ITT ENGINEERED VALVES

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Interim Report to the NRC of
10 CFR 21 Event 50285, reported by ITT 07/18/14
Concerning M1 diaphragms, Customer Testing

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1.0 INTRODUCTION

ITT Engineered Valves, LLC (ITT) was obligated to point out to end users a potential defect with items considered Basic Components for Nuclear industry service. The items in question are ITT's M1 EPDM Diaphragms, which were sold as parts incorporated into valve assemblies or as individual spare parts since the initial release of this M1 diaphragm compound in 2008, and also certain ITT items (ball valve seats, diaphragms) that were qualified via special projects for specific customer applications. The "potential defect" applies to affected items that are intended for Nuclear radiation applications. The problem came to light as a result of an NRC investigation of Steris Isomedix Services (Steris). The NRC found that Steris did not properly account for variances in radiation that could occur depending on where samples were placed in Steris' irradiation chamber. Based on this finding and also ITT's subsequent evaluation of the matter, ITT has concluded that there may be as much as 3.3 to 10% unaccounted uncertainty in the specified radiation dosage called for by ITT during Steris' treatment of samples that were used to qualify ITT's products. Any such affected component that was sold or is being sold will need to be evaluated as to the effect of the uncertainty in the test results on the actual component in service. As this evaluation can only be made by the customer after reviewing the usage and application of the affected item, this defect is best characterized as 'potential' by ITT.

Initial notification of the potential defect was made to the NRC via fax on 7/18/14. The potential defect report was designated Event 50285 shortly thereafter. A 30-day Written Notification was filed with the NRC on 8/15/14 and is available on the NRC web site.

Per 10 CFR part 21 requirements, this report is the 60-day Interim Report. The report is 'Interim' and not 'Final' because ITT is not able to close out the Nonconformances; due to the fact that the application and time of exposure comes into play in service, the determination of the impact of the potential defect is a responsibility that can only be borne by the end user.

2.0 POTENTIAL IMPACT OF NONCONFORMANCE

(Note: this section is a repeat of section 4.0 in the 30-day Written Notification report)

M1 Diaphragms

When the current EPDM M1 diaphragm compound was initially qualified during 2007 – 2008, samples of each size were manufactured and delivered to ITT's R&D lab. After conducting the standard qualification testing of unradiated diaphragms, samples were prepared for life cycle testing of irradiated samples. This consisted of sending samples to Steris for irradiation, retrieving and then testing the sample diaphragms at specific temperatures and pressures based on past customer requirements, ASME N31 Code Cases, MSS SP-100 testing, etc.

ITT used Steris to apply radiation to these diaphragm samples. Due to issues with variability in applied radiation levels as discovered by the NRC during the inspection at Steris conducted in May, 2014 (NRC inspection report #99901445), and as a result of ITT's review of that inspection report, ITT has determined that the minimum level of radiation specified by ITT for the M1 qualification project may not have been applied to the samples per ITT's stated minimum requirements. Due to this uncertainty in applied radiation level, it is possible that the actual dosage applied was as much as 10% lower than the minimum specified by ITT.

This 10% uncertainty was an accumulation of two issues:

1. Location in irradiation chamber – As a result of the NRC Notice of Nonconformance, Steris notified ITT in its June 18, 2014 letter that there was more uncertainty associated with the actual radiation dosage applied than was previously considered. The variation that now had to be accounted for was due to irregularities in measurement and sample placement in the radiation chamber. Followup correspondence from Steris indicated that ITT should have accounted for an additional +/- 3.5% uncertainty when specifying minimum radiation levels for M1 samples.
2. Dosimeter uncertainty - In ITT's purchase orders during the M1 qualification project in 2008, it was specified to Steris that certain levels of radiation should be applied to our samples, with a specified minimum value required. A statement that Steris' dosimeters carried a +/- 6.5% uncertainty was listed in the quotation paperwork, and also included on the certificate of conformance document. Since ITT specified that a minimum level be applied, it was not at all clear that by referencing the 6.5% uncertainty Steris was indicating that ITT had to then account for the dosimeter uncertainty by adjusting our targeted "minimum" desired radiation value accordingly. It was not until reviewing the NRC Nonconformance report 99901445 that it was recognized that ITT's 2008 qualification should have accounted for a 6.5% dosimeter uncertainty.

