DOE-ID NEPA CX DETERMINATION
Idaho National Laboratory

CX Posting No.: DOE-ID-INL-18-057

SECTION A. Project Title: Advanced Test Reactor 5-Year Plant Health Investment Strategy (2018-2019)

SECTION B. Project Description and Purpose:

The Advanced Test Reactor (ATR) 5-Year Plant Health Investment Strategy (5YS) establishes strategic risk-based investments in ATR to address maintenance backlog and improve plant health. This environmental checklist (EC) covers 5YS activities anticipated for completion from fiscal year (FY) 2018 through 2019. Based on Idaho National Laboratory (INL) priorities, some activities in this EC may not be completed or funded and other activities could be added. Individual projects will be reviewed by the Program Environmental Lead (PEL) and/or the National Environmental Policy Act (NEPA) Technical Lead to verify scope is covered by this NEPA analysis. In addition, the 5-year strategy is typically updated on an annual basis. This EC will be reviewed and revised consistent with the annual update to the 5-year strategy.

ATR received $6.5M of funding to plant improvements in August of 2017. However, because the funding was received in August, some activities were carried over to FY 2018 and are listed in Table 1.

Table 1. FY 2017 activities carried over to FY 2018

M-8 Motor and rewind installation
Replace reactor safety related transmitters
Plan and schedule 1D-N Loop new pumps and other component replacements (i.e. control valves, manual valves, pressurizer, etc.)
Inspect reactor vessel welds & tank chain

The FY18 President's Budget provided $9.6M for reduction in deferred maintenance. The breakdown of this funding is shown in Table 2.

Table 2. FY-18 5YS Scope

Replace Reactor Data Acquisition System (RDAS)/Lobe Power Calculation and Indication System (LPCIS) (Phase 1)
Replace Digital Radiation Monitoring System (DRMS) (Phase 1)
Replace primary coolant pump (PCP) check valves
Replace ATR radcon cabinet relay
Replace 774-E-1 and E-2 transformers
Inspect underground piping (firewater, raw/potable, waste)
Install Emergency Pump M-11
Replace digital control system (DCS) distributed processing units (DPUs)
Redesign Primary Coolant Pressure Control System (conceptual design)
Replace 670-E-80 electrical panel
Upgrade plant and instrument air (conceptual design)

Table 3 gives a proposed scope of activities based on receiving additional funding in FY18. As with any FY appropriation, ATR works within the available funds each year to execute the 5YS and may adjust planning based on an increase or decrease in funding. Changes may require a revision to this EC.

Table 3. FY 2018 proposed scope for additional funding

Refurbish Primary Coolant System (PCS) (replace M-8 PCP and PCP Check Valves)
Design plant instrument air and ventilation refurbishment
Replace reactor effluent radiation monitor (ERM) and design core quad low flow monitoring system
Refurbish ATR Critical (ATRC) utility cooling water and secondary coolant system pump
Replace surveillance and test system/plant protective system
Refurbish ATR Simulator
Replace reactor safety related transmitter
Evaluate M6 diesel generator safety analysis and review (SAR)
Refurbish experiment loops

For FY 2019 (Table 4), scope was driven by emergent equipment issues.

Table 4. FY 19 5YS scope

Refurbish confinement system and seals
Refurbish PCS (M-9 motor rewind and replace rotating element)
Replace RDAS/LPCIS
Replace DRMS
Refurbish ATR plant instrument air and ventilation
Install emergency pump M-10
Replace surveillance and test system (SATS)/plant protection system (PPS)

Replace ATR neutron level nuclear instrument
Remove Insulation and inspect low-pressure demineralized water (LDW) storage tanks 708A & 754
Refurbish experiment loops

Additional project details are provided below:

ATR Critical Control System Refurbishment
This activity replaces items associated with the ATR Critical Control System in a prioritized manner.

ATR Radiological and Confinement Seals
The Radiation Monitoring and Seal System (RMSS) provides ATR Confinement and is an Engineered Safety Feature (ESF). The purpose of the confinement is to limit the release of airborne radioactivity to the environment and is required to support reactor operations. The ATR confinement has five large doors with inflatable seals. Some of these doors have aged seals, and some of the operating mechanisms are old and need replaced. Large door inflatable seals 670-D-13, 670-D-15, and 670-D-52 will be replaced. Vertical lift doors DR 13, 15, and 52 will also be replaced and hardware on 17 confinement service doors will be refurbished.

Primary Coolant System Refurbishment
The ATR primary coolant system (PCS) is one main coolant loop composed of the reactor vessel, heat exchangers, primary coolant pumps (PCPs), emergency coolant pumps (ECPs), and associated piping and valves. The PCS includes a surge tank and surge line, a degassing and pressurizing system, pressure relief and safety valves, and instrumentation necessary for operational control and emergency response. This activity replaces pump seals on the primary coolant pumps rotating elements, discharge check valves, inspection ports in the body of the check valves, isolation valves, and several other key check valves. These check valves ensure primary coolant flows as intended and eliminates the possibility of back-flow or short circuit through other piping or components.

