

Approved
ORNL WORK PLAN
 Operations, Maintenance and Services
 Work Plan Name / Rev: MWP057337 / 1
 Expiration Date: 3/21/2026



WORK SCOPE/DESCRIPTION				
Requester (Name/Badge/Division):	Palcu, Lucian / 03035184 / X108			
Location of work (Bldg/Rm/Other):	3525 / / No CCP include in this package.			
Work Plan Title:	Replace Motor Controls for K-9 and K-7 Office Area Supply and Charging Area Supply.			
Description of Service/Work Needed: This work plan covers the work associated with the rebuild and upgrades of motor control components and wiring for the K-9 and K-7 office area supply and charging area supply. The existing electrical and mechanical components have been operated beyond their designed life and are beginning to malfunction; they will be replaced with modern, approved electrical and mechanical components. K-9 bucket, which feeds the office area supply fan, is located in compartment 1-A of Motor Control Center (MCC) #2, whereas K-7 bucket that feeds the charging area supply fan is located in compartment 2-B of Motor Control Center (MCC) #1.				
The work covered by this work plan includes the following major evolutions:				
<ul style="list-style-type: none"> perform Complex L/T/V as detailed in the work directions section removal of MCC buckets to rebuilt with listed components as detailed in the BOPM, and by following the electrical schematic(s) attached to it install new MCC bucket control components as needed, install new power and control wiring in new and existing conduit between MCC, the HVAC control panel, and the supply fan motors complete all field installation perform functional testing on the pump motors before returning to service perform 3525 ventilation fan interlocks testing 				
MCC #2 is fed from Switchgear Station 31-5. The Switchgear Station is located at the Southside part of building 3525. Because MCC#2 has generator back up power a Complex L/T/V will be performed by opening and locking MCC #2 feeder breaker located in Switchgear Station 31-5 and removing and locking Generator 80-3525 battery cable lead. MCC#1 is fed from Switchgear Station 31-5. MCC#1 will be a simple lock out.				
Please reference the 3525-BOPM-182, 3525-BOPM-189 and the attached engineering notes and schematics included in the work package for this work.				
NNFD-3525-DCN-187 provides the document changes to be made to the 3525 facility drawings.				
All work shall be performed in accordance with ORNL, NFPA-70, and NFPA-70E requirements.				
All electrical components shall be substituted with an engineering approved equal part.				
Charge Number, if required:				
Work Plan Grade/Worktype:	1 / G			
Author (Name/Badge):	Neal, Mark A / 00909951			
File Attachments:	Badge	Name	Attachment Desc	File Name
	03035184	Palcu, Lucian	QEA	MWP057337_Replace Motor Controls for K-9 and K-10 Office Area.pdf

03035184	Palcu, Lucian	BOPM, USQD	3525-BOPM-182 Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans.pdf
00909951	Neal, Mark A	Fan Interlocks	20240313083353937.pdf
00909951	Neal, Mark A	USQD	EUSQD-3525-24-016 R0 FINAL.pdf
00909951	Neal, Mark A	BOPM	3525-BOPM-189 Replace Motor Controls for K-7 Charging Area Supply Fan.pdf

INSTRUCTIONS

Prerequisites/Precautions:

Does this work apply to Hazard Category 1, 2, or 3 Nuclear Facility? If yes, do any of the following apply (as determined by USQ-qualified person)?

1. Is it a physical change? Yes
2. Is it a change to a procedure or program described in the documented safety analysis? No
3. Is it a new or revised operation? No

- If any of the above were answered yes, then initiate a USQD or USQD Screening Worksheet in accordance with Unreviewed Safety Question (USQ) Process for Nuclear and Facility Safety
- All work performed in, or in support of, a Category 1, 2, or 3 nuclear facility must be conducted in compliance with the nuclear facility Safety Analysis Report (SAR) and Technical Safety Requirements (TSR).
- Notify affected R&D personnel of work activity.
- Notify LSS, Security, Fire department, and the Facility/Operations Manager(s) of work activity.
- Plan/schedule work with Facility/Operations Manager(s).
- Consult Facility Management to determine facility operating conditions.
- Determine procurement requirements for materials or parts.
- Contact EPO/ECR and WSR
- Manage scrap metal in accordance with subject area

Directions:

- Proper PPE is to be used in performance of tasks.
- Notify the RCT and facility operations prior to starting work.
- Waste generated is disposed of in accordance with established ORNL procedures.
- Ensure that work area is clean and free of hazards during performance of work.
- Include appropriate sections of vendor manual in package/plan.

Post Work Testing:

- Ensure all de-energized equipment have been returned to service.
- MCC one lines and schematic shall be field marked to identify current configurations and provided to System Engineering to ensure configuration and control of the electrical system is maintained.

Closeout:

- Ensure that work area is clean and free of hazards prior to leaving it.
- Provide feedback to building Supervision and Task Leader.

JOB HAZARD EVALUATION

HAZARDS	PERMITS / CONTROLS
Asbestos/Man-Made Mineral Fibers: Some of these old, existing MCC buckets have electrical wire insulation that could, potentially, contains asbestos.	<ul style="list-style-type: none"> Asbestos hazard controls applied: <ul style="list-style-type: none"> Wet methods HEPA Vacuum Prompt Cleanup Medical Monitoring Authorization by the Asbestos Program Manager (APM) Training - Asbestos Competent Supervisor Training - Asbestos Worker Training - Asbestos Accreditation <u>Asbestos Management and Tracking System (AMTS)</u> (formerly UCN-13385, Asbestos Work Authorization (AWA)) PPE & Access - Gloves: Specify. PPE & Access - Safety glasses Approved HEPA Vacuum Cleaner Note: AWA is required for the removal of suspect or known ACM, so I've checked that box in the JHE. If more than 1 waste bag or wire will be removed, the abatement workers will need to be 32-hour worker trained and

<p>Deenergized Hazardous Energy Sources (LTV): Shutting down power to MCC #2 requires a Complex L/T/V. Shutting down power to MCC#1 can be covered under simple L/T/V.</p>	<ul style="list-style-type: none"> ORNL-213, ORNL Lock/Tag/Verify Permit form OR ORNL-214, ORNL Lock/Tag/Verify Permit Continuation form OR ORNL-215, ORNL Lock/Tag/Verify Permit Temporary Suspension form Perform Simple Lock/Tag/Verify - Work meets all criteria for Simple LTV <ul style="list-style-type: none"> No potential for stored, residual energy or re-accumulation of energy after shutdown For a single hazardous energy source that can be: Identified, isolated, and locked Isolation of single energy source completely de-energizes & deactivates equipment/system Energy source is isolated and locked out during service/maintenance Single lockout device will achieve a locked-out condition. Lockout is under personal control for each staff performing work Work creates no hazard for other staff Equipment/system has no known history of unexpected activation or re-energization during maintenance or servicing Otherwise: Perform Complex Lock/Tag/Verify Authorized employee performs Simple LTV actions: <ul style="list-style-type: none"> Identify hazardous energy source Identify energy isolation device Isolate equipment from energy source Install a personal lock Confirm isolation of hazardous energy source Perform Complex Lock/Tag/Verify - PERMIT - OR Equipment-Specific Hazardous Energy Control Procedure Erect physical boundary around equipment, a minimum of 4 feet from all electrical components. Anyone crossing boundary must apply their lock and sign onto the LTV permit.
<p>Lead: The bucket breaker doors could contain lead paint.</p>	<ul style="list-style-type: none"> Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM): Wet methods or HEPA will be applied to lead painted surfaces and where potential lead contamination may be present. Risk of airborne exposure to lead is low. Approved HEPA Vacuum Cleaner: or wet methods • Minimum of Lead Level 1 training is required when potential for exposure to lead exists. Lead Level 2 training is required for work under a Lead Compliance Plan. • Minimum PPE of nitrile, latex or other disposable gloves, with additional PPE based on activity assessment. • Personal hygiene practices after contact with known or potential lead contaminated surfaces(Personnel disturbing lead paint or lead contaminated items shall wash hands and face after removing PPE and prior to eating, drinking, use of tobacco products, applying cosmetics or lip balm, or taking medication.)
<p>Radiological Work: Consult the RCTs before work begins. Inside of MCC is to be smeared before work starts, and the bucket components scanned before leaving the building for the upgrades.</p>	<ul style="list-style-type: none"> Radiological Work Permit (Enter RWP no.) Approved HEPA Vacuum Cleaner Dosimetry Monitoring Requirements Follow radiological posting, entry control & egress requirements

