To: Paul Prevey, Lambda Research 7/2/99

From: Mark Kelly

Regarding: GE Nuclear Zircalloy Tube Texture Analysis Problems

---

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~~ others produced in the lab ~~has~~ have 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~~ the other GE Nuclear zircalloy tube ~~has~~ have been positioned incorrectly. Therefore, intensity distortions are probably present in ~~every~~ the pole figures, particularly ~~every~~ the (00.2) pole figures, 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~~ as distorted when they reviewed the report. Since it appears that ~~none of the~~ other specimens were not 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 Calcatera of GE Nuclear included the ~~legal~~ requirement that ~~vendors report~~ GE be notified of any ~~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. 10 CFR 21 might apply.

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, its 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 gaurentees 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 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 the solution to this and future ~~problem.~~ questions.

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

THIS DOCUMENT IDENTIFIES AN ALLEGER

A/3

To: Paul Prevey 7/2/99

From: Mark Kelly

Regarding: GE Nuclear Zircalloy Tube Texture Analysis Problems

---

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, the zircalloy tube specimens that have been in the lab since I've been there and probably others have 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, other GE Nuclear zircalloy tube specimens have probably been positioned incorrectly. Therefore, intensity distortions to some extent are probably present in other pole figures, particularly (00.2) pole figures, 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 as problematic when they reviewed the report. Since it appears that other specimens were not 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 Calcatera 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.

THIS DOCUMENT IDENTIFIES
AN ALLEGER

To: Paul Prevey 7/2/99

From: Mark Kelly

Regarding: GE Nuclear Zircalloy Tube Texture Analysis Problems

---

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, the zircalloy tube specimens that have been in the lab since I've been there and probably others have 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, other GE Nuclear zircalloy tube specimens have probably been positioned incorrectly. Therefore, intensity distortions to some extent are probably present in other pole figures, particularly (00.2) pole figures, 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 as problematic when they reviewed the report. Since it appears that other specimens were not 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 Calcatera 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.

THIS DOCUMENT IDENTIFIES
AN ALLEGER