

To: Paul Prevey, Lambda Research
From: Mark Kelly
Regarding: GE Nuclear Zircalloy Tube Texture Analysis Problems

7/2/99

As we discussed Thursday, I have demonstrated that incorrect sample positioning during the pole figure measurement one of the recent GE Nuclear zircalloy tubes analyzed for texture caused the intensity distortions that produced the erroneous pole figure. The incorrect sample positioning occurs because the sample is not flat. As we discussed, every zircalloy tube specimen that has been in the lab since I've been there and probably every zircalloy tube specimen produced in the lab has not been flat. The sample positioning directions in the Lambda pole figure procedure, 3P1016, state that the sample is to be positioned in the ring by placing both on a glass plate. Therefore, probably every GE Nuclear zircalloy tube has been positioned incorrectly. Therefore, intensity distortions are probably present in every pole figure, particularly every (00.2) pole figure, obtained in the lab. We know that, of the last three tube specimens examined, one was distorted significantly. That is, the pole figure intensity distortion was great enough to produce errors in the pole figure analysis that the client, GE, readily recognized that the pole figures were in error when they reviewed the report. Since it appears that none of the specimens were flat, we have good reason to believe that pole figures from other specimens, particularly (00.2) pole figures, are in error. As we saw from the release of the recent report with the erroneous pole figure, we are not in a position to determine which pole figures are distorted significantly with respect to GE Nuclear's use of the data and which are inconsequential.

Lambda Research must notify GE Nuclear of this problem with the past pole figure analysis. The recent job submitted by Dick Calcaterra of GE Nuclear included the legal requirement that vendors report significant defects. The particular CFR is included in the job folder and in my earlier memo. Given this requirement, I suggest that we review the situation with them, let them evaluate the results situation.

As we discussed, the root cause of the problem appears to be that to get a good pole figure, the specimen must be flat. Our procedure 3P1016 calls for flatness to be within 0.002 inches, yet does not specify a means to check the flatness. As far as I know, we have no procedure or way to check if the flatness of a springy, flexible, foil specimen like the zircalloy tube pole figure specimens is within two mils. Just by inspection, it's clear that specimens aren't nearly that flat. The fact that the specimens are not flat and the fact that the procedure 3P1016 states that specimens are to be placed in sample holder rings by placing both against a flat plate guarantees that when the sample holder ring is placed on the instrument, sample positioning error of some of the sample surface will be present in the specimens. While this does not appear to be a problem with typical polished coupons, this appears to be a problem when the current procedure is applied to GE Nuclear zircalloy tube foil specimens. Therefore, correction of the procedure and proper training of the personnel doing the test are probably essential elements of the solution to this problem.

Questions

cc: Mike Glavosik, P. Mason, C. Barger

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Lambda Research must notify GE Nuclear of this problem with the past pole figure analysis. The recent job submitted by Dick Calcaterra of GE Nuclear included the requirement that vendors notify GE of defects for evaluation per Section 706 of the Energy Reorganization act and 10 CFR 21. Given this requirement, I suggest that we review the situation with them and let them evaluate the situation. Practically, this might be an opportunity to improve our service to them. Technically, this is difficult work. Let them evaluate the technical situation.

As we discussed, the root cause of the problem appears to be that to get a good pole figure, the specimen must be flat. Our procedure 3P1016 calls for flatness to be within 0.002 inches, yet does not specify a means to check the flatness. As far as I know, we have no procedure or way to check if the flatness of a springy, flexible, foil specimen like the zircalloy tube pole figure specimens is within two mils. Just by visual inspection by eye, I can't tell what flatness to within 0.002 inches looks like. However, it appears that specimens aren't nearly that flat. The fact that the specimens are not flat and the fact that the procedure 3P1016 states that specimens are to be positioned in sample holder rings by placing both against a flat plate guarantees that when the sample holder ring is placed on the instrument, sample positioning error of some of the sample surface will be present in the specimens. While this does not appear to be a problem with the typical rigid polished coupons, this appears to be an problem when the current procedure is applied to GE Nuclear zircalloy tube foil specimens. Therefore, correction of the procedure and proper training of the personnel doing the test are probably essential elements of correcting the current situation and preventing its recurrence.

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