	<ul style="list-style-type: none"> Respond to Abnormal Radiological Conditions and Alarms. Radiological alarms include: Continuous Air Monitor (CAM), Area Radiation Monitor (ARM), Electronic Pocket Dosimeter (EPD), Personnel Contamination Monitor (PCM). RCT notification required prior to starting work.
Electrical Equipment and Tools	<ul style="list-style-type: none"> Listed by a nationally recognized testing laboratory (NRTL) Not NRTL listed <ul style="list-style-type: none"> i Has Equipment Labels or i Have made provision for Electrical Equipment Inspector (EEI) review and Electrical Safety Officer (ESO) approval or i Equipment poses no or little hazard (see Exhibit) Use GFCI protection when using corded electrical equipment.
Electrical Work: Replacement of electrical and mechanical components at MCC #2.	<ul style="list-style-type: none"> Minimum level of electrical worker qualification for the task (i.e. EW, QEW 1, 2, 3, 4, or 5): Specify. QEW 4 required for this work. Verify and establish limited approach boundary and restricted approach boundary. See Table 1 for AC or Table 2 for DC: Specify. Minimum 42" LAB Shock and Arc-Rated PPE to be used: Specify. Use ORNL PPE Category C (40 cal suit) for zero energy verification at MCC #2. Additional Lighting: Temporary lighting used for the duration of the work. Two-person rule Verify replacement components volts & amps rating
Elevated Work: Use of ladders to perform work.	<ul style="list-style-type: none"> Inspecting Ladders Guide [Step & Fixed]: Inspect prior to use Obtain Training - Fixed >10 feet; portable >3 feet Fall Protection Training Requirements: Specify. Fall Protection Authorized Person Training Buddy System (best management practice only, must select additional controls)
Ergonomic Conditions (Contact Stress, Vibration, Posture, Force, Repetitive Motion)	<ul style="list-style-type: none"> Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM) Evaluation of work station or Evaluation of work posture/positioning Diversify activities PPE: Specify. Kneeling pads if kneeling/working on knees Stretch breaks/exercises Worker rotation
Heat/Cold Stress: Conditions may be encountered	<ul style="list-style-type: none"> Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM) Frequent breaks
Manual Material Handling: Tools and equipment.	<ul style="list-style-type: none"> Establish Controls (Guideline) [apply 30-50-30 criteria for a non-repetitive lifting task] <ul style="list-style-type: none"> i Reduce weight i Decrease load i Design work area i Facilitate access to material i Optimum environment

- | i Reduce distance /Provide proper storage facilities
- | i Load storage
- | i Eliminate manual lifting/lowering
- | i Eliminate pushing/pulling – Use lifting aids
- | i Other instructions to staff
- | i Diversity of activities
- | i Apply hierarchy of controls approach
- | i Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM)

Noise: Drilling into metal could pose noise issues.

- | i Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM): Exposures to noise above the OEL will be infrequent during this evolution (less than 30 minutes). PPE will be used as a precaution rather than a prevention tool.
- | i Hearing protection (plugs or muffs): Selecting Hearing Protection: NRR 26 or higher required for possible use of cordless drill.
- | i Hearing Conservation Program

Chemical/Rec ID 1: IDEAL INDUSTRIES YELLOW 77 WIRE PULLING LUBRICANT (89767)

- | i Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM)
- | i Safety glasses

Chemical/Rec ID 2: Clear Glide Wire Pulling Lubricant (89853A)

- | i Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM)
- | i Safety glasses

Respirable Crystalline Silica: Potential Drilling into masonry walls

- | i Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM). Example: QEA required for respirable silica generating construction activities and where Respirable Silica is above action level. Specify.
- | i Staff Training: Respirable Crystalline Silica
- | i Wet methods: Specify.
- | i Approved HEPA Vacuum: Specify.
- | i No penetration will be deeper than 2" for anchors installation.

Pinch Points and Sharp Edges

- | i Watch placement of hands and feet to avoid pinch points.
- | i If handling sharp metal objects, wear gloves with a cut resistant rating of 4.

Debris in eyes

- | i Safety glasses with side shields are required during this activity.

Slips, Trips, and Falls

- | i Watch foot and hand placement especially on wet surfaces. Carefully examine work area for any trip and fall hazards.

(Approvals are certification of hazards assessment)			
Reviewer/Approver Roles	Signature	Date	
Accountable Management (Service Provider, Line, Equipment Owner, or Facility Management)	Keeton, Wesley	3/21/2024	
Accountable Management (Service Provider, Line, Equipment Owner, or Facility Management)	Woody, Bryan	3/20/2024	
Author	Neal, Mark A	3/20/2024	
Division Electrical Safety Officer (DESO)	Webb, Aaron	3/20/2024	
Fire Protection Engineer	Gardner, Justin	3/20/2024	
IS/IH	Dean, Ian	3/20/2024	
Radiation Protection	Walls, Mark	3/21/2024	
Safety Basis Engineer	Bailey, Brian	3/20/2024	
System Engineer, Accountable Equipment Owner, or Facility Engineer	Webb, Aaron	3/20/2024	
Task Leader	King, Blake	3/20/2024	
Work Package Concurrence			
Facility Manager			
Operations Supervisor			
Facility Manager Approval To Start Work			
Facility Manager			
Work Start Authorization			
Task Leader			
Work Acknowledged Complete			
Task Leader			
Worker Feedback:			
WORK DETAILS - Prerequisites/Precautions			
Hazards	Permits/Controls	Resources	Dur
1) -			
Refer to 3525-BOPM-182, 3525-BOPM-189 for this work.			
NNFD-3525-DCN-187 provides the document changes to be made to the 3525 facility drawings.			
		<input type="checkbox"/> Facilities Engineer <input type="checkbox"/> Project Leader <input type="checkbox"/> Systems Engineer	0
2) -			
Ensure that tasks performed using this work package are "ready to work" and the task is included on or added to facility's POD prior to beginning work.			
		<input type="checkbox"/> Task Leader	0
3) -			

Worksteps may be worked out of order with prior approval from the Task Leader as long as L/T/V requirements are maintained and observed and no new job hazards are introduced.

		<input type="checkbox"/> DEFAULT / ALL TRADES <input type="checkbox"/> Task Leader	0
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4) -

IF the scope of work changes, or an issue arises concerning the planned work during work execution, THEN suspend work AND notify the Task Leader.

		<input type="checkbox"/> DEFAULT / ALL TRADES	0
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5) -

IF there are changes to the planned engineering specifications THEN suspend work AND notify the Task Leader and System Engineer.

		<input type="checkbox"/> DEFAULT / ALL TRADES <input type="checkbox"/> Systems Engineer <input type="checkbox"/> Task Leader	0
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6) -

Visually check existing electrical components to verify electrical conditions. Take pictures and label configuration of field wiring prior to de-terminating existing equipment.

		<input type="checkbox"/> Electrician <input type="checkbox"/> Task Leader <input type="checkbox"/> Systems Engineer	2
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7) -

Notify the Fire Protection Engineer, Fire Dept.(574-5678), LSS office (574-6606), Security (574-6646), and Facility personnel of the MCC power outage by using ORNL's power outage system.

		<input type="checkbox"/> Project Leader	0
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WORK DETAILS - Directions

Hazards	Permits/Controls	Resources	Dur
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1) -

Conduct a pre-job briefing: ensure all personnel receive the briefing and sign the attached sign in sheet, using NNFD-FRM-038 Pre-Job Briefing and NNFD-FRM-062 Attendance Sheet to identify scope of work, hazards, controls, etc.

All work performed in, or in support of building 3525 must be conducted in compliance with the safety requirements of the facility.

After the pre-job brief, perform the "Take-A-Minute" evaluation before performing tasks to ensure hazards are addressed.

CAUTION: If unexpected hazards are encountered, stop work, put area in a safe condition if safe to do so and contact your supervisor and/or facility management.

