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US NRC
Attn: Document Control Desk
Washington, DC 20555-0001

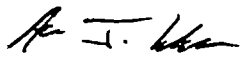
28 November 2019

Subject: 2018 Annual Operating Report for the Kansas State University TRIGA Mark II Nuclear Reactor (Facility License # R-88, Facility Docket # 50-188)

To Whom It May Concern:

This document serves as the annual operating report for the Kansas State University (KSU) nuclear reactor. The report is divided into paragraphs addressing specific items listed as requirements in the Technical Specifications 6.11e.

Sincerely,



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Kansas State University

Attachments:

1. Kansas State University TRIGA Mark II Reactor Annual Report, CY 2018
2. 10CFR50.59 Screening Forms

Cc: Linh Tran, Project Manager, NRC
Craig Bassett, Inspector, NRC

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Kansas State University TRIGA Mark II Reactor Annual Report, CY 2018

Introduction

The Kansas State University Nuclear Reactor Technical Specifications (TS) require a routine written report to be transmitted to the US Nuclear Regulatory Commission within 60 days after completion of the first calendar year of operating, and at intervals not to exceed twelve months thereafter, providing the following information:

TS.6.11.e.1 - A brief narrative summary of operating experience (including experiments performed), changes in facility design, performance characteristics, and operating procedures related to reactor safety occurring during the reporting period; and results of surveillance tests and inspections.

TS.6.11.e.2 - A tabulation showing the energy generated by the reactor (in megawatt-hours).

TS.6.11.e.3 - The number of emergency shutdowns and inadvertent scrams, including the reason thereof and corrective action, if any, taken.

TS.6.11.e.4 - Discussion of the major maintenance operations performed during the period, including the effects, if any, on the safe operation of the reactor, and the reasons for any corrective maintenance required.

TS.6.11.e.5 - A summary of each change to the facility or procedures, tests, and experiments carried out under the conditions of 10.CFR.50.59.

TS.6.11.e.6 - A summary of the nature and amount of radioactive effluents released or discharged to the environs beyond the effective control of the licensee as measured at or before the point of such release or discharge.

TS.6.11.e.7 - A description of any environmental surveys performed outside the facility.

TS.6.11.e.8 - A summary of radiation exposures received by facility personnel and visitors, including the dates and time of significant exposure, and a brief summary of the results of radiation and contamination surveys performed within the facility.

This information is transmitted in this report, in sections separated by TS clause. This report covers January 2018 – December 2018.

TS.6.11.e.1 - A brief narrative summary of operating experience (including experiments performed), changes in facility design, performance characteristics, and operating procedures related to reactor safety occurring during the reporting period; and results of surveillance tests and inspections.

The KSU reactor operated for its usual purposes in CY2018. Two reactor operation laboratory classes and a reactor theory laboratory class were directly supported, along with approximately 9 other courses with occasional use of the reactor. Through various outreach activities, classes, and research experiments, the facility hosted 1272 visitors. Compared to CY2017, the number of visitors to the facility decreased by 22 percent. Operations were significantly reduced for about a quarter of the year to address maintenance issues.

A majority of research experiments involved neutron activation analysis (NAA) and neutron detector testing utilizing in-core and beamline facilities. Other research activities included neutron radiography and gamma irradiation. Five pulses were performed during the first half of CY2018. A new experiment to measure the distribution of fission products in a fuel element by gamma spectroscopy was approved.

A maintenance outage occurred from early July to the end of September. Thorough inspection and repair of the rod control system was conducted during the outage. Long-term issues involving the control rod drives and console were alleviated following the maintenance period. Revised operating procedures were incorporated following the outage to include periodic drive function testing. In addition to typical component maintenance, other facility changes during CY2018 included placing radiation monitoring systems on uninterruptable power supply systems.

The NRC routine annual inspection was completed from August 14 – 16, 2018. No violations or inspector follow-up items were reported. (See Inspection Report No. 50-188/2018-201).

Water ingress into the beam port facilities is still being monitored. Ingress is observed to be minor and intermittent throughout the year. A repair plan for the water ingress is still under evaluation.

TS.6.11.e.2 - A tabulation showing the energy generated by the reactor (in megawatt-hours).

The monthly total energy generated by the KSU reactor is recorded in Table 1. The same data is shown as a bar chart in Figure 1. The total MWh of operation decreased from the prior year, from 36.2 MWh to 25.0 MWh.