ATR Reactor Equipment
PCS Pressure Control System Re-design
Installation of the DCS in 1993 involved many aspects of ATR control and monitoring. The three controllers PIC-01-1, FIC-01-8, and LIC-01-3 operate independent of each other, rather than working together, to control pressure. The proposed action analyzes optimizing these valves and may require an end-to-end interactive thermodynamic analysis of the PCS/SCS/Cooling Tower to support changes or revisions to performance requirements. Activities beyond the design phase require additonal NEPA review.

Reactor Data Acquisition System (RDAS) and Lobe Power Calculation and Indication System (LPCIS)
The RDAS and LPCIS computers are used to monitor and retrieve reactor operating parameters for use in Core Safety Assurance Packages (CSAP). The computers are based on obsolete VAX computer systems. The computers and software are unsupported and will be replaced.

ATR Electric Power Distribution System Upgrade Plan
Evaluation of the ATR Complex electric power distribution system resulted in a list of renovations needed to meet code and safety requirements. The proposed renovations for 2018-2019 are listed below:

Project 1 replaces the ATR incoming power transformers 774-E-1 and 774-E-2. The new transformers will have on-load tap changers and remote monitoring capability to enhance operability. These transformers will use less flammable (FR3) fluid as insulating and cooling medium.

Project 2 designs and constructs a new switchgear and emergency diesel generator facility located west of TRA-609 to house a new diesel generator to serve ATR and the Utility Area. The switchgear will replicate the 2,400 volt functions of the TRA-609 switchgear and will have a 4,160 volt section to connect to the diesel generato. The loads in TRA-609 switchgear will be moved to the new switchgear and the old switchgear will be removed.

This activity also installs a diesel generator for a secondary source of power to the ATR Complex Deepwell #4.

Project 3 replaces ATR 4,160 V switchgear 670-E-1 and 670-E-2. The proposed action installs modern vacuum switchgear including microprocessor protective relays, remote racking, and SCADA control. Each switchgear will have a main breaker fed from incoming transformer and a tie breaker connected to the other switchgear.

Project 4 refurbishes 674-M-6 diesel generator to OEM specifications and replaces 674-E-5 generator output switchgear to provide separate feeds to ATR and the Utility Area switchgear. The diesel generator control system will be replaced with modern components. The project will remove the 670-E-3 switchgear and relocate loads to the new 670-E-1 and 670-E-2 switchgears. A diesel generator will feed to 670-E-1 and another will feed to 670-E-2.

Project 5 divides safety loads into two redundant switchgear consisting of 670-E-9 and new corollary switchgear 670-E-9A. The 480 V Diesel Bus UPS will be divided into two stand-alone units with each one powering a 480 V bus. The UPS units and associated battery will be relocated to the ATR diesel pit area.

Project 6 replaces ATR 4,160:480 V transformers 670-E-4 and 670-E-6 and their associated 480 V switchgear 670-E-5 and 670-E-7.

ATR Plant and Instrument Air and Ventilation Refurbishments
The original system provided plant and instrument air to three reactors (MTR, ETR & ATR), and because only ATR remains, the size, location and distribution of plant and instrument air needs to be redesigned. Underground distribution is no longer needed. The proposed action replaces air compressors, buried compressed air distribution piping, monitoring systems, and air receivers; installs 480v switchgear; and improves the breathing air subsystem for the plant and instrument air system. This activity also replaces the ATR ventilation controls system and primary and backup dampers, installs filtration equipment, and replaces loop cubicle cooling systems. Two of the three air compressors in the system are driven by from 2400 Volt motors powered from Motor Control Centers (MCCs) that will be replaced. Air conditioning will be installed in the Reactor Area. Control circuits and the HEPA filtration equipment will be replaced.

ATR Pressurized Water Loops
Aged loop components will be replaced, primarily temperature control valves, flow control valves, and miscellaneous fittings during pump replacement. Asbestos insulation will be removed, and cubical air coolers will be replaced. The loop chemistry control system and the data acquisition computer systems will be refurbished. Spare pressurizers, heaters and heat exchangers will be procured. Scope includes replacement of the loop temperature control valve, the loop flow valve (FCV-1), mixing tee, recombination tee, strainer, and pressurizer flow control valve (FCV-11) in most of the loops. FCV-11 was previously replaced on 2E-NW and 2A-C. The proposed action replaces these items in 1D-N in 2018. Some of the loop wiring is old and brittle and will be replaced. In addition, two spare sets of heat exchangers will be provided for the standard loops, and spare heaters will be procured and installed.

ATR Motor Control Center (MCC) Replacements
The ATR electrical distribution system has many 480 V motor control centers (MCCs) and low-voltage AC and DC distribution panels that need replaced. The current MCCs on the list for replacement are 670-E-80 and 670-E-81.