		<input type="checkbox"/> Supervisor <input type="checkbox"/> DEFAULT / ALL TRADES	0
2) -			
If needed, and with prior approval granted by the Building Supervisor have the FRM panel disabled or put in bypass.			
3) -			
Notify Fire Department that work will likely result in a monitor notification associated with Motor Control Center (MCC) #2 losing power.			
4) -			
Building Supervisor's approval is required before buckets are removed to be worked on.			
Prior to work starting and after the old bucket(s) are removed RCTs to survey as needed.			
		<input type="checkbox"/> Electrician <input type="checkbox"/> Radiological Control Technician <input type="checkbox"/> Supervisor	0
5) - Place the Facility in Warm Stand By Mode prior to shutting down power.			
		<input type="checkbox"/> Electrician <input type="checkbox"/> Facility/Operations Supervisor <input type="checkbox"/> Hot Cell Operator	0
6) -			
Before any bucket is removed label all the electrical wires associated with it (that are left behind in the MCC). The labeled conductors will later be reconnected to the upgraded components.			
Replace damaged wires inside the MCC.			
		<input type="checkbox"/> Supervisor <input type="checkbox"/> Electrician	0
7) -			
Isolation of the MCC #2 for bucket upgrades (this evolution will be repeated as many times as necessary, over the span of multiple days):			

a. disconnect and then lock Generator 80-3525 battery cable lead

b. open breaker and place L/T/V to isolate power to MCC #2 from the outside
Switchgear Station 31-5

c. wearing appropriate PPE verify zero energy at MCC #2.

d. complete the Complex L/T/V form

		<input type="checkbox"/> Supervisor <input type="checkbox"/> Electrician	0
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8) -

RCT to smear bucket K-9 located in compartments 1-A of MCC #2.

		<input type="checkbox"/> Radiological Control Technician <input type="checkbox"/> Electrician <input type="checkbox"/> Task Leader	0
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9) -

If a bucket needs to be rebuilt remove it from its compartment, label electrical wires that will later be reconnected to the rebuilt components, and then have an RCT survey it. MCC buckets need to be cleared before they are taken to the shop to be worked on.

NOTE: When necessary, install temporary door hold covers so L/T/V can be lifted while bucket(s) is/are being rebuilt at the workshop.

If a bucket was already rebuilt and/or upgraded then install it in the MCC compartment along with the rest of the electrical and mechanical components (door handle, overload reset button, etc.).

As needed, route new conduit and install new power and control wiring at the MCC, and between the MCC, the HVAC control panel and the supply/exhaust fan motors

Finish landing the electrical wiring inside the bucket compartment per engineering diagram.

		<input type="checkbox"/> Radiological Control Technician <input type="checkbox"/> Supervisor <input type="checkbox"/> Electrician	0
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10) -

After work inside MCC #2 compartments is completed visually inspect all new and/or modified equipment prior to releasing L/T/V.

Release Complex L/T/V.

		<input type="checkbox"/> Supervisor	
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11) -

When applicable, check phase rotation as soon as installation is complete and safe to do so.

Perform functional testing of all upgraded systems and document on the Post-maintenance form or in the Work Log.

		Supervisor Electrician	0
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12) -

Place labels at newly installed equipment.

Provide copy of any changes to Engineering for drawing revision.

All work shall be performed in accordance with NFPA-70 and NFPA-70E.

		Electrician Task Leader	0
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13) - Isolation of the MCC #1 for bucket upgrades (this evolution will be repeated as many times as necessary, over the span of multiple days):

A. Open breaker and place L/T/V to isolate power to MCC #1 from the outside Switchgear Station 31-5

B. Wearing appropriate PPE verify zero energy at MCC #1.

14) - RCT to smear bucket K-7 located in compartment 2-B of MCC #1.

15) -

If a bucket needs to be rebuilt remove it from its compartment, label electrical wires that will later be reconnected to the rebuilt components, and then have an RCT survey it. MCC buckets need to be cleared before they are taken to the shop to be worked on.

NOTE: When necessary, install temporary door hold covers so L/T/V can be lifted while bucket(s) is/are being rebuilt at the workshop.

If a bucket was already rebuilt and/or upgraded then install it in the MCC compartment along with the rest of the electrical and mechanical components (door handle, overload reset button, etc.).

As needed, route new conduit and install new power and control wiring at the MCC, and between the MCC, the HVAC control panel and the supply/exhaust fan motors

Finish landing the electrical wiring inside the bucket compartment per engineering diagram.

			0
16) - After work inside MCC #1 compartments is completed visually inspect all new and/or modified equipment prior to releasing L/T/V.			
Release Complex L/T/V.			
		<input type="checkbox"/> Electrician <input type="checkbox"/> Engineer	0
17) - <u>When applicable, check phase rotation as soon as installation is complete and safe to do so.</u>			
Perform functional testing of all upgraded systems and document on the Post-maintenance form or in the Work Log.			
		<input type="checkbox"/> Electrician	0
18) - Place labels at newly installed equipment.			
Provide copy of any changes to Engineering for drawing revision.			
All work shall be performed in accordance with NFPA-70 and NFPA-70E.			
			0
19) - Ensure that work area is clean and free of hazards prior to leaving it.			
		<input type="checkbox"/> Electrician	0
WORK DETAILS - Post Work Testing			
Hazards	Permits/Controls	Resources	Dur
1) - Perform visual inspection of all added equipment and labeling to ensure accuracy with respect to design documentation.			
If needed, perform presence/absence of voltage checks as required to ensure wiring was properly installed.			
Perform functional testing of all systems after installation.			
Perform the 3525 ventilation fan interlock testing.			
		<input type="checkbox"/> Supervisor <input type="checkbox"/> Electrician <input type="checkbox"/> Systems Engineer	0
WORK DETAILS - Closeout			
Hazards	Permits/Controls	Resources	Dur
1) - Pick up and clean up the areas around which work was performed.			

		Electrician Laborers	8
2) - Properly dispose of all waste and trash as required.			
		Electrician Laborers	4
3) - Drawings shall be updated and completed.			
		Task Leader Systems Engineer	0

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 Work Plan Name / Rev: MWP057337 / 1
 Expiration Date: 3/21/2026



PRE-JOB SAFETY REVIEW GUIDE

ID: 57337

Scope of Work: Review work package/plan to ensure all participants understand the work activity.

Hazards: Review the hazards identified in Job Hazard Evaluation (JHE) / work plan (IOP).

- ↳ Since the work package / plan was written: 1) Have conditions changed? 2) Are there new hazards? Refer to Field Notes and Focus Areas.

Hazard Controls / Permits: Review:

- ↳ Written permits for the work activity.
- ↳ Precautions, step warnings, Hold Points ...
- ↳ Personal Protective Equipment (PPE)
- ↳ Work instructions for information - e.g., steps where hazards are introduced.
- ↳ ORNL subject area requirements - e.g., non-permit hazard controls.

Performing Work:

- ↳ Discuss group/individual responsibilities for safe & effective work.
- ↳ Follow work instructions & safety procedures.
- ↳ Availability/location of materials, tools, etc.
- ↳ Any previous experiences / lessons learned?
- ↳ Response if work cannot be performed as planned.
- ↳ What is the worst thing that could happen?
- ↳ Are there Potential error traps with the job? → →
- ↳ Take a minute before: work start & leaving work area.
- ↳ Work Hand-off / Turnover - workers & Task Leader

→ **Potential Error Traps:**

- ↳ Time pressures
- ↳ Distractive environment
- ↳ High workload
- ↳ First time evolution
- ↳ First day back
- ↳ Vague guidance
- ↳ Over confidence
- ↳ Imprecise communications
- ↳ Work stress

Abnormal Situation Response:

- ↳ Stop Work: Observe an unsafe act, activity or condition that creates an imminent danger.
- ↳ Emergency Response: Discuss egress paths or other responses if problems are encountered.

Field Notes and Focus Areas: (Use this area as a work space to record notes related to new hazards identified in the field or changed conditions. Record feedback in work package/plan information systems.)

By signing below, I am indicating that I have been briefed on the potential hazards associated with completing this job.

Signature / Badge	Date	Signature / Badge	Date

Qualitative Exposure Assessment – Multiple Hazard Form

Project Information

- No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task
 QEA could not be conducted at the time the RSS/Work Plan was reviewed/approved due to inadequate information provided by the PI, Work Planner/Package author on some or all agent(s)/hazard(s). List the agent(s) for which a QEA could not be conducted: All Agents (see below) or Specific Agent(s) that could not be assessed: Heat/Cold Stress. Discuss controls incorporated into Work Control to assure EA is conducted in the future: IH/IS will be contacted for environmental/physiological monitoring as needed during hot/cold weather conditions or for use of multi-layered PPE.

