

The Judas Tube Program

The eddy-current practical exams are generally designed to insure that an analyst calls defects greater than a given depth or voltage at a 90% confidence level. Indian Point and many other utilities do not count off on their exam for false positives. This makes it possible for analyst to "call everything that moves" without going into a detailed study to determine if the indication is really a defect or not. When the analyst gets on the job, he can not make too many false positive calls because it would overburden the resolution analyst. The analyst's performance is monitored each day, and he gets feedback from this monitoring. Too many false positive calls will result in retraining and being sent home if this continues. Therefore, the level of performance of the analyst falls of during production data analysis. Some method of monitoring this performance during production is needed.

I believe that NRC should institute the "Judas Tube" program. This would consist of collecting tubes from the test and current inspection that had defects in them. They would be recycled back into the analysis data stream with the date, row and column disguised to match the other tubes in the cal group. The readings would be changed so they would match the cal standards in that cal group being done. This can be done with a simple c-program. Each cal group would contain at least one Judas Tube, and the analyst would be graded on their ability to detect these defects. If the analyst did not achieve a passing grade, they would have to be retrained and retested. Also, all cal groups that they analyzed would have to be redone by a qualified analyst. Into this collection of Judas Tubes, we would also insert a few "Monkey Tubes", such as R34C51 of Steam Generator 22, with defects so obvious that even a monkey could find them. If an analyst missed one of these tubes, that would be an automatic failure, and he would have to be retrained and tested. Also, all the tubes he had analyzed would have to be redone.

The analyst's evaluation program could be extended to include any normal defective tubes from the plant that come through the data analysis program. If the plant had enough normal defective tubes, then the Judas Tubes would not need to be inserted. However, this is seldom the case. It would also keep the analyst on their toes and insure that they would examine each tube, since they know that they will get some bad tubes in every cal group. This will slow down the analysis speed, more from the increased care that each analyst will take rather than the insertion of the extra tubes. However, it will insure that the tubes get the quality of inspection that NRC has been led to believe they are getting.

In keeping with the Judas Tube program, I think that the utility should re-analyze all of the cal groups done by the analysts who missed the "monkey tubes" at the Indian Point inspection. The utility should be notified as soon as possible about this so that they will have time to include this in their program without impacting their critical path.

J/169

Emmett:

I talked to Indian Point some yesterday afternoon. The calls by the analyst that reviewed R34C51 of SG22 were reviewed and he missed something like 6 out of 18 tube calls. I believe that when an analyst misses something like this, there is something fundamental wrong with the program (training, guidelines, instructions, data management), and it should be corrected immediately. Some methods of screening should be done during the inspection to insure that this type of performance is detected very early in the inspection. With this type of performance, the utility does not achieve the 90% confidence level that EPRI claims.

I explained to the utility that the Judas Tube program was a general one that I believed all utilities should be using during their inspection. I believe that we can achieve almost the same thing by requiring the single analyst calls at Indian Point be reviewed. If any analyst has missed a "Monkey Tube", then all tubes that that analyst did must be re-analyzed. I suggested that Andy review the single analyst calls and determine which cal groups must be redone. Tubes that have a high signal-to-noise ratio, such as R34C51 and R35C51 of SG22 should be declared "Monkey Tubes". I will be glad to look at a tape of any scans that Andy has questions about and give my opinion. Amrit Sagar could also be used for this. This procedure would probably correct this problem at Indian Point for this inspection, but I think NRR should push for the full Judas Tube Program for future tests at all utilities, and add this to the analyst monitoring program.

On the other side of the coin, some of the calls that I reviewed were not defective tubes. The signal-to-noise was low enough that it was a guess if the indication was a real defect or not. The pressure tests on the tubes showed no change in the signal. This proved that if it was a defect, it was not large enough to have any significance effect on the tube's integrity. Most likely, it was a deposit on the tube OD. A significant number of tubes that the utility has plugged fall into this class. A re-analysis of the data will probably turn up some more tubes in this category. I do not believe that these tubes will need to be plugged, but that is a decision to be made after the re-analysis. However, any new "Monkey Tubes" would need to be plugged:

I will be glad to discuss this with you this morning before the 10:00 am phone call.

Caius