Table 1 - Energy generated by the KSU Triga Mark II reactor by month for CY 2018.

Month	MWh Burnup
January	1.41
February	2.09
March	7.13
April	5.44
May	1.40
June	1.89
July	0.20
August	0.00
September	0.00
October	1.26
November	4.02
December	0.18
TOTAL	**25.03**

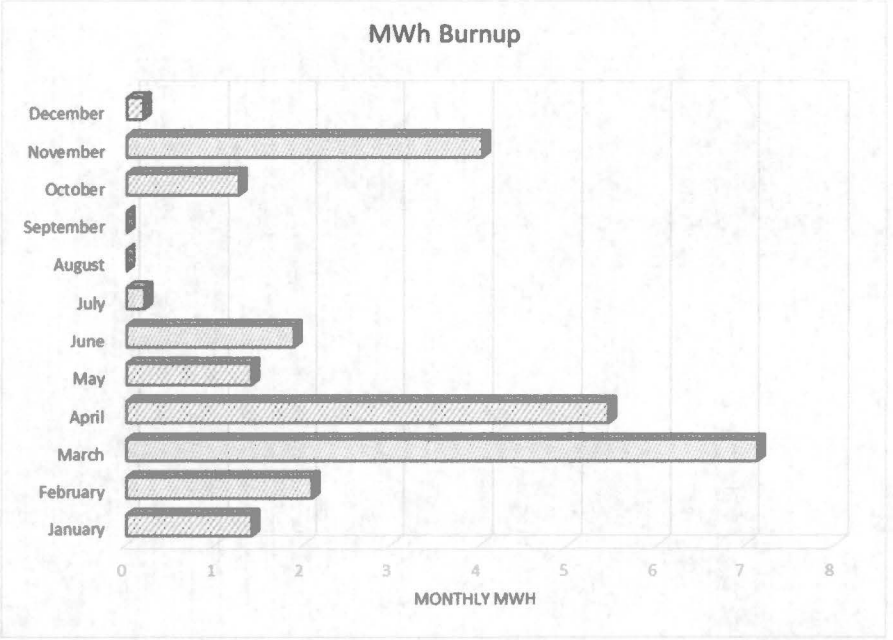

Figure 1 - Energy generated by the KSU Triga Mark II reactor by month for CY 2018.

The reactor operated for a total of 313 hours during 2018, at an average power of 80 kW. Table 2 lists the number of hours operated and Figure 2 shows the percentage of

operation for various purposes, i.e., research support, training, education, etc. Training percentage seems low because operator training was often performed when the reactor was being operated for another purpose, such as research support, classes, or maintenance. The plot demonstrates that the reactor is operated in accordance with our stated primary functions: education, research support, operator training, and demonstration (e.g., tours). Compared to CY2017, research and tour operations were reduced while class and maintenance remained relatively constant. The extended maintenance outage contributed to the reduction in operating hours for research and tours by at least one-half. Since the maintenance period occurred mostly outside of the academic schedule, class operations were un-affected.

Table 2 – Operating hours grouped by purpose at the KSU TRIGA Mark II reactor for CY 2018.

Purpose	Operating Time [hr]
Research	71
Tours	25
Classes	111
Maintenance	86
Training	10
Testing	10
TOTAL	**313**