Process/Job/Task:

(SEG/SET Name) Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans

Work Description: The rebuild and upgrades of motor control components and wiring for the K-9 and K-10 office area supply and exhaust fans. The existing electrical and mechanical components have been operated beyond their designed life and are beginning to malfunction; they will be replaced with modern, approved electrical and mechanical components. K-9 bucket, which feeds the office area supply fan, is located in compartment 1A of Motor Control Center (MCC) #2, whereas K-10 bucket that feeds the office area exhaust fan is located in compartment 1B.

Facility #: 3525

Room/Lab/Shop #: Facility

Organization: NNFD

RSS/Work Plan #: MWP057337

Agents and Control Information

	Process/Job/Task	Rec ID	Agent	Quantity or Magnitude	¹ Potential Routes of Entry	Primary Exposure Forms	Frequency of Exposure	Duration of Exposure per Exposure Event	² Engineering and Administrative Controls	*OEL	Health Severity Rating 1-4	Exposure Rating 1-4	Certainty Rating 1-3	³ QEA Rating 1-24	⁴ Exposure Decision
1	Lubricating Wire	89767	Petroleum distillates	< 1 qt	Inh, A	Liquid	Variable	< 1/2 hour	T, P, GV	5 mg/m3 Oil Mist	3	1	1	4	Acceptable (2 - 7)
2	Lubricating Wire	89853A	Petroleum distillates	< 1 qt	Inh, A	Liquid	Variable	< 1/2 hour	T, P, GV	5 mg/m3 Oil Mist	3	1	1	4	Acceptable (2 - 7)
3	Awkward postures, kneeling, bending	N/A	Ergonomics	N/A	N/A	Other	Variable	1/2 - 2 hours	T, P	N/A	3	2	1	5	Acceptable (2 - 7)
4	Handling tools/equipment	N/A	Manual Material Handling	< 50 lbs.	N/A	Other	Variable	1/2 - 2 hours	T, P	N/A	3	2	1	5	Acceptable (2 - 7)
5	Using electric drill	N/A	Noise	100 dBA	N/A	Other	Variable	< 1/2 hour	T, P	N/A	3	2	2	10	Uncertain (8-15)
6	Potential lead paint on breaker doors	N/A	Lead	Unknown	Inh, Ing	Particulate	Variable	< 1/2 hour	GV, P, T, HEPA Vac or W	05mg/m3	4	2	1	6	Acceptable (2 - 7)
7	Potential drilling in to block or masonry wall	N/A	Respirable Crystalline Silica	Unknown	Inh	Particulate	Variable	< 1/2 hour	GV, P, T, HEPA Vac or W	0.025 mg/m3	4	2	1	6	Acceptable (2 - 7)
8															
9															
10															

1. Routes of entry codes: Inh – Inhalation, P – Penetration, Ing – Ingestion, S – Splash; A – Absorption 2. Engineering Control codes: GB – Glovebox, GV – General Ventilation, Hood – Other LEV Hood, I/E – Isolate or Enclose Hazard, LH - Lab Hood S – Shielding, W – Wet Methods; Administrative Control Codes: T – Training, L/P – Labeling or Postings, P – Written procedure/plan; LT – Limited Stay Time; W/R – Modified Work/Rest Cycle, BEI – Biological Monitoring, MS – Medical Surveillance;

3. QEA Rating = (Health Severity Rating + Exposure Rating) x Certainty Rating; 4. Exposure Decision: Acceptable (2-7), Uncertain (8-15), Unacceptable (16-24)

* Optional field

Exposure Decision and Follow-up

Acceptable Exposure (LOW RISK)				Uncertain and Unacceptable Exposures						
Was Agent Hazard Acceptable (Low Risk)?	If yes, describe justification for classification as acceptable			Follow-up Priority	Follow-up Schedule	Is Quantitative Monitoring Required?	Recommendations/Comments			
1 YES	Small quantity, short duration use in area. Oil mist is not expected to be generated during normal use.			_____	_____	_____				
2 YES	Small quantity, short duration use in area. Oil mist is not expected to be generated during normal use.			_____	_____	_____				
3 YES	Workers will minimize extended periods of peak hand/wrist forces and awkward/strained body positions when possible. Appropriate tools will be used for the tasks and unnecessary motions or exertions will be eliminated. Work activities will be self-limiting and stretch breaks or rotation of tasks will take place as needed. Workers will discontinue work and contact IH/IS for an evaluation if discomfort or difficulty is experienced while performing the work.			_____	_____	_____				
4 YES	30-50-30 criteria will be applied for non-repetitive lifting tasks and proper lifting techniques will be used. Mechanical lifting devices or team lifts will be used for awkward items or those exceeding 50 lbs, as applicable. There are no repetitive 2-handed mono-lifting tasks associated with these work activities.			_____	_____	_____				
5 NO				_____	_____	_____	Hearing protection with a NRR of 26 or higher is required if using tools/equipment that produce sound pressure levels > 85.0 dBA but less than 103 dBA. Contact IH/IS for a sound level survey if higher noise levels are anticipated or encountered.			

Qualitative Exposure Assessment – Multiple Hazard Form

6	YES	Personnel will minimize handling or disturbance of Pb or Pb-based materials when possible. PPE required to protect from radiological contamination will suffice for lead contamination/particulates. Lead Level 1 training is required. Personal hygiene practices after contact with known or potential lead contaminated surfaces (Personnel disturbing lead paint or lead contaminated items shall wash hands and face after removing PPE and prior to eating, drinking, use of tobacco products, applying cosmetics or lip balm, or taking medication.)	_____	_____	_____	
7	YES	Approved integrated HEPA tool attachments will be used when drilling into masonry surfaces. Personnel are silica trained. Gloves and safety glasses are required when performing work activities. Wet methods or HEPA vacuum will be used to clean areas as needed. Tasks meet the Respirable Crystalline Silica Exclusion criteria. If tasks are proposed that do not meet the Respirable Crystalline Silica Exclusion criteria, IH/IS will be contacted to evaluate prior to work activities beginning.	_____	_____	_____	
8	_____		_____	_____	_____	
9	_____		_____	_____	_____	
10	_____		_____	_____	_____	

Qualified H&S Professional:

Brittany Herman

Date: 1/6/2022

Qualitative Exposure Assessment – Multiple Hazard Form

QEA Rating Tables

Table 1: Health Severity Rating

Rating		Criteria
HSR		Effects from Over Exposure
1	Negligible	Negligible or reversible effects of little concern Note: This applies to chemical agents classified as a *Relatively Harmless Hazard.
2	Minor	Minor or reversible health concern Note: This applies to chemical agents classified as a *Slight Health Hazard. Examples for using this rating for physical agents include: heat fatigue, discomfort from repetitive stress tasks, minor skin burn not requiring medical treatment, etc.
3	Medium	Medium to severe, reversible health concern. Note: This applies to chemical agents classified as a *Moderate Health Hazard. Examples for using this rating for physical agents includes temporary threshold shift in hearing, heat exhaustion, reversible repetitive stress disorders requiring medical intervention, temporary or transient sight impairment, minor skin burns (UV or IR) requiring medical treatment, etc.
4	Major	Major or irreversible health concern. Includes unknown health effects Note: This applies to chemical agents classified as a *High Health Hazard or *Extreme Health Hazard. Examples for using this rating for physical agents include: standard threshold shift in hearing, heat stroke, permanent peripheral nerve or tendon damage, ruptured disc, permanent (total or partial) loss of sight, formation of cataracts, neurological effects, sterility, etc.

