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September 12, 1988
5000-88-1633

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Gentlemen:

Subject: Oyster Creek Nuclear Generating Station (OCNGS)
Docket No. 50-219
License No. DPR-16
Oyster Creek Drywell Containment

References: GPUN Ltr. 5000-86-1116, dated 12/18/86
GPUN Ltr. 5000-87-1421, dated 11/20/87
GPUN Ltr. 5000-88-1544, dated 4/25/88
NRC Ltr., dated 8/10/88

On July 28, 1988, GPUN representatives met with the NRC staff to discuss ASME Code Compliance for the upper elevations (71' to 94') of the Oyster Creek Drywell. The focus of the discussions was the analytical technique used to model the cylindrical region and the results which were obtained. Besides the CB&I axisymmetric analysis, GPUN discussed: the basis for upper elevation UT inspections, alternate analysis techniques (finite element analysis) to demonstrate code compliance, our interactions with the ASME Code Committee, and the certified mill test reports for the upper elevation drywell plates.

At the end of the GPUN presentation, the NRC staff and the Region 1 representatives caucused and made a request for supplemental information. In order to comply with this request, we have repeated the item and provided our response as an attachment. One item, the certified mill test reports for the upper drywell plates, was already made available to Region 1 for their inspection.

We believe this letter completes your request for supplemental information. If you have additional questions on this matter, please contact Mr. Michael Laggart, Manager, BWR Licensing at (201)316-7968.

Very truly yours,

R. F. Wilson
Vice President
Technical Functions

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ATTACHMENT
OYSTER CREEK
UPPER DRYWELL REGION
SUPPLEMENTAL INFORMATION

1) Request: Formalize the drywell inspection program and be specific of what is planned for the refueling outages and plans for target of opportunity outages.

Response: By letter 5000-86-1116, GPUN committed to a UT shell thickness test program (sand bed region) at future outages of opportunity including forced outages otherwise requiring drywell entry during the next cycle (Cycle 11). During meetings of June 11, 1987, and November 13, 1987, GPUN modified this commitment to include the upper elevations and to continue the program for several years.

Installation Specification IS-328227-004 which was previously made available to the NRC resident inspector specifies the functional requirements for the UT inspections of the Oyster Creek Drywell. This specification also identifies the inspection areas for both the sand bed region and upper elevations of the Drywell.

Since the duration of a forced outage where a drywell entry is made is dictated by other factors, GPUN utilizes a priority basis (separate instructions) for performing the UT inspections. Given that the sand bed region (11'- 3") has a priority 1, the following table delineates the current priorities for the upper elevations.

Priority	UT Inspection Elevation	Area
2	87' - 5"	Two 6" x 6" grids above the intersection of Bays 13 and 15
3	87' - 5"	One 6" x 6" grid above the intersection of Bays 9 and 11
4	50' - 2"	One 6" x 6" grid above Bay 5

If the length of the outage does not permit the placement of temporary planking for priorities 2 or 3, then as a minimum priority 4 is inspected.

2) Request: Document the basis for not inspecting the drywell at the 75'-0" elevation.

Response: As discussed in the July 28 meeting, the 75'-0" elevation was of interest since the model used for the axisymmetric analysis did not demonstrate code compliance for a 40" region at this elevation. GPUN did not consider that an expansion of the UT effort to include examination at the 75' elevation was warranted since we had data from elevations 87'-5" and 50'-2". Our justification for this position is provided in the following paragraphs which provide our assessment of: corrosion environment, corrosion to November, 1987, and the radiation exposures.

Corrosion Environment

We have concluded that the corrosion damage to the upper elevations of the drywell was the result of simple aqueous corrosion of poorly protected carbon steel. We consider it likely that most of the corrosion occurred during the erection stage. During erection, the drywell stood fully exposed to the environment. Then, the Firebar D was applied as a slurry in three coats. The plastic covering the Firebar was torn several times, again exposing the drywell to the weather, until the concrete pours were completed. It wasn't until 18 months after erection began, that the drywell was fully protected from the environment.

