

COMBUSTION ENGINEERING, INC.

END OF CYCLE 4 FUEL AND CEA EDDY CURRENT INSPECTION REPORT
1980 MAINE YANKEE REFUELING OUTAGE

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END OF CYCLE 4 FUEL AND CEA EDDY CURRENT INSPECTION REPORT
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This report summarizes the results of the eddy current test data taken at the 1980 Maine Yankee Outage for CEA Guide Tube Wear, CEA Guide Tube Crimp Size, and CEA Finger Wear. CEA and fuel assembly core locations for Cycle 4 are given in Figures I and II of this report.

CEA GUIDE TUBE WEAR

[] test assemblies, [] were tested for guide tube wear in accordance with approved C-E procedures. Fuel assemblies have [] and assemblies [] have [] The maximum [] reading obtained as a result of the eddy current testing was [] indicating that no detectable CEA guide tube wear has occurred in these test assemblies. These assemblies were in core locations documented as relatively low wear areas from previous wear test data.

CEA GUIDE TUBE CRIMP SIZES

Of the [] Batch G fuel assemblies tested for guide tube crimp size, [] required recripping of all guide tubes. Initial crimp sizes of these bundles ranged from [] Recrimping and eddy current testing of these assemblies were performed in accordance with approved C-E procedures, with all resulting recripps ranging from [] These same [] all located under CEAs during Cycle 4, showed no detectable sleeve wear. It should be noted that although the eddy current procedure used is specifically designed for evaluating guide tube crimp size, the test method is capable of detecting sleeve wear to a minimum of []

CEA FINGER WEAR

Eddy current testing was performed on [] CEA assemblies at Maine Yankee during the January 1980 refueling outage. The testing was performed in accordance with

approved C-E procedures for the detection of wear at the []
] and for wear caused by []

] in the sleeves. The lower portion of each CEA finger was inspected with an eddy current coil.

types of CEA assemblies were tested. CEA assemblies [] are the full length, full strength standard CEAs using B₄C pellets. CEA assemblies [] are full length, reduced strength CEAs using stainless steel slugs in place of the B₄C pellets in the four outer fingers. Wear signals were observed on all CEAs tested with the most significant wear appearing in the range of [] from the tip of the fingers. The signal [] and location estimates are summarized in Table I. The signal [] were compared to those obtained from testing a CEA wear standard with [] machined wear simulations. A description of the wear standard and the corresponding signal [] is given in Table II. Note that the signal [] depends upon the circumferential extent and depth of the wear pattern. Consequently, the signal []

The average wear signal indication, per CEA assembly, ranges from []
] This range corresponds approximately to a []

] the degree of wear on a control rod is acceptable for continued operation, if the ET data indicates that the wear is not more severe than a maximum wear depth of [] with an []. It should be noted that prior to Cycle 4, CEA [] was located in core position [] which has been documented as a relatively high wear (guide tube) location from previous wear testing. Refer to Figure III for high wear locations.

The correlation used in this eddy current analysis assumes that the signal is attributed [] of the CEA finger. [] leading to some [] of the actual wear.

TABLE I
(CONTINUED)

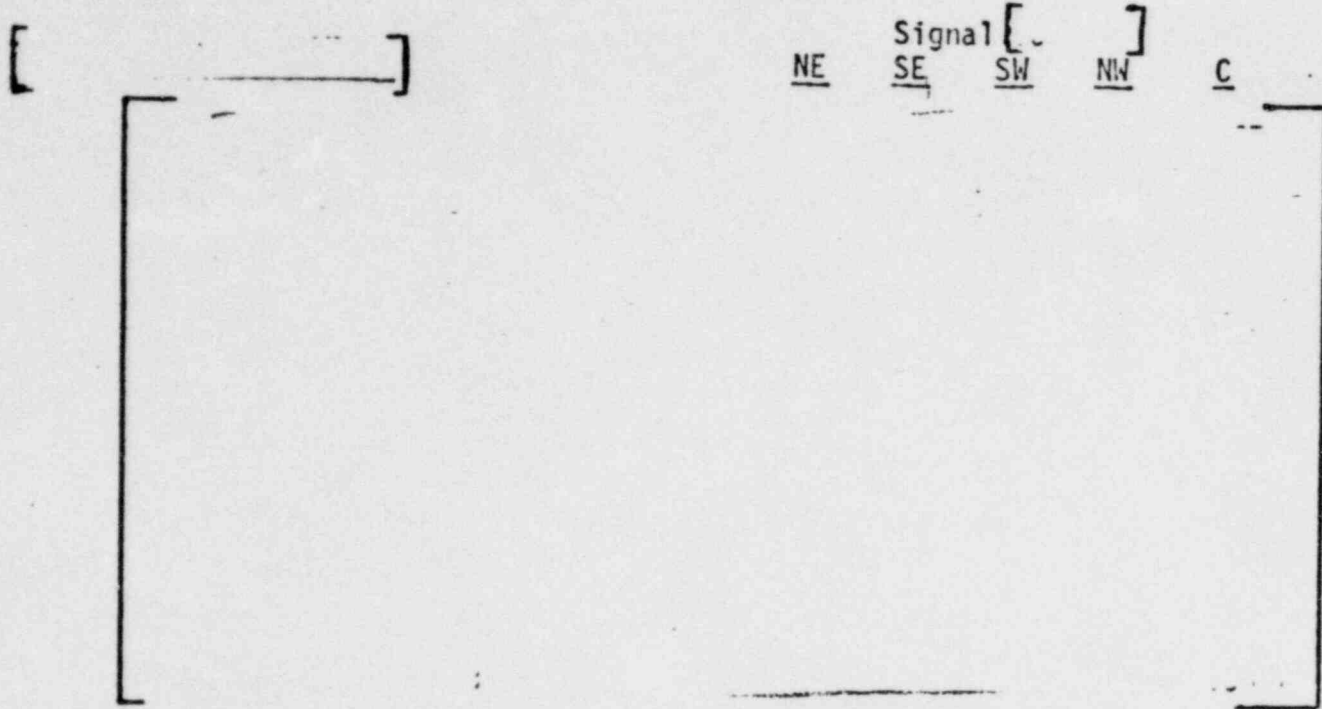
CEA No.

Results []

Location

<u>CEA No.</u>	<u>Results</u> []	<u>Location</u>

TABLE II
CORRELATION: ET Signal [] Vs. Wear



MAINE YANKEE CYCLE 4
FUEL ASSEMBLY LOCATION

[] "G" assemblies tested []
[] test assemblies []

Indicates 'G' Assembly No.
unless otherwise annotated.

XXX

Indicates
CEA Location

FIGURE I

MAINE YANKEE
CEA LOCATIONS CYCLE 4
CEAs []

PLANT NORTH →

FIGURE II

MAINE YANKLE HIGH WEAR LOCATIONS
CYCLE I, IA, AND II SUMMARY

NOTE:

$$\text{Ratio} = \frac{\text{Assembly Avg. ET} [\dots]}{\text{Core Avg. ET} [\dots]}$$



High Wear
Locations
Ratio > 1.50

FIGURE III