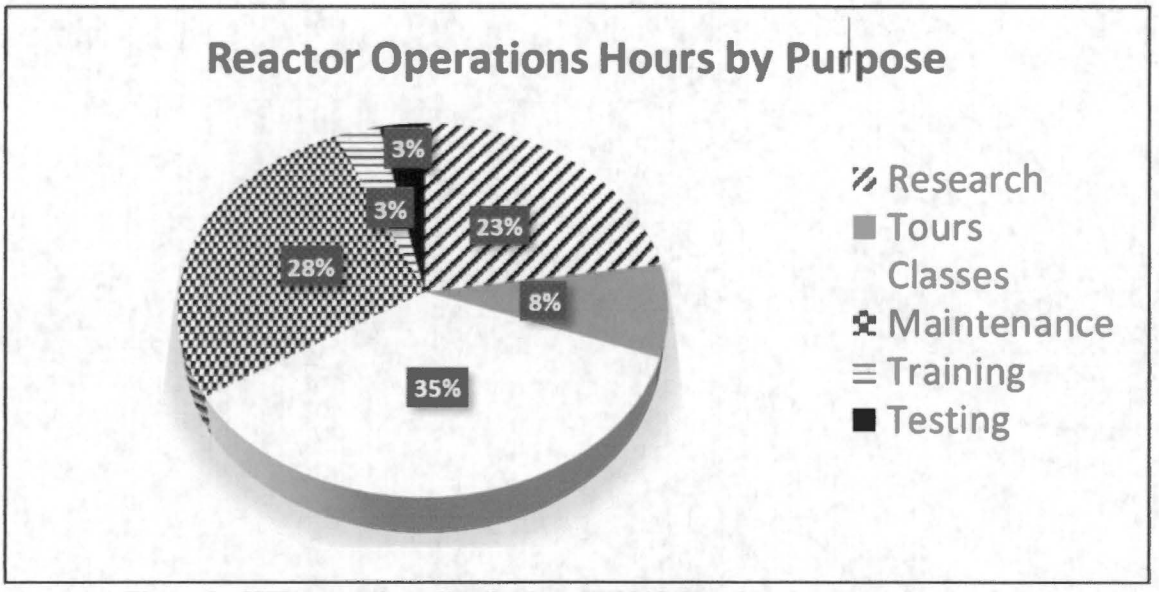

Figure 2 - KSU operations distribution, CY2018, based on purpose of operation.

TS.6.11.e.3 - The number of emergency shutdowns and inadvertent scrams, including the reason thereof and corrective action, if any, taken.

For CY 2018, there was a total of 20 inadvertent SCRAMS. Table 3 summarizes the inadvertent SCRAMS for CY 2018 at the KSU reactor. No emergency shutdowns occurred during the time period reported. Table 3 does not include single dropped rods. Occasionally, a single rod would drop, but not due to a reactor trip. Single rod drops were corrected following refurbishing the shim rod drive.

Note that the period scram due to electrical noise occurred when the other rods were bottomed. In other words, the reactor is at very low power when the scram occurred. During the maintenance outage from 7/11/18 to 9/28/18, the NLW-1000 channel was investigated for causes of electrical noise. The PA-1000 preamp for the NLW-1000 was checked and a ground connection was secured. No other period scrams due to electrical noise were observed following the maintenance outage.

Table 3 – Inadvertent SCRAMS and Emergency Shutdowns.

Date	Action	Comments
2/14/18	Period Scram	Caused by electrical noise during checkout
2/15/18	Period Scram	Electrical noise during checkout
3/13/18	Period Scram	Electrical noise while driving in cylinder following manual shutdown
3/16/18	Period Scram	Operator Error
3/30/18	Period Scram	Electrical noise from rod motion in source range
3/30/18	Period Scram	Electrical noise from rod motion in source range
3/30/18	Period Scram	Electrical noise from rod motion in source range
3/31/18	Period Scram	Electrical noise from rod motion in source range
4/20/18	SCRAM	NPP-1000 Test button accidently depressed
4/24/18	Period Scram	Electrical noise from rod motion in source range
4/25/18	Period Scram	Operator Error
4/25/18	Period Scram	Operator Error
4/26/18	Period Scram	Operator Error
5/1/18	SCRAM	Mode selector switch moved passed Steady State from Auto
5/2/18	SCRAM	Console power loss
5/4/18	Period Scram	Electrical noise from rod motion in source range
6/6/18	SCRAM	Occurred while moving from Auto to Steady State
6/7/18	SCRAM	All SCRAMs indicated, cause unknow to operator. Likely power loss
7/3/18	Period Scram	Electrical noise from rod motion in source range
10/26/18	Manual and Fuel Temp	Fuel temps indicated 19 and 18 C during SCRAM. Spurious SCRAM. Possible relay issue suspected. Relay K4 reseated.

TS.6.11.e.4 - Discussion of the major maintenance operations performed during the period, including the effects, if any, on the safe operation of the reactor, and the reasons for any corrective maintenance required.