*From the [Hazard Classification Guide](#), Appendix C, of ORNL Chemical Hygiene Plan

Table 2: Exposure Rating

Rating		Criteria
1	Negligible/Remote	<ul style="list-style-type: none"> • Little to no exceedance of 10% of the OEL (i.e., 95th percentile exposure estimate is virtually always less than 10% of the OEL) • No signs or symptoms of exposure • There is sufficient quantitative exposure data to judge exposure • Very little skin contact with Agent is expected • Engineering and administrative controls are in place and functioning • Only diluted chemicals are used in the process • Very low intensity of energy source • Short exposure duration • The phase of the chemical does not allow for route of exposure
2	Low/Occasional	<ul style="list-style-type: none"> • Exposure >5% exceedance of 10% of the OEL (i.e., 95th percentile exposure estimate lies between 10% of the OEL and 50% of the OEL) • No specific signs or symptoms of exposure • Qualitative monitoring indicates insignificant levels of hazard • Only incidental skin contact with Agent • There is exposure potential • Engineering and administrative controls are available but effectiveness is questionable
3	Medium/Probable	<ul style="list-style-type: none"> • Exposure >5% exceedance of 50% of the OEL (i.e., 95th percentile exposure estimate lies between 50% of the OEL and the OEL) • Air concentrations may exceed established action levels • Routine skin contact with chemical is expected
4	High/Likely	<ul style="list-style-type: none"> • Exposure >5% exceedance of the OEL (i.e., 95th percentile exposure estimate > OEL) • Signs and symptoms are evident • High generation of airborne particles or vapors

Table 3: Certainty Rating

Rating		Criteria
1	Certain	The environmental agent's exposure profile and health effects are well-understood. The industrial hygienist has high confidence in the acceptability judgment.
2	Uncertain	There is enough information to make a judgment, but further information gathering is warranted to verify the exposure assessment.
3	Highly Uncertain	The acceptability judgment was made in the absence of significant information on the exposure profile and/or health effects.

Qualitative Exposure Rating

$$\text{QEA Rating} = (\text{Health Severity Rating} + \text{Exposure Rating}) \times \text{Certainty Rating}$$

BOP Modification Form

SECTION 1: CHANGE ORIGINATION / IDENTIFICATION			
Work Package No. MWP057337	Facility 3525	Date 1-5-2022	Originator Name / uid L. Aaron Webb / lwu
Title of Change: Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans			
Component / System MCC #2 / 480V Electrical Power			
Description of Change / Reason for Change (add attachments or redline drawings if needed) This BOPM covers the upgrade and replacement of motor controls for K-9 and K-10 Office Area Supply and Exhaust Fans.			
<p>The existing MCC#2 buckets 1A (K-9) and 1B (K-10) will remain in service, but new electrical components will be installed and wired in the bucket. The existing MCPs and operator handles may be reused or replaced new 30-amp MCPs with cradle and operator handle. The existing starter, overloads, control power transformer, and indication lights will be removed and replaced as indicated on new and revised drawings.</p> <p>NNFD-3525-DCN-157 provides the document changes to be made to the 3525 facility to accommodate the changes made in this BOPM.</p> <p>New power and control wiring may be installed if required in new and existing conduit between the MCC, the HVAC control panel and the supply fan motor if required.</p> <p>All work shall be performed in accordance with NFPA-70 and NFPA-70E.</p> <p>All electrical components may be substituted with an engineering-approved equal part.</p>			
Does this change impact other components/systems <input type="checkbox"/> Yes (list below) <input checked="" type="checkbox"/> No			
Does this change involve penetrations(s) of SSC's credited in the DSA for confinement of radioactive materials or shielding of personnel? <input type="checkbox"/> Yes refer to NNFD-002, <i>Change Control of Modifications</i> <input checked="" type="checkbox"/> No, proceed to Section 2. Do the penetration(s) meet the permit exclusions (refer to NNFD-002, <i>Change Control of Modifications</i>)?*** <input type="checkbox"/> Yes <input type="checkbox"/> No, Initiate CCP.			

SECTION 2: CHANGE DOCUMENTATION LIST existing and/or newly required documents (drawings, specifications, calculations, procedures etc.) N/A <input type="checkbox"/> if change is below documentation threshold.			
Document Number	Document Title	Rev # BEFORE Change	Required for Return to Service
E3E020566D067	BLDG 3525 ELECTRICAL MCC 2 & 3 ONE LINE DIAGRAM	B	<input type="checkbox"/>
E20566Y514E	ELECTRICAL MISCELLANEOUS SCHEMATICS AND DIAGRAMS	E	<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
ACTS entry made to revise High Priority or Electrical drawings <input type="checkbox"/>			

SECTION 3: APPLICABLE CODES / STANDARDS	
NFPA 70 National Electrical Code	
NFPA 70E Standard for Electrical Safety in the Workplace	
SECTION 4: MODIFICATION EVALUATION	

Modification Background / Description / Reason / Type:

While performing the December Generator Run Test an issue occurred when the ventilation system shut down to transfer to generator power, it was noticed that the K-10 exhaust fan did not restart as expected. Upon closer inspection it was identified that the starter contactor had failed and needed to be replaced. The K-9 fan was also identified as needing to be upgraded also. So a decision was made to upgrade the electrical controls for these fans to insure this system operates as required.

Design Basis & Functional Requirements / Justification:

These supply fan motors are rated 7.5 hp with a rated full load current of 11 amps. NEC Table 430.52 indicates the Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protection Devices as being 175% for Dual Element (Time Delay) Fuses or 800% for Instantaneous Trip Breaker. This would result in a recommendation to use 20 amp fuses (11 amps * 1.75 = 19.25 amps) or a 30 amp MCP breaker will be used (11 amps * 8 = 88 amps). The motor nameplate indicates a 1.0 service factor the adjustable overload relay that is provided recommends setting the overload at the level of full load amps to protect motors with service factors under 1.25, the overload will be set at 11. A size 1 starter was selected that is rated for up to 10 hp.

Additional conduit to complete this installation shall be field routed as required.

All changes detailed in this BOPM are required to be installed in accordance with all applicable ORNL and NEC requirements.

Acceptance Criteria & Testing Requirements:

Perform visual inspection of all added equipment & labeling to ensure accuracy with respect to design documentation.

Perform visual inspection of electrical connections to ensure proper sizing of wiring and proper connections.

Perform absence/ presence of voltage checks as required to ensure wiring is installed correctly.

Upon completion of installation when power is restored, perform functional testing on the pump motor before returning to service.

Controls Required During Modifications:

Coordinate all lockout / tagout and other activities with the facility manager before beginning work.

SAFETY AND TECHNICAL REVIEWS				
Discipline	N/A	Approval Signature	uid	Date
Facility Safety Basis Engineer OR				
USQD or USQDS SCREEN Number (attach copy) <u>EUSQD-3525-22-002</u>				
Independent Design Reviewer	LAW			
Informed Training Group to evaluate training needs	LAW			
Design Authority (if multiple disciplines involved and/or if *** answer is yes)	LAW			
Additional SME	LAW			
Additional SME	LAW			
Process/System Engineer	<i>Leslie Aaron Webb</i>	lwu	1/14/22	

CN-3

Instructions:

General: All signatures should be accompanied by the signers' ORNL user ID (uid). If a uid is not available, the signer's badge number may be substituted.

Section 1, CHANGE ORIGINATION / IDENTIFICATION: The Originator shall complete Section 1 and submit the BOP Modification Form (BOPM) to the System /Process Engineer.

Description of Change: Describe the Change in enough detail to identify what components are being modified and the scope of the modification.

Impact: If the change impacts other components or systems, check yes then list and describe the impact. If the change involves penetration(s) that meet the exclusions of SBMS SA, *Excavation/Penetration* and are in SSCs credited in the DSA then the BOPM form shall be signed by the Design Authority.

Section 2, CHANGE DOCUMENTATION: The System /Process Engineer lists all output documents that will be changed as a result of this modification including drawings, NCR's, procedures, etc. The "Rev # Before Change" column should be completed with the document/drawing revision number current when the modification begins.

If the change does not alter any existing documents, check N/A.

Those documents which are required to be completed in order for the item to be returned to service shall have the "Required for Return to Service" box checked.

High Priority or electrical drawings shall be revised per NNFD-002, and an associated action shall be entered in ACTS.

Section 3, APPLICABLE CODES AND STANDARDS: The Process/ System Engineer should complete this section. SBMS Area, Creating Engineering Designs, contains an exhibit: Design Codes and Standards, which includes the engineering design standards applicable at ORNL. Designs must incorporate engineering hazard controls to alleviate potential workplace hazards where feasible and appropriate. If a hazard is identified which cannot be alleviated through one of the codes/standards listed in the Work Smart Standard (WSS), a request should be made to add the code/standard to the WSS.