During the drywell expansion test, it was noted that the Firebar D had entrapped moisture due to incomplete curing and introduction of water from external sources. This was evidenced by the appearance of water at sleeves around several penetrations in the concrete wall.

Additionally, water coming from the sand bed drains was noted during the 1980, 1983, and 1986 refueling outages. This leakage was later identified as originating from the flooded reactor cavity.

Leachate analyses performed on the Firebar D samples removed from the 50'2" elevation in November, 1987, showed leachable chloride and sulfate concentrations over an order of magnitude less than those from samples removed from just above the sand bed. Additionally, the moisture retention capability of Firebar D is an order of magnitude less than the sand. Therefore, we have concluded that the corrosion environment is much less severe in the upper elevations than in the sand bed region, since the harmful chemical species have apparently leached out of the upper elevation Firebar D and were carried away with the water to the sand bed. Further, the Firebar D retains much less moisture than the sand.

If the Firebar becomes wetted during an outage, the corrosion rate will be low (2-3 mils/yr based on the corrosion of steel in demineralized water). The temperatures of the drywell during operation at the 54' and 89' are approximately 132°F and 222°F, respectively. Therefore, during operation, we expect that the drywell/Firebar interface will dry out in time, and the total corrosion will be insignificant.

Based on our evaluation, we concluded that the corrosion environment is generally the same at all elevations above the sand bed, and that there is no evidence that significant differences in wall thinning should exist from one elevation to any other.

Corrosion to November, 1987

UT indicated that, at the 50'2" and 87'5" elevations, the drywell wall had undergone general corrosion at some locations with isolated pits (see figures 1 and 2). Remember that general corrosion of carbon steel is merely a progression of pits. The lowest average grid thickness at elevation 50'2" was 0.757" and at elevation 87'5" was 0.619". The conservatively estimated wall losses were 33 and 46 mils, respectively. We conservatively applied the corrosion estimates, for safety evaluation purposes, to the entire region (circumference and height) at all elevations above the sand bed, even though we know that this extent of corrosion clearly does not exist.

Radiation Exposure

Additional UT of the drywell wall on the 75' elevation would require about 13 man-rem exposure, 10 man-rem for scaffolding tower erection and take-down, and 3 man-rem for the surface preparation, UT, and surface protection. To perform the 87'5" UT, approximately 3 man-rem exposure was incurred. Since there is no evidence of a different corrosion environment between 75' and 87'5", we consider that the expenditure of an additional 13 man-rem is not ALARA.

Conclusion

Based upon our evaluation of the corrosion experienced to date, the corrosion environment, and radiation exposures, we have concluded that the gathering of additional wall thickness data on the 75' elevation of the drywell cylinder is not warranted.

3) Request: Commit to provide an assessment of the corrosion rate at each refueling outage.

Response: By Safety Evaluation (SE) No. 000243-002, GPUN has documented the results from the UT inspections and the structural analysis, the cause and extent of the corrosion, the drywell licensing basis and design parameters, and the postulated corrosion rates for the sand bed and upper elevations. To date, GPUN has docketed this SE twice to the NRC staff. Based on the July 28th meeting, GPUN has concluded that the issues of the UT inspection method, the methods for structural evaluation, the cause for the corrosion, are well documented by the SE and the NRC staff has concurred with the GPUN approach.

For future operating cycles, GPUN will update its records to reflect the results of the latest UT inspections. For each refueling outage, GPUN will provide the NRC staff an assessment of the corrosion to date for the sand bed and upper elevations. The SE will be updated if the results of these inspections impact the statements or conclusions which were made in the previous revision.