Various system maintenance was performed throughout CY2018 for part failure due to normal wear and tear. An extended outage from 7/11/18 to 9/28/18 was taken to troubleshoot and repair issues with control rod drives. The following is a summary of all major maintenance activities during CY2018:

- AC power line conditioner installed.
- Shim rod ON indicator lamp replaced
- Safety rod position potentiometer replaced.
- NPP-1000 current limiting resistor replaced.
- Control room area radiation monitor replaced due to detector failure.
- Secondary cooling wye strainer elbow replaced due to pinhole leak.
- North cooling tower fan belt slipped off power transmission system. Fan belt replaced.
- Heating Ventilation and Air Conditioning supply line valve replaced.
- Fuel tool actuating line repaired.
- Area Radiation Monitoring system uninterruptable power supply (UPS) battery failed. UPS replaced.
- Continuous Air Monitor power routed through UPS.
- Rod drive control system troubleshoot
    - Current limiting resistor for rod control indicators resoldered.
    - Contact resistance in console microswitches resulted in rod drive drift. All control rod drive console microswitches replaced.
    - Regulating rod drive drift from bias resistance too high. Regulating rod drive fixed bias resistor bypassed. Bias resistance provided by potentiometer.
    - All control rod drives cleaned, refurbished, and adjusted.
    - Safety rod drive motion issues. Slide bearings replaced.
    - Regulating rod drive pausing while withdrawing. Regulating rod drive gearbox replaced.
    - Transient rod drive limit switch LS3 replaced.
- NLW-1000 preamp PA-1000 grounding secured.
- Exhaust plenum power routed through UPS.

TS.6.11.e.5 - A summary of each change to the facility or procedures, tests, and experiments carried out under the conditions of 10.CFR.50.59.

The following changes were carried out under 10CFR50.59:

- Added Experiment 55 – Fuel Element Gamma Spectroscopy Using Fuel Movement Device.
- Area Radiation Monitoring system uninterruptable power supply replaced.
- Continuous Air Monitor connected to uninterruptable power supply.
- Rod drive control microswitches replaced.
- Regulating rod drive R903 bias resistor bypassed.
- Procedure 8, Reactivity Balance revised.
- Procedure 12, Instrument Checkout revised.
- Procedure 15, Steady State Operations revised.
- Exhaust Plenum Monitor connected to uninterruptable power supply.

The screening forms for these changes are attached.

TS.6.11.e.6 - A summary of the nature and amount of radioactive effluents released or discharged to the environs beyond the effective control of the licensee as measured at or before the point of such release or discharge.

Per procedure, the concentration and total activity were calculated prior to discharge, showing both to be below the limits in 10CFR20. Table 4 summarizes the average concentration and total activity released.

Table 4 – Summary of radioactive effluent (water)

Isotope	Avg. Concentration (Ci / mL)	Total Volume (mL)	Total Activity Released (Ci)
Alpha-emitters	6.14E-15	1.01+07	6.20E-08
Beta-emitters	1.98E-11	1.01E+07	2.00E-04

The only other discharge beyond the facility boundary was HVAC condensate discharge to the sanitary sewer. Since the Kansas State University average water usage is 750,000 gallons per day, it is nearly impossible to exceed 10CFR20 limits for effluent concentration at the KSU reactor. HVAC condensate water is never circulated through or near the reactor core and historically radiation levels in HVAC condensate are at or near background levels.

TS.6.11.e.7 - A description of any environmental surveys performed outside the facility.

Radiation surveys are performed within and around the facility to verify that radiation levels remain safe when at full-power operation. These surveys indicate that the dose rate (gamma and neutron) at the reactor dome does not exceed the hourly dose limit to members of the public of 2 mrem / h, as set forth in 10CFR20, which indicates that the outside dose cannot exceed this limit.

TS.6.11.e.8 - A summary of radiation exposures received by facility personnel and visitors, including the dates and time of significant exposure, and a brief summary of the results of radiation and contamination surveys performed within the facility.

Overall, no staff exceeded 100 mrem for CY2018. Table 5 shows the distribution of workers receiving given amounts of dose. The average deep dose equivalent was 17.47 mrem with a maximum of 54 mrem. The lens dose equivalent had a similar average of 18.53 mrem and the maximum for an individual of 59 mrem. Shallow dose equivalent average was 20.07 mrem with a maximum of 59 mrem. Extremity monitoring had an average of 32.07 mrem and a maximum of 82 mrem.