Customer Projects

Since 2008 there have been several projects that were initiated by ITT's customers that required irradiation application services from Steris. This would occur when ITT products needed to meet a specific customer condition that was not previously validated, so a special test project would be necessary to qualify ITT products for that condition. These projects had results that could have been affected by both the off-carrier location uncertainty and the dosimeter variation uncertainty. ITT is able to locate these customers and inform them of the event, see below.

3.0 AFFECTED CUSTOMERS

ITT directly contacted all M1 customers via formal letter in late July - early August. Spurred by this and the NRC notifications, many end users followed up with ITT with more questions and requests for more information. Such correspondence was received from the end users and other interested parties listed below:

Wolf Creek Nuclear Operating Corp.
AEP, Cook Nuclear Plant
PSEG
NRC, Northeast Region
Ameren
South Carolina Energy and Gas (SCEG), VC Summer
Nuclear Utility Group on Equipment Qualification (NUGEQ)
Entergy, Indian Point
Duke Power, Oconee and also Headquarters
Exelon, Byron and Braidwood
Luminant, Comanche Peak
PG&E, Diablo Canyon
Southern Co., Vogtle
TVA, Watts Barr Nuclear
Entergy, Waterford 3
APS, Palo Verde
New Brunswick Power, Point Lepreau
Dominion Power
Exelon, Three Mile Island

Dominion Power, Surry

All of the customer inquiries above were fully addressed by ITT (usually within the same day), and inquiries continue to be handled as quickly as possible.

Customers who purchased special services from ITT in order to conduct testing and qualification of irradiated diaphragms since 2008 are as follows:

1. Duke Energy Corporation (Oconee), PO 00151156
2. Exelon Generation Company (Braidwood and Byron), PO 636683-01
3. Luminant Generation Company (Comanche Peak), PO 0731098 6D2

All three customers listed above have already been contacted by ITT and are evaluating the test project and the resulting products to determine how to address the 10 CFR Part 21 finding.

4.0 CONTINUING PLAN OF ACTION

All affected ITT customers were notified of the 10 CFR Part 21 potential defect with a formal letter. As per section 3.0 above, customers have responded and are carrying out the necessary evaluations. Ongoing sales of ITT M1 diaphragms are also accompanied by a letter notifying end users of the 10 CFR 21 situation.

ITT is continuing with a new M1 qualification effort using irradiated samples that have been appropriately treated, with the minimum applied radiation dosage accounting for the recently discovered uncertainty. This testing will take several weeks to complete all sizes and all conditions (in order to satisfy all ITT customers equally). Full qualification of certain of the smaller sizes of M1 diaphragms is on schedule to be achieved by December 2014, with other sizes attaining qualification during the 1st quarter 2015.

5.0 INTERIM REPORT SUMMARY

On 7/18/14, ITT reported a potential 'failure to comply' defect to the NRC which involved the qualification of M1 diaphragms for radiated service, and also the qualification of select ITT products to specific customer-paid test programs. The qualification of these products had been conducted using samples that were radiated to minimum levels that did not completely account for all uncertainty in

the measurement of the radiation applied, which was discovered after the fact. This uncertainty of appropriate supporting data was evaluated at ITT and deemed to be a potential cause of a substantial safety hazard per 10 CFR part 21.

ITT has communicated to all customers the particulars of this 10 CFR Part 21 potential defect, in the form of formal letters to each M1 diaphragm customer regarding existing product, letters included with all ongoing sales of M1 diaphragms, and direct contact with customers who purchased products qualified via customer directed testing. ITT continues to provide information to concerned customers when called upon, in order to aid their evaluation of the impact of the qualification uncertainty on products in service.

In order to further mitigate concerns ITT has embarked on an M1 diaphragm re-qualification project, repeating the qualification testing previously conducted in 2008 using appropriately irradiated diaphragms, which accounted for all applicable uncertainties in the radiation level measurement. Qualification is still on target for completion of all sizes by first quarter 2015.