NOT TO SCALE

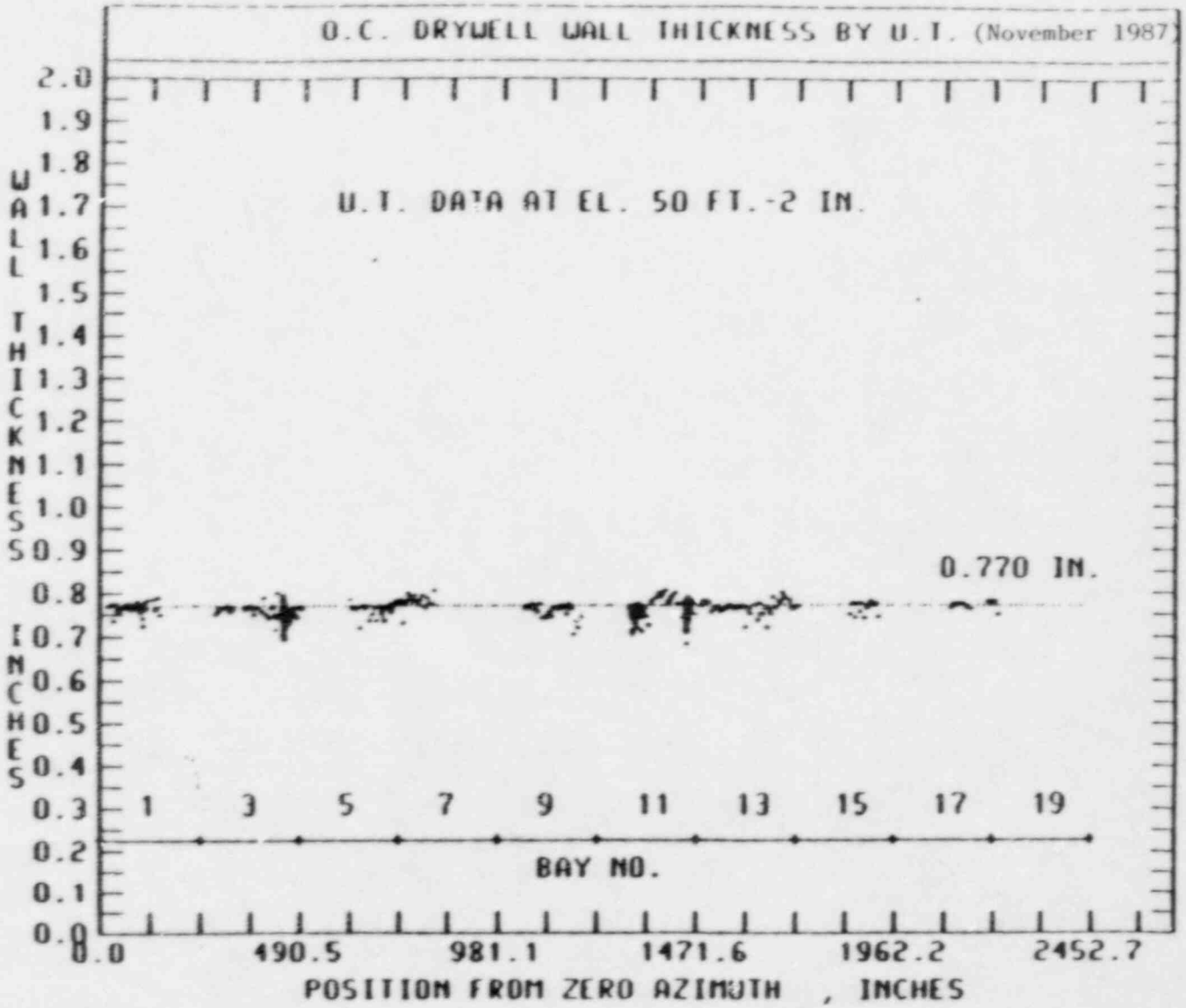

FIGURE 1