Table 5 - Summary of total occupational dose received by KSU reactor workers from 1/1/2018 - 12/31/2018.

mrem	DDE	LDE	SDE	Max Extremity
(0, 10]	4	4	4	4
(10, 20]	4	4	2	0
(20, 30]	5	5	7	2
(30, 40]	1	1	1	2
(40, 50]	0	0	0	5
(50,100]	1	1	1	2
(100,150]	0	0	0	0
(150,200]	0	0	0	0

Visitor dose at the KSU TRIGA reactor facility is measured using self-reading pocket ion chamber dosimeters, with an indication range from 0-200 mR. Self-indicated pocket dosimeter readings suffer from imprecision due to parallax error, sometimes resulting in negative values or readings above the true value.

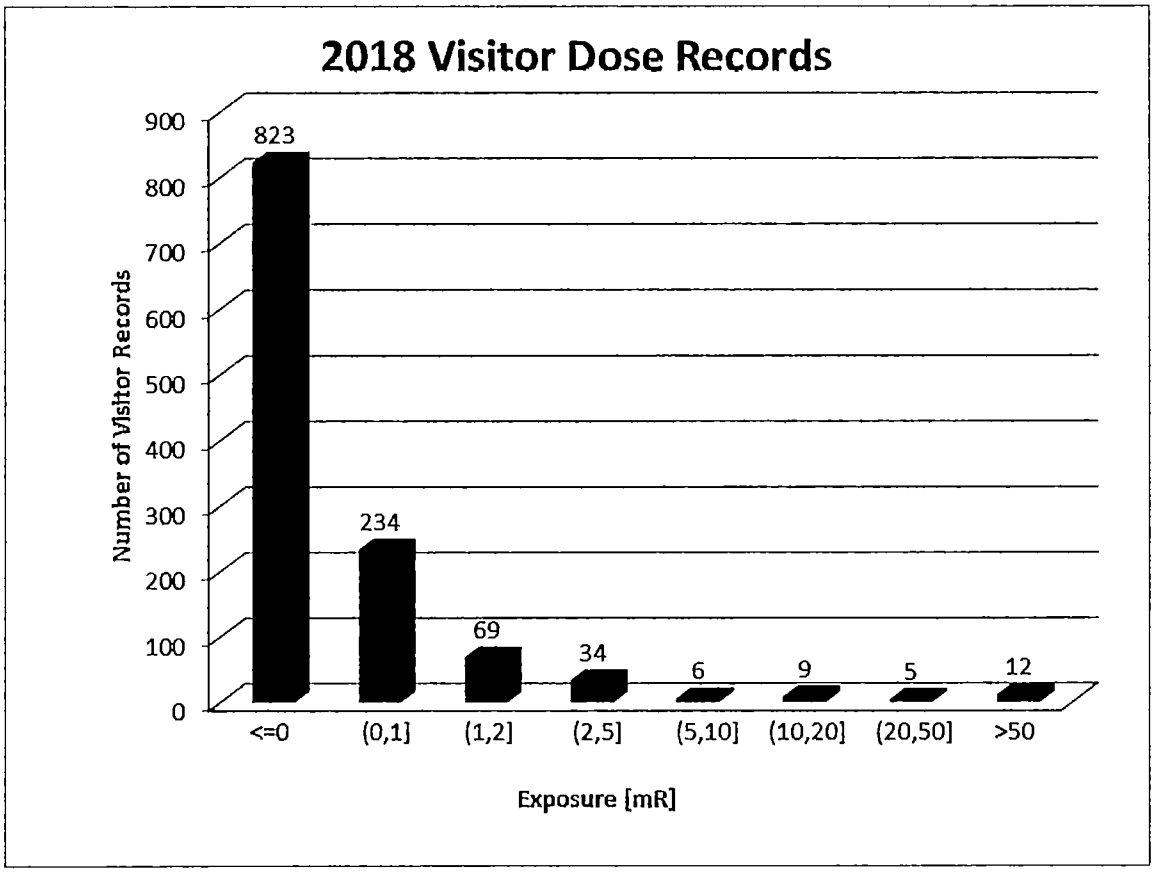

Figure 3 - Visitor exposure records from CY 2018.

All monthly radiation surveys and contamination surveys conducted at the facility in 2018 were nominal. Overfill of the Bulk Shield Tank (BST) occurred during a routine refill. The BST is filled with de-ionized water and used for storing materials for decay. Monthly surveys of BST water show less than or equal to background levels. Water samples and wipe tests of areas affected by the overfill showed no areas above background.