Section 4, MODIFICATION EVALUATION: The Process/System Engineer should complete this section using a graded approach commiserate with the complexity and scope of the change. Information entered in Section 1 – Description of Change does not have to be repeated in this section. This section may include the following:

Modification Background / Description / Reason / Type: Describe the problem and the events leading to the change and include a description of how the system, equipment, or component operated before the proposed modification.

Design Basis & Functional Requirements / Justification: Describe the specific functions to be performed by the item affected by the design modification and the specific values or range of values that bound the design (e.g., pressure, temperature, flow, voltage input, voltage output, etc.). Provide explanation, analysis or calculation on why the proposed modification is within the boundaries of the cited design requirements.

Acceptance Criteria & Testing Requirements: Enter Acceptance Criteria/Testing Requirements that ensures the modification functions as expected.

Controls Required During Modifications: Describe any controls, (i.e. compensatory measures, TSR mode restrictions) required to be in place while this modifications is being installed and normal equipment may be out of service.

SAFETY AND TECHNICAL REVIEWS: The System/Process Engineer initially determines which reviews are required by checking or initializing the "N/A" column for those reviews not required. In addition to the applicable System Engineer, review and approval from the Design Authority is required if multiple engineering disciplines are involved and/or if the change involves penetration(s) that meet the exclusions of SBMS SA, *Excavation/Penetration* and are in SSCs credited in the DSA. In this case, the Design Authority shall ensure all appropriate engineering input is obtained, and may list additional engineers for review. After the System/Process Engineer has determined review applicability the BOPM form should be routed to all reviewers for approval and signature. After approvals, route the BOPM form to the Process/System Engineer for final approval.

The approved BOPM form shall be included with the Maintenance Work Package

EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

Part I – Introduction

1. EUSQD Number: EUSQD-3525-22-002	Revision Number: 0	Facility/Activity: Building 3525
2. Subject of evaluation: Balance of Plant Modification Form 3525-BOPM-182, <i>Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans</i>		
3. Description of the change: The subject of this evaluation is Balance of Plant Modification (BOPM) Form 3525-BOPM-182, <i>Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans</i> . This BOPM form covers the upgrade and replacement of motor center controls (MCCs) for the K-9 and K-10 Office Area supply and exhaust fans. While performing recent Generator Run Tests, an issue occurred when the ventilation system shut down to transfer to generator power. It was noticed that the K-10 exhaust fan did not restart as expected. Upon inspection, the starter contactor had failed and needed replacement. The K-9 fan was also identified as needing to be upgraded.		
<p>The existing MCC#2 buckets 1A (K-9) and 1B (K-10) will remain in service, but new electrical components will be installed and wired in the buckets. The existing Motor Circuit Protectors (MCPs) and operator handles may be reused or replaced new 30-amp MCPs with cradle and operator handle. The existing starter, overloads, control power transformer, and indication lights will be removed and replaced as indicated on new and revised drawings. Additional conduit to complete this installation shall be field routed as required.</p>		
<p>Drawing change notice (DCN) NNFD-3525-DCN-157 provides the document changes to be made to the 3525 Facility drawings to document the changes made by this BOPM and associated workplan. Drawings E3E020566D067 and E20566Y514E will be revised to reflect these changes.</p>		
<p>New power and control wiring may be installed if required in new and existing conduit between the MCC, the Heating Ventilation and Air Conditioning control panel and the supply fan motor if required.</p>		
<p>All work shall be performed in accordance with NFPA-70 and NFPA-70E. All electrical components may be substituted with an engineering-approved equal part. The installation work will be completed under Work Package No. MWP057337, <i>Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans</i>. The work covered by this work plan includes the following major evolutions:</p> <ul style="list-style-type: none"> • perform Complex L/T/V as detailed in the work directions section • removal of MCC buckets to rebuilt with listed components as detailed in the BOPM, and by following the electrical schematic(s) attached to it • install new MCC bucket control components • as needed, install new power and control wiring in new and existing conduit between MCC, the HVAC control panel, and the supply fan motors • complete all field installation • perform functional testing on the pump motors before returning to service, and • perform 3525 Facility ventilation fan interlocks testing 		
<p>MCC #2 is fed from Switchgear Station 31-5. The Switchgear Station is located at the Southside part of the 3525 Facility. Because MCC#2 has generator back up power, a lockout/tagout/verification will be performed by opening and locking MCC #2 feeder breaker located in Switchgear Station 31-5 and removing and locking Generator 80-3525 battery cable lead.</p>		
DSA Change?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
<p>4. Primary safety basis documents:</p> <ol style="list-style-type: none"> 1) ORNL/3525/SAR, Rev. 8A, <i>Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525</i> 2) ORNL/3525/TSR, Rev. 11A CN-3, <i>Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525</i> 3) ORNL/NNFD/SSAR, Rev. 17, <i>Oak Ridge National Laboratory Standardized Safety Analysis Report</i> 4) ORNL/3525/SAR, Rev. 9A, <i>Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525</i> (resubmittal of 2020 Annual Update- approved but not implemented) 5) ORNL/3525/TSR, Rev. 12A, <i>Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525</i> (resubmittal of 2020 Annual Update- approved but not implemented) SBSs 6) ORNL/3525/SBS/2018-001, Rev. 1, <i>Safety Basis Supplement, Irradiated Fuel Examination Laboratory, Building 3525, Functional Testing of the K-15 System Ventilation Upgrade Project</i> 		

EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

- 7) ORNL/3525/TSR, Rev. 11A CN-4, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525*
- 8) ORNL/3525/SBS/2020-001, Rev. 0, *Safety Basis Supplement for the Operation of the Upgraded K-15 System in Building 3525* (submitted but not approved)
- 9) ORNL/3525/TSR, Rev. 11A CN-2, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 10) ORNL/3525/SBS/2020-001, Rev. 0A, *Safety Basis Supplement for the Operation of the Upgraded K-15 System in Building 3525* (resubmittal of Rev. 0- submitted but not approved)
- 11) ORNL/3525/TSR, Rev. 12B, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (resubmittal of Rev. 11A CN-2- submitted but not approved)
- 12) ORNL/3525/SBS/2020-001, Rev. 0B, *Safety Basis Supplement for the Operation of the Upgraded K-15 System in Building 3525* (resubmittal of Rev. 0A- submitted but not approved)
- 13) ORNL/3525/TSR, Rev. 12C, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (resubmittal of Rev. 12B- submitted but not approved)

Part II – Expert Determination

1. Relative to the documented safety analysis (DSA), is it readily apparent, based on expert knowledge, training, and experience, that the proposed change **does not**:
- a. Increase the probability or consequences of an accident described in the DSA?
 - b. Directly or indirectly increase the probability of failure or consequences of a malfunction of equipment important to safety described in the DSA?
 - c. Create the possibility of an accident of a different type than previously evaluated in the DSA?
 - d. Create the possibility of a malfunction of equipment important to safety of a different type than previously considered in the DSA?
 - e. Decrease a Margin of Safety?

Yes No

2. If the conclusion is Yes, provide a brief rationale why the change is not a USQ. Otherwise, prepare a standard USQD.

The current 3525 Facility safety basis acknowledges the fact that structures, systems, and components (SSCs) within the facility will require periodic maintenance and repair. The analysis attempts to make amenities for these activities and the hazards they present by identifying and evaluating the anticipated tools and methods used in the repairs. Also, the impacts of these SSCs being unavailable during the repair are also evaluated.

The safety-class, safety-significant, and defense-in-depth SSCs, which are equipment important to safety, are listed in SAR Table 3-7, *Defense-in-depth SSCs*, and Table 4-1, *Summary list of safety-significant SSCs*. The K-10 system and the K-10.3-1 HEPA filter are not equipment important to safety. The Office Area supply and exhaust fans are not safety-related components and are not credited to prevent or mitigate any accidents. Thus, they are not listed in these SAR tables.

The new fan motor controls for the supply and exhaust fans are expected to operate, malfunctions, and fail at the same rates as the existing ones (despite their improved integrity). The BOPM form seeks to restore the Office Space supply and exhaust systems to a more reliable condition. The fan motor controls will be extensively tested before bringing the Office Area ventilation systems back online. Thus, assumptions made in the SAR regarding these elements will remain valid.