NOT TO SCALE

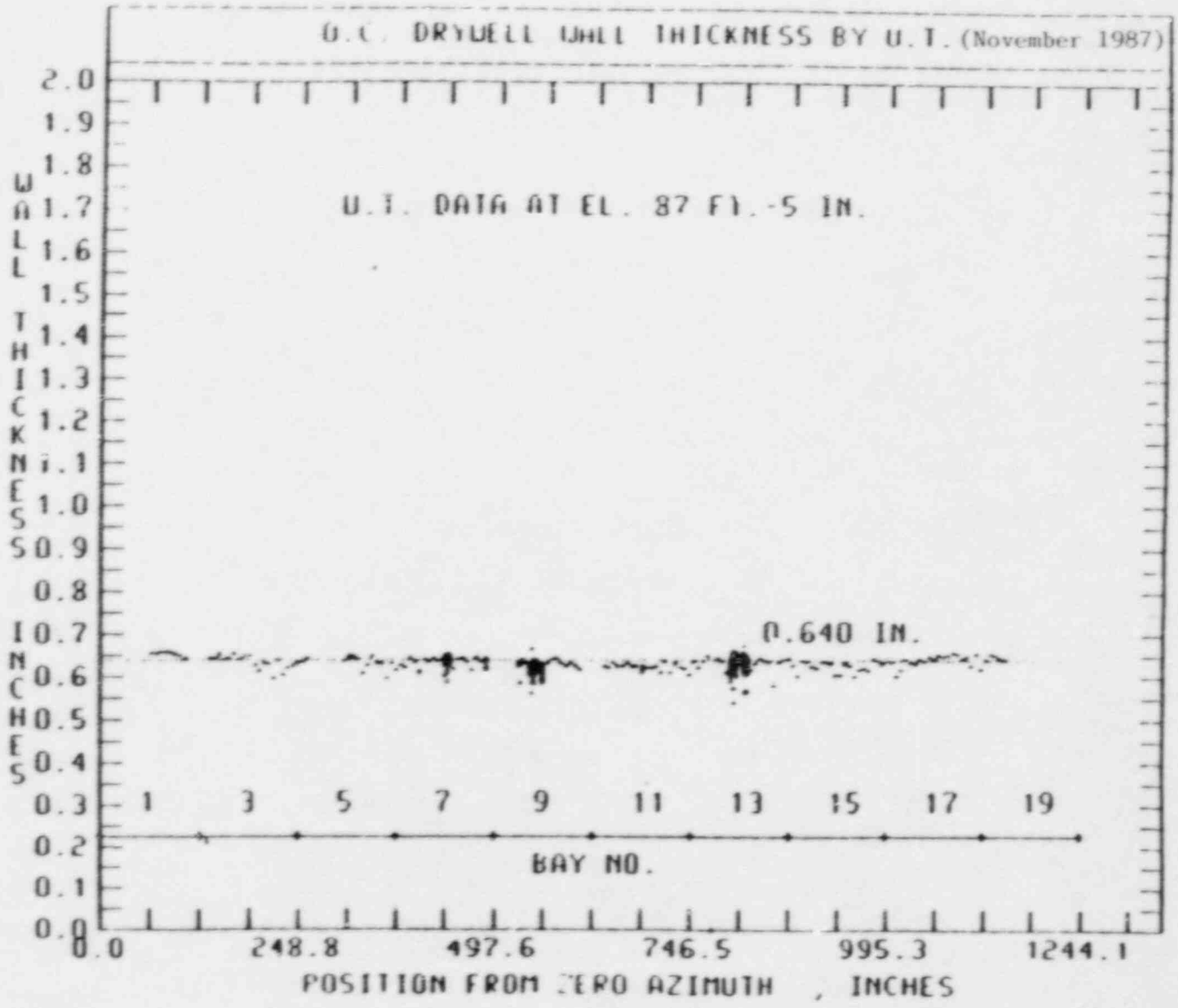

FIGURE 2