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Enclosed is the follow up report per Reed Technical Specification TS 6.7.2.a.
For the notification to the NRC Operations Center 8/10/2017, NRC Tracking
Number 52896.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 8/23/17

Melinda Krahenbuhl, Ph.D.
Director, Reed Research Reactor

A020
NRR

Follow-up report per Reed Technical Specification TS 6.7.2.a
NRC Tracking Number 52896

On August 10, 2017, Reed College reported a potential violation of Technical Specifications 3.22. and 3.2.3. Specifically, the reactor was operated with the log channel inoperable at low powers due to noise in the signal. Due to the signal to noise ratio, the source interlock would not have actuated if the source had not been physically present, although the source interlock test was performed on the start-up checklist and functioned normally.

The operators discovered the noise in the log power signal during the start-up checklist on Aug 9, 2017. The data point collected from the log channel indicated a power level of $1.02 \times 10^{-4}\%$ of full power. The typical shutdown power is $\sim 2.0 \times 10^{-7}\%$ of full power. The scheduled reactor operation was terminated. The staff evaluated the recent start-up checklists to determine the cause and duration of the electronic noise on the log channel. The staff determined that the reactor was operated with the high noise to signal ratio on three previous runs. The data collected during the evaluation is contained the following table. An additional start-up was initiated on 8/8/2017, however the reactor operations were terminated prior to criticality due to fluctuations in the high voltage readings of the linear channel.

Date	Log channel readings with reactor shut down
8/1/17	7.75×10^{-6}
8/3/17	1.24×10^{-4}
8/4/17	2.15×10^{-4}
8/8/17	1.02×10^{-4}

The evaluation also included reviewing the electronic logs of the log channel readings. This review found that the noise is most often but not exclusively associated with the status of console power. The noise was removed by repositioning the log channel's signal cable. The manufacturer was contacted to help find and implement a means of preventing future incidents of excessive noise in the signal.

In order to deter future operations when noise obscures the log channel's signal at low power, two changes have been made to the start-up checklist.

1. An acceptable range for the log power channel power at start-up was added. This range excludes the readings associated with noise in the table above, and should prevent operations if noise is obscuring the signal.
2. The log channel's operability will be verified by evaluating its response to the control rod movement. This operability test is already used for the linear power channel. The resulting change in power is small enough to be completely obscured by noise. Therefore the test is well suited to identifying noise related problems.

These two changes are largely redundant and should reinforce continued and on-going training on the importance of the log channel and source interlock function.