If new conduit or other hardware is needed, anchors will be needed for mounting on the solid concrete or other facility walls. None of the penetrations will be through the confinement boundary wall and all will be less than 2" in depth. Appropriate Hilti adhesive or drop-in anchors will be used. For concrete or masonry walls, anchors consisting of a threaded stud or internally threaded insert that is either (1) inserted into a hole drilled into the concrete and the hole filled with adhesive grout or (2) inserted into a metal or plastic mesh sleeve that is inserted into the hole drilled into the concrete and sleeve filled with adhesive. The Hilti adhesive anchors form a leak tight seal. The penetrations nor the mass of the new hardware installation are considered to be sufficient to negatively impact the integrity of the facility structure.

The facility also has procedures and protocols for maintaining the radiological and hazardous material inventories below the SAR evaluated quantities. No new quantities above the SAR-approved levels are introduced to the facility because of the BOPM form changes. Therefore, there is no increase to the consequences of a malfunction of equipment important to safety previously evaluated in the DSA.

EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

The completion of the BOPM form work under the MWP057337 work plan will be completed using methods routinely employed within the facility. Hand and power tools will be used to make the modifications necessary for the installations. The work will be completed by trained craftsmen familiar with the facility, equipment, and work methods. The work will be governed by existing facility programs and protocols (e.g., Radiation Work Permits) as required. Proper Standards-Based Management System (SBMS) procedures and protocols for addressing penetrations, concrete dust, electrical hazards, and waste removal will be employed as well.

To some extent, the electrical power servicing the facility may be de-activated during completion of this task. The loss of such utilities is not an uncommon occurrence and the facility has procedures and protocols in place to control work and hazards during such outages until the system(s) has been functionally tested and returned to "on-line" status. The use of these compensatory measure is not a new type of condition and has no impacts on the safety analysis.

The work may involve elevated work surfaces such as ladders. Many of the facility areas included in the SAR consider the maintenance, modification, and/or repair activities within the scope of their evaluations. These tools are routine types of hazards that have been screened during hazard identification in the SAR Appendix A and are only considered as potential initiators of accidents involving the radioactive material inventory. There is nothing unique about these activities as they pertain to the installation of the fan motor controls so the frequencies and conclusions in the SAR are applicable and do not need to be altered. The use of the power and hand tools has no impact on the safety analysis.

The BOPM form work does not include any new hazards not already evaluated in the current analysis. No existing hazards are increased either. Since the change does not introduce any new interfaces with credited or other SSCs, facility systems and components will operate, malfunction, and fail at the same rate and in the same manner as documented in the current safety analysis. Therefore, the change will not increase the probability of a malfunction of equipment important to safety previously evaluated.

These changes will also involve updating facility drawings per Drawing Change Notice (DCN) NNFD-3525-DCN-157. The DCN merely changes the cited drawings to reflect the installed changes. Drawing changes are administrative changes and do not require further analysis.

Likewise, because the BOPM work does not allow new (unevaluated) equipment or modifications to existing equipment, it does not introduce any new types of activities, hazards, energy sources, or equipment, (2) involve changes to any hazards, energy sources, or SSCs, (3) affect the ways any SSCs function, perform, or can malfunction or fail, or (4) involve new or different types of configurations, manipulations, or operations of any hazards, energy sources, or SSCs. The BOPM form and associated work plan and DCN do not change the operation of any other equipment in the 3525 Facility footprint.

Conclusion

There are no changes to the type, form, or quantity of hazardous materials or energy sources evaluated in the safety basis documents associated with this change. There are no significant changes to preventive controls, material airborne source terms, material release paths, mitigative controls, or safety related equipment associated with this change. The underlying safety management programs (SMPs) are not affected by the change. The change does not affect proposed accident scenarios. No new accidents will result from the implemented changes. There are no changes to existing accident frequencies, consequences, or potential equipment failure modes, and no new types of accidents are possible. All proposed hazards are bounded by hazards already evaluated in the SAR.

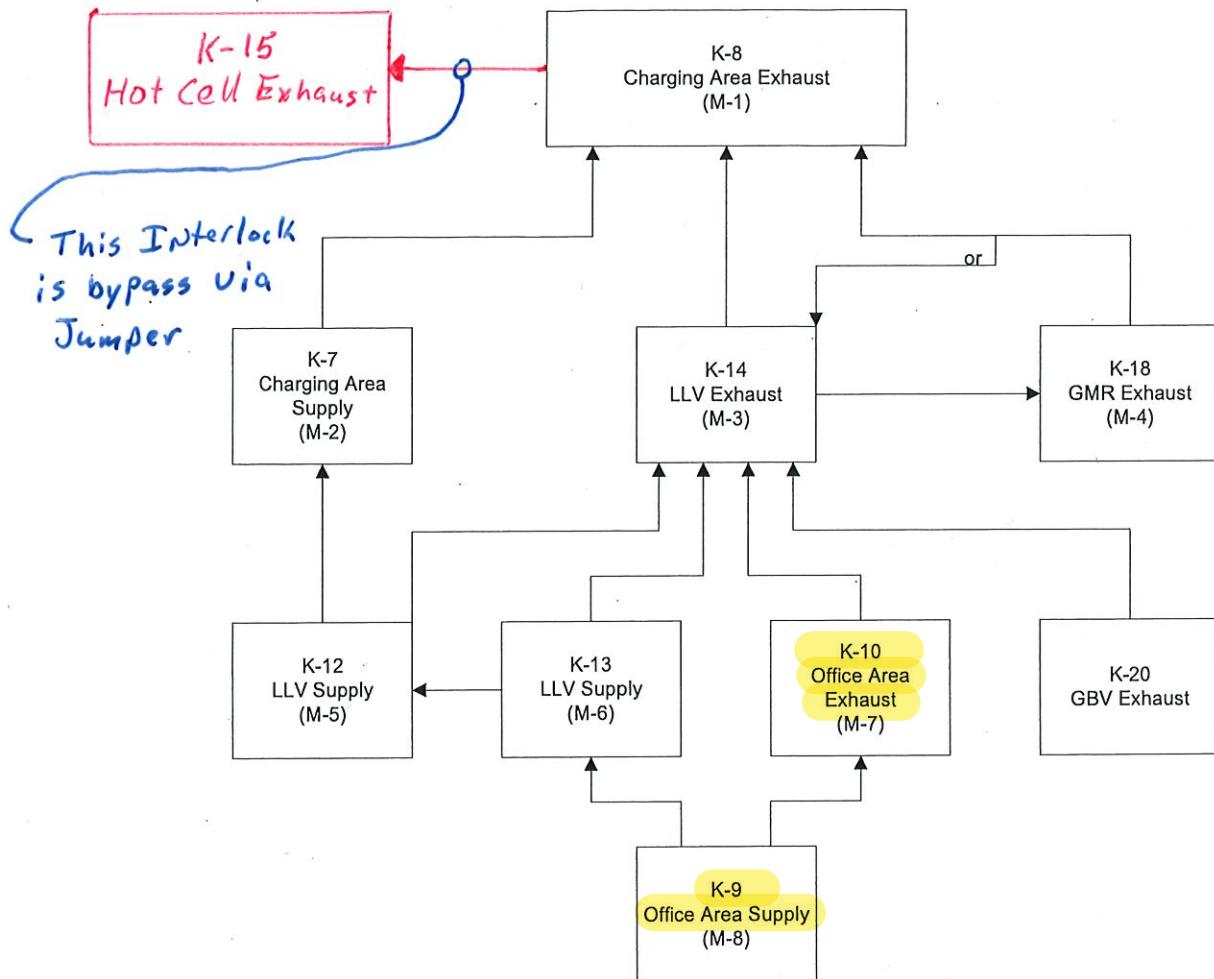
Part III – Conclusion and Approval

Based on this determination, the proposed change does Not represent a USQ.

This document has been electronically approved for use. Documentation of electronic concurrence and approval of this document is maintained in IDMS.