This concludes the 2018 Annual Report for the Kansas State University TRIGA Mark II Nuclear Reactor.

Date: 5/29/18

Title: Experiment 55 – Fuel Element Gamma Spectroscopy Using Fuel Movement Device

Performer: Max Nager

Description: Experiment 55 has proposed a new method for fuel movement. Fuel will be removed from the tank using previously approved facility procedures, but subsequently transferred to a Fuel Movement Device (FMD) that holds it in place and rotates it while gamma spectroscopy is performed. The description of the FMD is outlined in both Experiment 55 and the experimenter proposal.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Fuel Movement	Fuel Movement	Fuel Movement Device Failure	Fuel Element Failure in Air

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa	x	
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction	x	
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	N/A
LOCA	N/A
Fuel Handling	N/A

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***
Continuous Air Monitor	N/A

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	N/A
LOCA	N/A
Fuel Handling	N/A

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***
N/A	N/A

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)
N/A

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition	N/A	N/A
LOCA	N/A	N/A
Fuel Handling	N/A	N/A
Other	N/A	N/A

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit	N/A	N/A
Analysis	N/A	N/A
Approach to Limit	N/A	N/A

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis	N/A	N/A
New Analysis	N/A	N/A
Comparison	N/A	N/A

Comments: The FMD utilizes an electronically actuated apparatus to grip and move the fuel element. The Fuel Element Failure in Air MHA does not credit any type of fuel movement device, including the fuel tool used for inspections. The main mode of failure is accidental release of the element by the FMD. Even if the roughly two and a half foot drop resulted in element failure, the consequences would be within the scope of the highly conservative MHA. The other, hypothesized mode of failure is the FMD accidentally exerting its full weight on the element. In that scenario analyses have shown a buckling factor of safety greater than 50. Any additional fuel movement increases the likelihood of occurrence of the MHA. However, this device does not pose any more likelihood of increasing the occurrence of the MHA than the fuel handling tool.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 8 June, 2018

Method of RSC approval: Email Vote

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 7/9/18

Title: ARM UPC Replacement

Performer: Max Nager

Description: The Area Radiation Monitoring system (ARM) is powered by an APC SMART-UPS uninterruptible power supply. It is desired to replace the APC SMART-UPS with the APC Back-UPS Pro. The proposed alternative matches the current system in function.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	SSC Design Function	Failure Mode(s)	Accident Scenario(s)
Area Radiation Monitoring system	Radiation Monitoring	Power Loss	LOCA

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	N/A
LOCA	N/A
Fuel Handling	N/A

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***
Radiation Monitoring	N/A

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	N/A
LOCA	N/A
Fuel Handling	N/A

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***
N/A	N/A

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)
N/A

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition	N/A	N/A
LOCA	N/A	N/A
Fuel Handling	N/A	N/A
Other	N/A	N/A

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit	N/A	N/A
Analysis	N/A	N/A
Approach to Limit	N/A	N/A

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis	N/A	N/A
New Analysis	N/A	N/A
Comparison	N/A	N/A

Comments: The SMART UPS has an output of 950 watts/1400 VA while the Back Ups has an output of 900 watts/1500 VA. The SMART-Ups is not described in the SAR so a replacement with another UPS of nearly the same output does not deviate from the safety basis.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 2/10/18

Method of RSC approval: Email Ballot

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 8/23/18

Title: Connection of CAM to Uninterruptible Power Supply

Performer: Max Nager

Description: The Continuous Air Monitor (CAM) consists of a Thermo Fisher AMS4 Iodine unit. The CAM is currently connected directly to mains power, but a change is desired in the form of powering it from an Uninterruptible Power Supply (UPS). The UPS will be powered from mains. The CAM is required to be OPERATING per TS 3.3.4(e) and provides indication of a potential instance of fuel element failure in air.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Continuous Air Monitor	Radiation Monitoring	Detector Failure	Fuel Element Failure in Air

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC	x	

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution	x	
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***
Continuous Air Monitor	There would be a decrease in the likelihood of malfunction.

