilution water pumps added. This reduced the normal system flow during plant operation to approximately 76,000 gpm, or less than 20% of original design flow. In addition, the dilution water pumps are not required to support the plant in off-normal situations and are automatically de-energized on loss of offsite power. The post-accident flow through the intake pipe and structure then, is only that necessary to support the service water system, or approximately 16,000 gpm. This post-accident flow is only 4% of original design flow and only 21% of the flow during normal plant operation. Thus, normal plant operation provides continuous assurance that the intake pipe and structure are capable of supporting post-accident needs.

Second, if flow blockage were to occur by some postulated mechanism, the operators would be alerted. A level sensor is installed in the service water pump bay which provides an alarm at a level of approximately 576' msl. This alarm level is approximately 6' below the lake level. A severe flow restriction could cause the dynamic head losses at the restriction to increase, thereby causing the differential level between the open lake and the service water bay to increase in order to pass the same flow. Since lake level is effectively constant, the increased head loss would result in a lower equilibrium bay level.

Head loss due to a flow restriction is directly proportional to the square of the velocity (and therefore flow) through that restriction. At Palisades, stopping one dilution water pump (drops total flow from 76,000 gpm to 46,000 gpm) reduces the head loss in the intake pipe, screen, etc, to 37% of its previous value. If this action were taken in response to a low-level alarm (ie, equilibrium level at alarm point), the head loss through the intake restriction would drop from 6' to 2.2'. In other words, simply stopping one dilution water pump can restore almost 4' of the service water bay level under these conditions. Stopping both dilution water pumps (drops total flow from 76,000 gpm to 16,000 gpm) reduces the head loss through the restriction to only 4.4% of the assumed 6' loss or less than 3.5". Therefore, over 5-1/2' of the assumed 6' drop in service water bay level can be restored by simply stopping these pumps.

It should also be noted that the approximate 6' drop in service water bay level to the alarm is very conservative with respect to NPSH requirements for the pumps. At normal lake levels, there is approximately 28' of water above the pump suctions. A reduction in bay level to the alarm set point still leaves approximately 22' of water above the suctions. The initial manufacturer flow tests for the pumps, however, were performed with an NPSH of only 7.8' or 7.9'. From this, it is readily apparent that bay levels substantially below the alarm level will still allow the service water pumps to operate at full capacity.

Third, it has been noted previously that an alternate water supply for the service water pumps is available independent of the normal intake path. This alternate supply is piped to the intake structure from the Warm Water Recirculation Pump (can be powered from emergency diesel generator) and takes a suction from the mixing basin or from the lake at the discharge structure. Therefore, even if catastrophic damage could occur to the intake pipe or other components which completely blocked intake flow, the service water pumps could still be maintained operable through this alternate source.

Fourth, as noted previously, the intake crib superstructure was replaced in mid-1971 due to ice damage which occurred during the previous winter. The new structure is much more substantial than the original. Since that time, the new structure has gone through eleven winters of normal lake ice movement. Inspections of the crib which were performed in 1972 and 1975 revealed no damage and no operating problems which might be attributable to the intake bell or crib have been observed since that inspection.

It must be pointed out that the intake crib is a protective structure which does not have a function related to conveying water through the intake pipe. The crib structure and the attached bar racks merely surround the flared end (bell) of the intake pipe to filter out large objects to prevent intake pipe blockage. The crib is a square structure with overall dimensions of approximately 57' x 57', the top of which is approximately 9' above the open end of the bell. The bell dimension at this open end is approximately 18' x 18'. The attached sketch shows the general configuration of the pipe, bell and crib.

Fifth, previous discussions with the staff about sand deposits within the intake structure and pipe have indicated that sand buildup is perceived to be a much more serious concern than it really is. Some sand deposits are routinely present. In fact, however, these sand deposits have not affected the system's ability to pass adequate water flow. If the sand were never removed, it is possible that the ultimate buildup could impair flow, but this would be a very slow phenomenon. Sand has been removed from various parts of the system in 1975 and 1981, not because flow was impaired, but because it was considered good practice.

As discussed above, ample warning would exist of this developing situation and operator actions are immediately available to ensure sufficient flow for the service water pumps.