Replace Deepwell Pumps and Rewind Motors
This activity refurbishes all deepwell pumps that supply ground water to ATR Complex. The deepwell casings will be inspected and repaired. The pump bowls, line shaft and water column piping will be replaced. The deepwell check and isolation valves will be inspected and replaced if necessary. The well motor will also be replaced or refurbished.

Advanced Test Reactor Simulator System Refurbishment
The ATR Simulator supports the Advanced Test Reactor as both a training platform for operators and a testing platform for system engineers. The ATR Simulator is a full replica of the Reactor Control Room and a partial replica of the experiment loops control room and also includes replicas of the following plant systems:

- Console Display System
- Process Distributed Control System
- Loop Distributed Control System
- Regulating Rod Control System
- Plant Clock
- Digital Radiation Monitoring System (graphical display only).

Plant signals are simulated and communicated to and from the above plant systems via a collection of custom computer models. The current computer models are written in a legacy version of the C programming language and are compiled and executed inside a Solaris 8 environment that runs as a Virtual Machine in a raid configured Windows computer. These hardware and software applications will be upgraded.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

Project activities have the potential to contribute to air emissions through the following:

- Generating air pollutants, including but not limited to radionuclides, chemical and combustion emissions. Some activities may involve stationary air emission sources, including stationary internal combustion engines.
- Generating hazardous and radiological emissions, such as by operation of fuel burning equipment, decontamination work, use of maintenance products that contain hazardous constituents, and disturbance of contaminated soils.
- Distributing, excessing or disposing of appliances containing refrigerants.
- Maintaining, servicing or repairing stationary heating, ventilation, air conditioning and refrigeration equipment.
- Maintaining, testing, or disposing of halon-containing equipment and halon.
- Purchasing equipment containing refrigerants or halon.
- Acquiring and dispositioning chemicals.
- Disturbing asbestos.
- Generating fugitive dust or other fugitive emissions.
- Purchasing, relocating, operating, modifying or maintaining portable air emission sources, including non-road internal combustion engines.

Discharging to Surface-, Storm-, or Ground Water

Activities addressed by this EC have the potential to impact waters of the United States (U.S.) or groundwater through conduct of the following:

- Maintaining, repairing, or altering drinking water systems and cross connection at the INL
- Using drinking water systems and cross connections at the INL
- Maintaining or repairing septic tanks or septic systems
- Discharging Wastewaters
- Managing storm water discharges.

Disturbing Cultural or Biological Resources

Activities included in this EC have the potential to disturb cultural or biological resources as follows:

- Maintaining or repairing facilities, structures, equipment or processes
- Management of migratory birds and bird nests on the INL
- Modifying historical buildings or structures

Generating and Managing Waste

Proposed activities have the potential to generate waste from conducting the following activities:

- Decontaminating equipment containing or contaminated with polychlorinated biphenyls (PCBs) (From equipment manufactured before 1982)
- Maintaining equipment containing or contaminated with PCBs (From equipment manufactured before 1982)
- Modifying or disposing of buildings, structures, or equipment built before 1982 may contain PCBs (paint, caulk, light fixtures, adhesives, ceiling tiles, etc.).
- Disposing asbestos-containing material
- Disturbing asbestos or removing asbestos-containing material
- Other activities that generate waste.

Releasing Contaminants

Activities addressed by this EC have the potential to release contaminants through the following:

- Acquiring, using, storing and dispositioning chemicals
- Managing and dispositioning excess property and materials
- Reporting and cleaning up spills and releases
- Managing elemental lead
- Removing lead from service or from a structure.

Using, Reusing, and Conserving Natural Resources

Activities addressed by this EC have the potential for use, reuse and conservation of natural resources related to the following:

- Generating greenhouse gasses
- Building energy use
- Consuming potable, industrial or irrigation water
- Generating storm water
- Generating landfill waste or construction and demolition wastes
- Generating recyclable materials
- Engaging in sustainable acquisition practices.

SECTION D. Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification: Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

For Categorical Exclusions (CXs), the proposed action must not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, or similar requirements of Department of Energy (DOE) or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment or facilities; (3) disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources (see 10 CFR 1021). In addition, no extraordinary circumstances related to the proposal exist that would affect the significance of the action. In addition, the action is not "connected" to other action actions (40 CFR 1508.25(a)(1) and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1608.27(b)(7)).

References: 10 CFR 1021, Appendix B to subpart D, items B1.3 "Routine maintenance, " B2.2 "Building and equipment instrumentation," and B2.5 "Facility safety and environmental improvements."

Justification: The deferred maintenance activities fall within the above classes of actions that DOE has determined do not individually or cumulatively have a significant effect on the human environment (categorical exclusions). There are no extraordinary circumstances related to the proposal that affect the significance of the environmental effects of the proposal. The proposal has not been segmented, is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), and is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)).

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act) ☐ Yes ☒ No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on: 12/04/2018