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: The CAM provides indication of fuel element failure, but is not credited in the fuel element failure MHA. Repeated power outages at the facility have resulted in malfunction of the CAM, rendering it INOPERABLE for as long as several weeks at a time. Powering it from a UPS will reduce the likelihood of a sudden power loss to the CAM, along with an associated malfunction. Furthermore, it will improve the safety function since the CAM will be capable of monitoring for short periods following a facility power outage.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 8/24/18 (another vote approval 8/26/18)

Method of RSC approval: Email Ballot

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 9/25/18

Title: Replacement of Console 1SM299-T2 Micro® Switch to Honeywell 11SM1-T2 Micro Switch

Performer: Max Nager

Description: The reactor console has a set of 15 Twist-Lite® Series 12, Push-Button lamp indicators, referred to as switches S3-S17. S3-S7 correspond to the rod drive magnet/contact buttons, S8-S12 to the "UP" buttons, and S13-S17 to the "DN" buttons. Each switch contains a sub-assembly of three 1SM299-T2 Micro® switches. Current 1SM299-T2 Micro® switches have developed contact resistance and therefore require replacement.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Manual Scram	Scram	Switch Failure	None

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments:

Specification	1SM299-T2	11SM1-T2
Current Rating	5 A at 250 VAC	5 A at 250 VAC
Contact Type	Silver	Silver
Actuator	Pin Plunger	Pin Plunger
Terminal Type	T2	T2
Circuitry	Momentary SPDT	Momentary SPDT

Table 1. Specification Comparison

Neither the SAR nor the Technical Specifications cite any specifics of switches S3-17. As shown in Table 1, the specifications for the proposed new switches meet those of the switches currently installed in the console. Absolute failure of the manual scram system resulting from installation of the new switches would not enter into any condition different from a failure of the manual scram system in its present state.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 9/25/18

Method of RSC approval: Email Ballot

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Original

Date: 9/27/2018

Title: Bypass of Regulating Rod R903 Bias Resistor.

Performer: Alan Cebula

Description: The R902 and R903 Bias Resistors provide the phase difference that holds the rod drive in place against the weight of the control rod assembly while no movement is requested. As currently configured, the regulating rod drive attempts to drive out, even in the absence of an "UP" signal and the R902 potentiometer set to minimum resistance. This condition is thought to be caused by too large of a phase difference overcompensating for the weight of the connecting rod system. To reduce the phase difference, the R903 resistor must be bypassed leaving the R902 potentiometer to adjust the phase. The maximum resistance of the R902 potentiometer is 500 ohms which exceeds the R903 resistance of 220 ohms.

Bypassing the R903 Resistor will allow for setting a lower resistance and restore the intended function of holding the rod in place. Potential negative conditions and/or failures that could result from this change are a reduction in rod drive speed and rod drive dropping. These conditions are conservative with respect to the current condition.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	SSC Design Function	Failure Mode(s)	Accident Scenario(s)
Control Rod Drive	Control Rod Drive Motion	None/See Below	None

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x

Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution	x	
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: The R903 Resistor is not cited in the Technical Specifications nor in the Safety Analysis Report (SAR). The SAR does not specify a bias resistance value but does describe the ability to adjust it. The TRIGA Instrumentation Manual specifies R903 as having a fixed resistance of 220 ohms. It is thought the additional gear reduction on the regulating rod reduces the required holding torque compared to a standard rod drive. It was noted a spare regulating rod drive circuit contained a bypassed R903 resistor.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval:

28 September 2016

Method of RSC approval:

Voice vote

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 9/27/18

Title: Procedure 8 Revision

Performer: Max Nager

Description: A revision has been proposed to Procedure 8 Reactivity Balance.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Scrams/Interlocks	Scram/Interlock	None	None

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design

function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

	YES	NO

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: Revision will be evaluated pursuant to TS 6.3.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 28 September 2018

Method of RSC approval: Voice vote

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 9/27/18

Title: Procedure 12 Revision

Performer: Max Nager

Description: A revision has been proposed to Procedure 12 Instrument Checkout.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Scrams/Interlocks	Scram/Interlock	None	None

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design

function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

	YES	NO

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: Revision will be evaluated pursuant to TS 6.3.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 28 Sept. 2018

Method of RSC approval: Voice Vote

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 9/27/18

Title: Procedure 15 Revision

Performer: Max Nager

Description: A revision has been proposed to Procedure 15 Steady State Operations.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Scrams/Interlocks	Scram/Interlock	None	None

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC		x

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution		x
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design

function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

	YES	NO

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: Revision will be evaluated pursuant to TS 6.3.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 28 Sept. 2018

Method of RSC approval: Voice Vote

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.