In summary then, more than ten years and eleven winters have passed since replacement of the intake crib structure with no operational problems due to intake pipe and structure damage or blockage. The sand removal which has been performed was not to correct flow problems but was simply considered good practice. Even if flow blockage of the intake pipe were to occur, however, ample warning and corrective actions are available to ensure sufficient flow to the service water system.

Consumers Power Company will agree, however, to formalize an inspection program for the intake structure, pipe and crib. This program is expected to be incorporated into either the plant preventive maintenance or surveillance testing programs and will include appropriate records of those inspections. The inspections will be performed at a scheduled frequency of five years, a value which is directly supported by past experience.

In addition, since the intake crib has not been inspected since 1975, it is agreed that the next crib inspection will be performed prior to or in conjunction with the next plant refueling outage, currently scheduled in 1983.

The inspection program will include external inspections of the intake crib, bell and surrounding riprap, internal inspections of some distance inside each end of the intake pipe, general internal inspections within the intake structure and external inspections of the warmwater pump suctions in the lake and mixing basin at the discharge structure. This program will be in place prior to start-up from the 1983 refueling outage.

In conclusion three, the staff recommends that special inspections be performed immediately after "...significant unusual events (such as earthquake, flooding, ice, etc)...." Since ice movement is a routine annual occurrence which has not affected the system function over the past eleven winters, its inclusion in this list is inappropriate. Similarly, it is not apparent how flooding could affect any of the structures. An earthquake of sufficient magnitude might possibly affect the structures, but in this, as well as other "significant unusual events," immediate assurance is available without inspection that the intake pipe, etc, have remained functional. It must be noted that the Section of Regulatory Guide 1.127, from which this general subject is drawn, is written specifically to cover events which might challenge the integrity of a dam. From the standpoint of a dam, special inspections after events such as earthquakes, especially heavy runoff from rains, flooding, etc, are probably appropriate. Clearly, the same concerns are not applicable here.

In addition, events which might be "significant, unusual events" which severely challenge the plant's ability to maintain the service water system functional, would almost undoubtedly be reportable to the NRC under current Technical Specifications or regulations and the site resident inspectors would certainly be aware of their occurrence. The NRC then would either be directly involved in specifying the corrective action to be taken or in reviewing and questioning any action we, the licensee, determine to be necessary.

Following an event, if CP Co made the determination that a significant probability existed for a loss of service water due to failure of the intake pipe, etc, then actions, including perhaps an inspection, would be taken. Since it is not possible to define "significant unusual event" with any precision, however, and since the existing regulatory structure would make any CP Co judgement subject to NRC review, we do not believe that any action is warranted here. No action is proposed, therefore, for conclusion three of this topic evaluation.

