

July 15, 1983

State of Illinois :
County of Cook : SS.


UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
)	Docket Nos. 50-329-OM
CONSUMERS POWER COMPANY)	50-330-OM
)	50-329-OL
(Midland Plant, Units 1)	50-330-OL
and 2))	

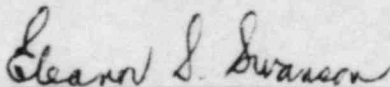
Affidavit of Dr. W. G. Corley

My name is Dr. W. G. Corley. I have previously been a witness in this proceeding and my professional qualifications are in the record. I swear that the statements made in the attached Affidavit are true and correct.



W. G. Corley

Signed and Sworn to
before me this 15th
day of July, 1983.



Notary Public

My Commission Expires January 14, 1987

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AFFIDAVIT
OF
DR. W. GENE CORLEY

My name is William Gene Corley. I am Director, Engineering Development Division, Construction Technology Laboratories, a Division of the Portland Cement Association. My qualifications were entered into the record at a hearing in December 1981.

At the request of Consumers Power Company, I visited the Midland Nuclear Power Plant on February 15, 1983 and inspected reported cracking visible in Rooms 110 and 116 near intersections of buttresses and the slabs in the containments. A copy of my report on this inspection is attached.

In this affidavit I would like to supplement information supplied in the report.

According to information given to me by representatives of Consumers Power Company and by representatives of Bechtel, both containments had exterior surface coatings applied prior to the time they were prestressed. Containment construction was completed above the 600 ft. level, an elevation higher than the highest visible crack inspected on February 15, 1983, by early 1975. Coatings were applied to the structures in June of 1977. Prestressing began in late 1979 and was completed by early 1981. Dewatering of the area around the containments was first done the latter part of 1979.

In my report of March 1983 (revised April 1983) I noted that coating material was visible in the cracks at the locations I inspected with a 50 power magnifier. I concluded that the cracks were present prior to the time coatings were applied. As indicated by the construction sequence, the cracks observed on February 15, 1983 must have been present before application of coatings was completed in June 1977.

Approximately four years passed between construction of the containments to the 600 ft level and application of prestressing. In general, this time period would be beneficial in that it would reduce the total amount of creep and shrinkage that would occur after prestressing was applied. Reduced creep and shrinkage would mean less loss of compressive stress in the concrete after prestress was applied. However, shrinkage that occurred after construction but before application of prestressing would also add to the likelihood of surface cracks occurring in the structures. It is not unusual to find cracks in prestressed structures, particularly if prestressing is done a long time after the concrete has been placed.

In the containment structures at the Midland Plant, restraint conditions at the intersection between the base and the walls would be a place that some cracking might be expected. According to Bechtel calculations provided to me by Dr. Shunmugavel stress caused by dead load and prestress force would induce tension at the locations where

cracks were observed. In combination with shrinkage and temperature stresses, these tensile forces might be expected to be high enough to cause cracking. Based on this information, it is reasonable to expect that cracks would be found in the locations inspected.

Prior to the February 15, 1983 inspection I made of cracking visible in rooms 110 and 116, I had seen time versus settlement records for the containments. My inspections of these records disclosed that total settlements were relatively small. In addition, total differential movements measured around the perimeter of the containments were small. Because of the high rigidity of the containments, little differential movement would be expected.

My visual inspection of the cracks and review of Sheets 1 and 2 of "Field Engineers Report Form CC-183," dated 12-17-82 which is included in my report entitled "Visual Inspection of Cracks in Containments Near Anchorages in Rooms 110 and 116," disclosed that the pattern of cracking did not support the possibility that cracks were caused by settlement of the structure. The observation that some cracks were approximately horizontal, some approximately vertical, and others were inclined, suggests that the cause was most likely to be restrained volume changes. For the reasons cited in this paragraph and the preceding paragraph, the possibility of settlement causing the observed cracks was not addressed in my report.

Subsequent to inspecting cracks in the containments, information was supplied to me that indicated estimated containment settlement caused by dewatering was 0.8 in. This estimate is given in FSAR Subsection 2.5.4.10.3.1.5. As of July, 1983, settlement of the containments has been less than 0.6 in. Based on this information, it is my opinion that the cracks cannot be attributed to differential settlement. The observation that coating material is in the cracks also precludes the likelihood that any cracking was caused by the dewatering. The coating was applied in June 1977 while the dewatering started in late 1979. Consequently, the coating could not have entered any crack that occurred after dewatering started.

I have reviewed the crack maps recorded by Wiss, Janey, Elstner & Associates in July 1983 in Drawing No. 7220-C198-2857-1 (11 pages) and referred to in Dr. Shunmugavel's affidavit. They do not change my opinion concerning the cause of such cracks.

Based on visual inspection of reported cracking in rooms 110 and 116 on February 15, 1983 and on subsequent review of construction schedules, settlement measurements, and other documents, it is my opinion that the cracks do not affect safety of the containments. In massive structures such as the containments, it is common to have cracks caused by volume changes in the concrete. Cracks inspected are not wide enough to indicate that any structural damage has been done. Consequently, the cracks do not need to be repaired.

As recommended in my report entitled "Visual Inspection of Cracks in Containments Near Anchorages in Rooms 110 and 116," cracks should be monitored by qualified engineers during the pressure testing of Unit 1 and Unit 2. Monitoring of these cracks will give additional assurance of the safety of both units. I have reviewed the Applicant's commitment to containment crack monitoring to be performed in addition to the SIT, as described in Dr. Shunmugavel's affidavit, and I believe it is adequate.