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September 20, 2018

**SUBJECT:** Revisions to Technical Specification Submission Supporting License Amendment Request, PUR-1, Docket 50-182

Dear Ms. Montgomery,

In further support of the License Amendment Request (LAR) for Digital Instrumentation and Control Upgrades to the PUR-1 Reactor, some modifications to the proposed Technical Specifications are herein submitted to promote clarity and better align with the guidance set forth in ANSI/ANS-15.1-2007.

There has been an inconsistency in prior submissions regarding the regulating rod's operability status in TS 3.2.b. The Technical Specifications herein submitted contain the text of the currently approved license specifically stating, "Both shim-safety rods and the regulating rod shall be operable."

Table II of the Technical specifications contain a change to the setpoint language for the area radiation monitors. In order to prevent an inadvertent Technical Specification violation, the words "or less than either" were added to the setpoint of the Pool Top Monitor and "or less" was added to both the Water Process and the Console Monitor. This change allows for more conservative setpoints of the radiation level to be selected and promotes facility safety by allowing more stringent ALARA principles. The revised Table II is below. A basis for this change reads simply, "Use of more conservative values are permitted on the setpoint to allow greater safety margin."

| Channel                | Minimum Number Required <sup>(e)</sup> | Setpoint  | Function     |
|------------------------|--|---|--------------|
| Pool top monitor       | 1                                      | 50 mR/hr, 2x full power background, or less than either | Scram        |
| Water process          | 1                                      | 7 ½ mR/hr or less                                       | Scram        |
| Console Monitor        | 1                                      | 7 ½ mR/hr or less                                       | Scram        |
| Continuous air sampler | 1                                      | Stated on sampler                                       | Air sampling |

(e) For periods of one week or for the duration of a reactor run, a radiation monitor may be replaced by a gamma sensitive instrument which has its own alarm and is observable by the reactor operator.

Section 4 of the guidance reads, “Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service.” The aforementioned text shall be placed in the Technical Specifications as TS 4.2.g. The new TS 4.2.g reads:

Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service.

The following basis is also included to justify the addition of this TS:

Testing replaced, repaired, or otherwise modified systems shall be done to ensure their adequate performance with the integral reactor safety and control system. Appropriate surveillance testing is taken to mean actions which provide reasonable assurance it will provide any required protective function and not inhibit other systems from performing their respective functionality.

There are several other minor errors in the Technical Specifications as submitted in the December 18, 2017 supplement (ML18010A895) to the original LAR. The basis for TS 3.1.d cites the assurance of a reactor *period* of sufficient length to allow the reactor to shutdown without exceeding the Safety Limit. The revised Basis reads:

Specification 3.1.d limits the allowable excess reactivity to the value assumed in the SAR. This limit assures that the consequences of reactivity transients will not be increased relative to transients previously reviewed, and assures reactor change rate of minimal magnitude



such that the reactor may be shutdown without exceeding the safety limit.

Similarly, the basis for TS 3.1.e references the prior *period* language which should be amended to *change rate*. The new basis for 3.1.e reads:

Specification 3.1.e limits the reactivity worth of secured experiments to values of reactivity which, if introduced as a positive step change, are calculated not to cause fuel melting. This specification also limits the reactivity worth of unsecured and movable experiments to values of reactivity which, if introduced as a positive step change, would not cause the violation of a safety limit. The manipulation of experiments worth up to 0.003  $\Delta k/k$  will result in reactor change rates smaller than 12 percent per second. This change rate is sufficient to initiate a setback but not a scram. These change rates can be readily compensated for by the action of the safety system without exceeding any safety limits.

The clarifying footnote (a) in Table I notes that the Log count rate and change rate channel is not required after the Log N-Period channel comes on scale. As the new channel measures Log N and the *change rate*, this must be updated to reflect that. Footnote (a) is revised to read:

- (a) Not required after Log N-Change Rate channel comes on scale.

The first basis for TS 3.2 references the *period* as well. The first sentence reads in part, "...the period scram conservatively limits the rate of rise of reactor to periods with care manually controllable..." This is revised to reference the newly instituted *change rate* scram.

The neutron flux level scrams provide redundant automatic protective action to prevent exceeding the safety limit on reactor power, and the change rate scram conservatively limits the rate of rise of the reactor power to values which are manually controllable without reaching excessive power levels or fuel temperatures.

The following paragraph references the Log Count Rate and Period Channel and its withdrawal interlock. This paragraph is hereby revised to correctly reference the Log Count Rate and Change Rate channel which is now utilized in the PUR-1 I&C. Additionally, the word interlock is replaced with the more descriptive term *inhibit*. This change provides regulatory and operator clarity. The paragraph in full reads:

The rod withdrawal inhibit on the Log Count Rate and Change Rate Channel assures that the operator has a measuring channel operating and indicating neutron flux levels during the approach to criticality.

The new digital I&C features a set of UPS units to enable controlled shutdown in the event of a power loss. The UPS units are designed to supply at least 30 minutes of power to the system and the Technical Specifications require the controlled shutdown occur well within this time frame to a



maximum of 15 minutes. This is reflected in the added Technical Specification 3.2.e.

Technical Specification 4.2.b formerly referenced the calibration of the channels in Table II. This reference was inconsistent with the table's title, "Safety-Related Channels." The revised TS 4.2.b now reads

A channel check on the radiation monitoring equipment shall be completed daily during periods when the reactor is in operation. Calibration of the Safety-Related Channels specified in Table II and hand held radiation survey instruments shall be performed annually, with no interval to exceed 15 months. Calibration may be deferred with CORO approval during periods of reactor shutdown, but shall be performed prior to startup.

A typographical error was made in the prior licensed Technical Specifications. The bases for 4.4 referenced TS 4.4.d which was removed in license renewal. This reference has been omitted and the new TS bases read:

Specification a, b, and c check the integrity of the reactor room. Based upon past experience these intervals have been shown to be adequate for ensuring the operation of the systems affecting the integrity of the reactor room.

Additionally, in TS 4.4, the Applicability and Objective statements reference the fuel clad. This is inconsistent with the relevant Limiting Condition for Operation. The new TS 4.4 Applicability reads

This specification applies to the surveillance requirements for maintaining the integrity of the reactor room.

and the Objective reads

The objective is to assure that the integrity of the reactor room is maintained, by specifying average surveillance intervals.

To maintain consistency throughout the Technical Specifications, as previously noted, the word *interlock* has been replaced with *inhibit* to provide regulatory and operator clarity. In furtherance of that improvement, TS 6.4.d is updated with the replacement of the word *inhibit* for *interlock*. The new TS 6.4.d reads

Routine maintenance of the control rod, drives and reactor safety and inhibit systems or other routine maintenance of major components of systems that could have an effect on reactor safety;



As an attachment to this submission is a table which details all changes to the Technical Specifications from their currently licensed version to the proposed.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.  
Executed on September 20, 2018.

Sincerely,

/SA/

Clive Townsend  
PUR-1 Reactor Supervisor  
School of Nuclear Engineering

Enclosure: Technical Specifications Page Revisions