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ATTACHMENT

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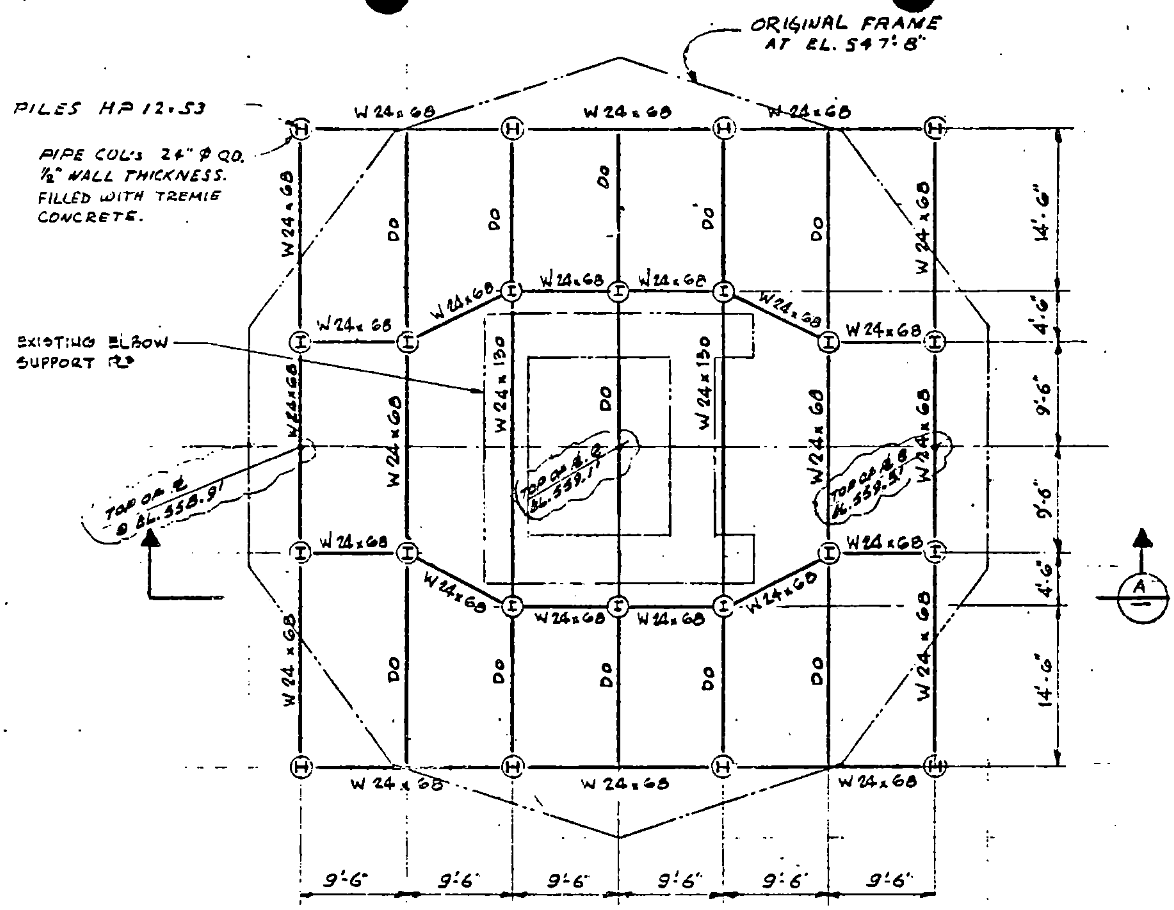

PLAN AT EL. 560'-0"

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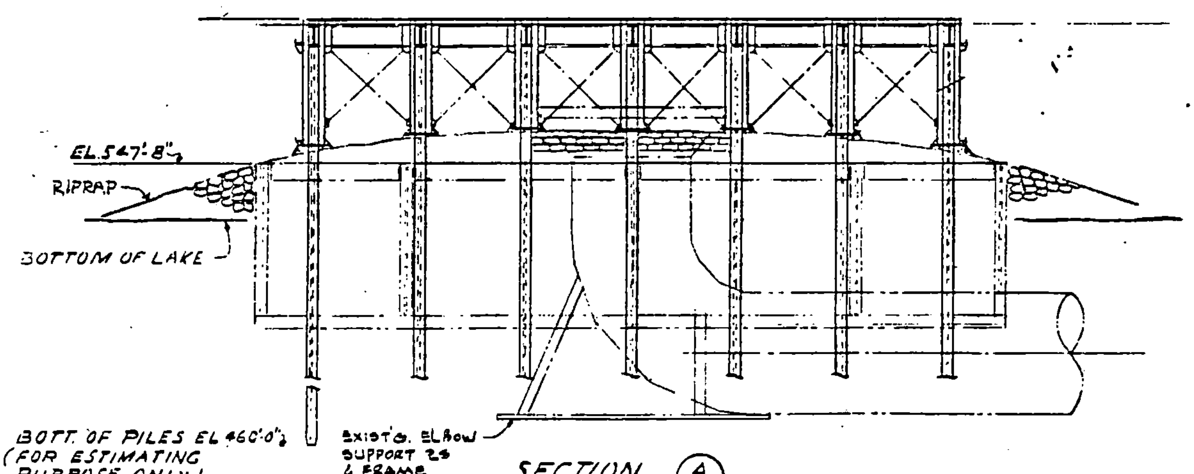

SECTION A

Palisades Plant Intake Crib Structure