WASHINGTON D C 20555

5/15/84 5/14/84
Vince, call

Mr. Vincent Lettieri
Brookhaven National Laboratory
Upton, New York 11973

Dear Vincent:

Enclosed please find a summary of our statistical analysis of the primer protective coating backfit inspection program at Comanche Peak, Unit 1. The analysis is based on solely on the data we received from Lisa Bielfeldt of Texas Utilities Generating Company in letters dated 3/29/84, 4/17/84 and 4/23/84.

The two variables analyzed in this report are adhesion and dry film thickness (DFT). For each variable, we provide both the sample proportion of failed area as well as a 95% upper confidence interval for the population proportion of the defective area. The interpretation of the summary statistics should be made in light of the comments and assumptions we offer in the attachment.

Should you have any questions, please give either one of us a call.

Sincerely,

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Dan Lurie

Dan Lurie, Mathematical Statistician
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(301) 492-4989

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Enclosed:
As stated

cc: G. Burdick, PES
F. Hawkins, NRR
E. Trager, RV
A. Hertfield, RV

phil - This letter was signed by Lee Abramson and mailed to mr Lettieri around the middle of May.
Dan Lurie

STATISTICAL ANALYSIS OF PROTECTIVE COATING (PRIMER ONLY)
BACKFIT INSPECTION PROGRAM AT COMANCHE PEAK - UNIT 1

Failure Rate and 95% Upper Confidence Limit (UCL)

| | Adhesion Test | DFT test |
|---|---|---|
| I. CONCRETE | | |
| Failure Rate | 0/1691 = .000 | 101/4623 = .022 |
| 95% UCL | 3.00/1691 = .0018 (a) | .022+1.645(.0022)=.0254 (b) |
| II. STEEL LINER | | |
| Failure Rate | 2/405 = .0049 | 105/1494 = .0703 |
| 95% UCL | 6.30/405 = .0156 (a) | .0703+1.645(.0066) = .0812 (b) |
| III. Misc. Steel - PIPE SUPPORT | | |
| Failure Rate | 5/230 = .0217 | 17/230 = .0739 |
| 95% UCL | 10.51/230 = .0457 (a) | 25.50/230 = .1109 (a) |
| IV. Misc. Steel - CABLE TRAY SUPPORT | | |
| Failure Rate | 3/297 = .0101 | 35/297 = .1178 |
| 95% UCL | 7.75/297 = .0261 (a) | 46.40/297 = .1562 (a) |
| V. Misc. Steel - CONDUIT SUPPORT | | |
| Failure Rate | 1/225 = .0044 | 10/225 = .0444 |
| 95% UCL | 4.74/225 = .0211 (a) | 16.46/225 = .0754 (a) |
| VI. Misc. Steel - OTHER | | |
| Failure Rate | 11/765 = .0144 | 67/765 = .0876 |
| 95% UCL | 18.21/765 = .2380(a) | .0876+1.645(.0102) = .1044 (b) |

(a) Constructed from Poisson probability table
(b) Calculated from binomial probability distribution

COMMENTS AND ASSUMPTIONS

1. The failure rate in a population is defined to be the ratio of the defective area to the total area in the population. It is virtually impossible to obtain the exact population failure rate witout testing the entire population of interest. Two estimators of the population failure rate are derived from the sample and are given in this analysis. The first estimator is the sample failure rate which is the ratio of the number of defective tests to the number of tests in the sample. This estimator (often called a "point estimator") in and by itself may not be very meaningful, as no measure of assurance is associated with it. The second estimator is a 95% upper confidence limit (UCL) on the population failure rate. This estimator is constructed from the sample such that one is "95% sure" that the true failure rate does not exceed this UCL. Other UCL's, such as 90% UCL or 99% UCL, could be similarly constructed.

2. The 95% UCL's for the failure rates of the various items in Unit 1 were calculated using two approaches. Whenever the number of defective points was low (50 or less), a table value for the confidence limit for a poisson variable was used. (See Table 40, "Biometrika Tables for Statisticians", vol 2, by Pearson and Hartley, Cambridge University Press, 1970). When the number of defectives exceeded 50, a normal approximation to the binomial distribution was used.

3. The failure rate is not necessarily the best single statistical criterion for determining the adequacy of the coating. Instead, one may wish to estimate the total area that would flake off in case of an accident. This may be accomplished by multiplying the given estimators by their corresponding total areas. The latter quantities are found in Bielfeldt's letters of 3/29/84 and 4/14/84.

4. As stated in the cover letter, the analysis is based solely on the data supplied by TUGC. It does not reflect the results of subsequent tests conducted by BNL.