Date: 11/12/18

Title: Connection of EPM to Uninterruptible Power Supply

Performer: Max Nager

Description: The Exhaust Plenum Monitor (EPM) consists of three Thermo Fisher AMS4 units (heads): one for particulate, one for noble gas, and one for iodine. The EPM is currently connected directly to mains power, but a change is desired in the form of powering it from an Uninterruptible Power Supply (UPS). The UPS will be powered from mains. The EPM is required to be OPERATING per TS 3.3.4(f) and provides indication of a potential instance of fuel element failure in air.

SCREENING – The following guidance provides criteria to screen the proposed change from further assessing the need for NRC review.

SSC Affected	**SSC Design Function**	**Failure Mode(s)**	**Accident Scenario(s)**
Continuous Air Monitor	Radiation Monitoring	Detector Failure	Fuel Element Failure in Air

Safety Analysis and Accident Response/Mitigation	YES	NO
Decrease SSC design function reliability when failure would initiate accident		x
Decrease SSC design function reliability when failure would affect accident mitigation		x
Reduce redundancy, reliability, or defense in depth		x
Add or delete an automatic or manual design function of an SSC	x	

Human Interface	YES	NO
Convert an automatic feature to manual or vice versa		x
Adversely affect ability to perform required actions		x
Adversely affect time response of required actions		x

Interface Outside of the Proposed Change	YES	NO
Degrade seismic or environmental qualification		x
Affect method of evaluation used to establish design basis or safety analysis		x
Introduce unwanted or previously unreviewed system or material interaction		x
(Not described in SAR) indirect effects on electrical distribution	x	
(Not described in SAR) indirect effects on structural integrity		x
(Not described in SAR) indirect effects on environmental conditions		x
(Not described in SAR) indirect effects on other SAR design functions		x

EVALUATION - If the change does affects (1) a design function of SSC, (2) a method of performing or controlling design function, or (3) evaluation for demonstrating the design function will be accomplished, as indicated by one or more YES answers in the "Screening" section, complete the applicable tables below.

Does the change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Frequency***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Likelihood of Malfunction***

Does the change result in more than a minimal increase in the consequences of an accident previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Potential Impact on Accident Consequences***
Reactivity Addition	
LOCA	
Fuel Handling	

Does the change result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final SAR (as updated)?	YES	NO
		x

Affected SSC	***Potential Impact on Consequences of Malfunction***

EVALUATION – continued

Does the change create a possibility for an accident of a different type than previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident Description (Including Likelihood and Consequences)

Does the change create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR (as updated)?	YES	NO
		x

Accident	***Affected SSC***	***Result***
Reactivity Addition		
LOCA		
Fuel Handling		
Other		

Does the change result in exceedance or alteration of a design basis limit for a fission product barrier as described in the SAR (as updated)?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis Limit		
Analysis		
Approach to Limit		

Does the change result in departure from a method of evaluation described in the final SAR (as updated) used to establish design bases or in the safety analysis?	YES	NO
		x

Category	***Reference/Text***	***Value***
Design Basis		
New Analysis		
Comparison		

Comments: The EPM provides indication of fuel element failure, but is not credited in the fuel element failure MHA. Repeated power outages at the facility have resulted in malfunction of the EPM, rendering it INOPERABLE for periods of time. Powering it from a UPS will reduce the likelihood of a sudden power loss to the EPM, along with an associated malfunction. Furthermore, it will improve the safety function since it will be capable of monitoring for short periods following a facility power outage.

APPROVAL – According to Technical Specifications, Section 6.2(b)4, the Reactor Safeguards Committee is responsible for determining "whether changes in the facility as described in the safety analysis report (as updated), changes in the procedures as described in the final safety analysis report (as updated), and the conduct of tests or experiments not described in the safety analysis report (as updated) may be accomplished in accordance with 10 CFR 50.59 without obtaining prior NRC approval via license amendment pursuant to 10 CFR Sec. 50.90."

Date of RSC approval: 11/12/18

Method of RSC approval: Email Ballot

Attach appropriate records of RSC approval (e.g., email ballots or meeting minutes) to this form.