Approver Name (Badge)	Approval Role	Approval Date
Bailey, Brian (744255)	Preparer	01/13/2022
Keeton, Wesley (740916)	BV Fac Mgmt GL - Final Approver	01/13/2022

3525 Ventilation Fan Interlocks



Meaning of the arrows: Arrows point to the required operating fan

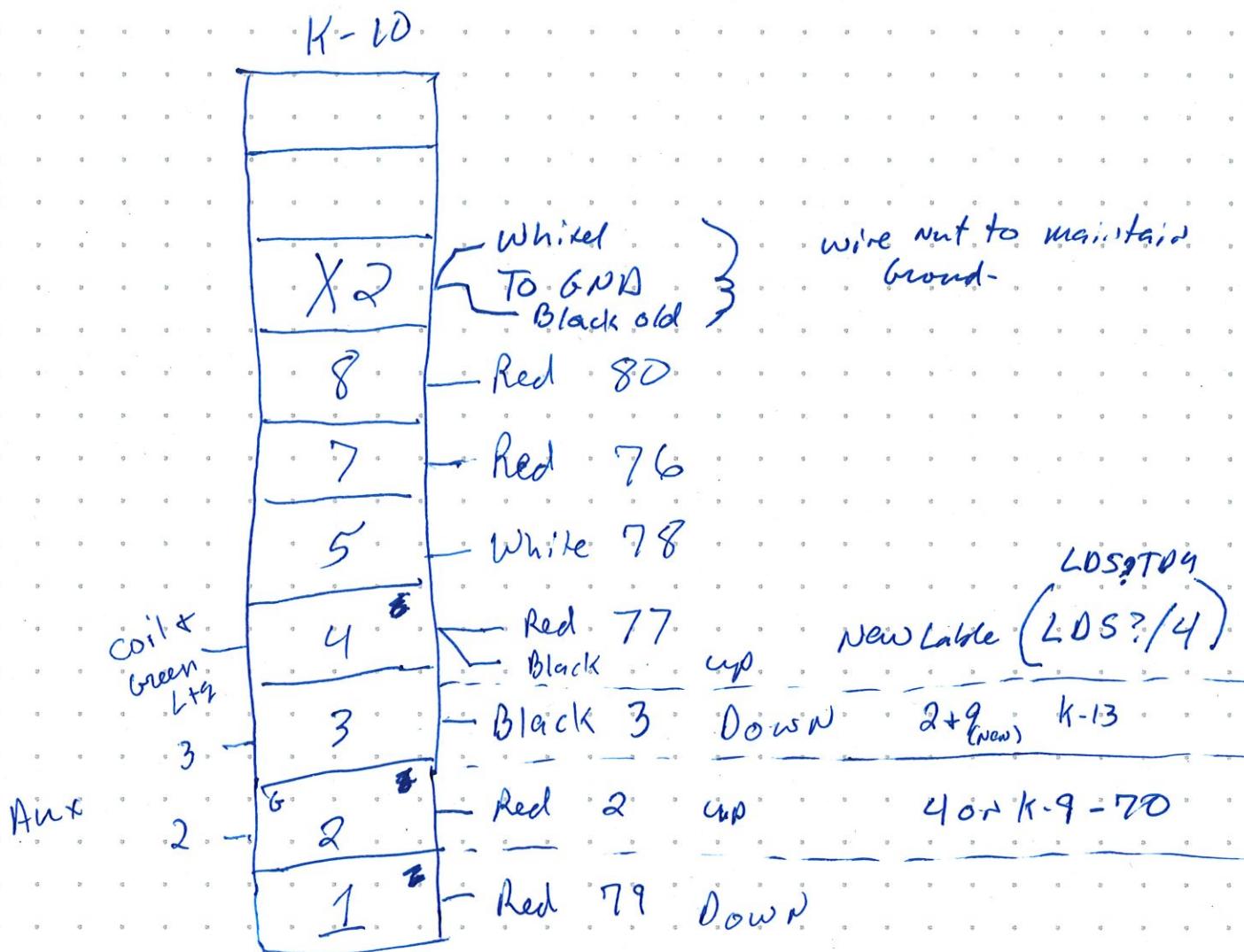
Examples:

For K-7 to run, K-8 must be running

For K-12 to run, both K-7 and K-14 must be running

K-10 Bucket Park

1-5-22



K-9 Bucket Not secured in place, screws Not Eased

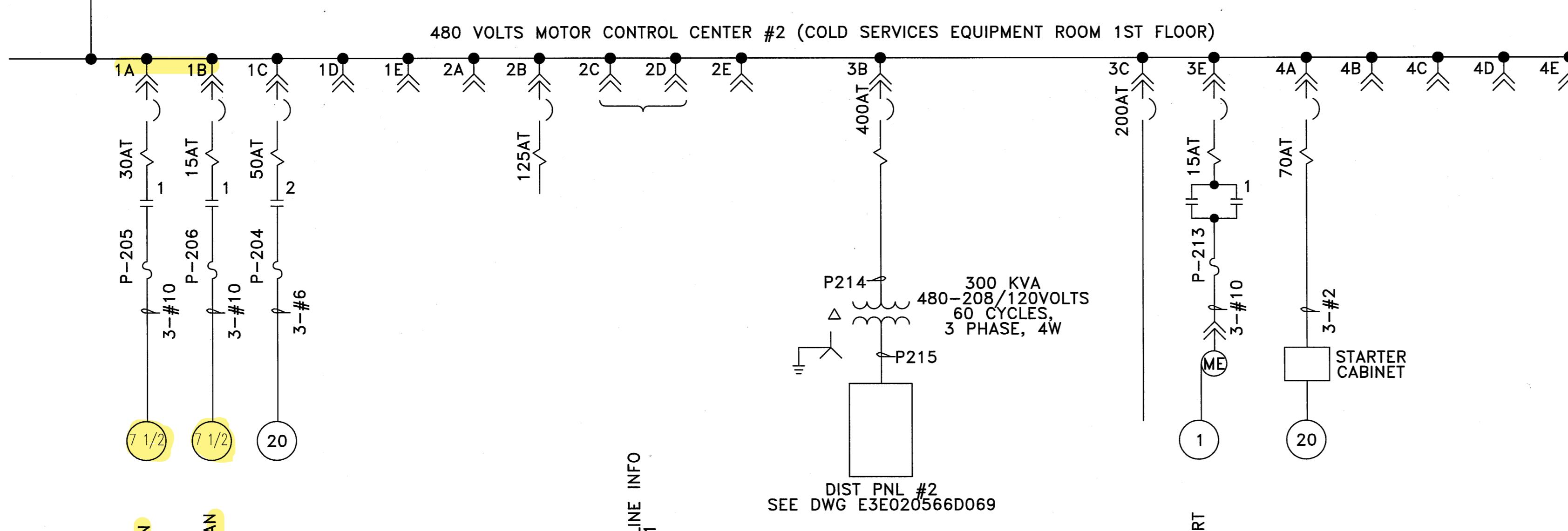
1A	K9.8-1	2A	SPACE	3B	P-214 TRANSFORMER FEED	4A	CHILL WATER PUMP
7 1/2 HP	1				20 HP	4B	SPACE
1B	K10.8-1	2B	SPARE				
7 1/2 HP	1						
1C	K13.8-1	2C	K8.8-2	3C	SPARE	4C	K16 CONTROL TRANSFER CHILLED WATER SYSTEM
20 HP	2	7.5 HP	1			4D	SPACE
1D		2D	K15-EF-2	3E			
SPACE		CELL EXHAUST FAN					
		10 HP					
1E		2E			P-213 MOTORIZED TRANSFER CART	4E	SPACE
					1 HP		

MOTOR CONTROL CENTER #2
480V, 3 PHASE, 60CY
COLD SERVICES EQUIPMENT RM 123

1A	SPARE	2A	K8.8-1
			CHARGING AREA EXHAUST FAN
1BL	1BR J3.9-1	2B	K15-EF-1
EMERGENCY PANEL EMB	P-123 CONDENSATE PUMPS		CELL EXHAUST FAN
2 3/4 HP	10 HP		
1D		2C	SPARE
P-306 EMERGENCY PANEL EMA AND XFMR	2D	K18.8-1	
			P-301 AIR LOCK EXHAUST FAN
		1 1/2 HP	
1E		2E	SPACE
P-130 SUMP PUMP			CONTROL XFMR FOR AIR LOCK EXHAUST FAN K-18.8-1
1/2 HP	1		

MOTOR CONTROL CENTER #3
EMERGENCY POWER SUPPLY
480V, 3 PHASE, 60CY
COLD SERVICES EQUIPMENT RM 123

FROM ATS MCC#2
SEE DWG E3E020566D065

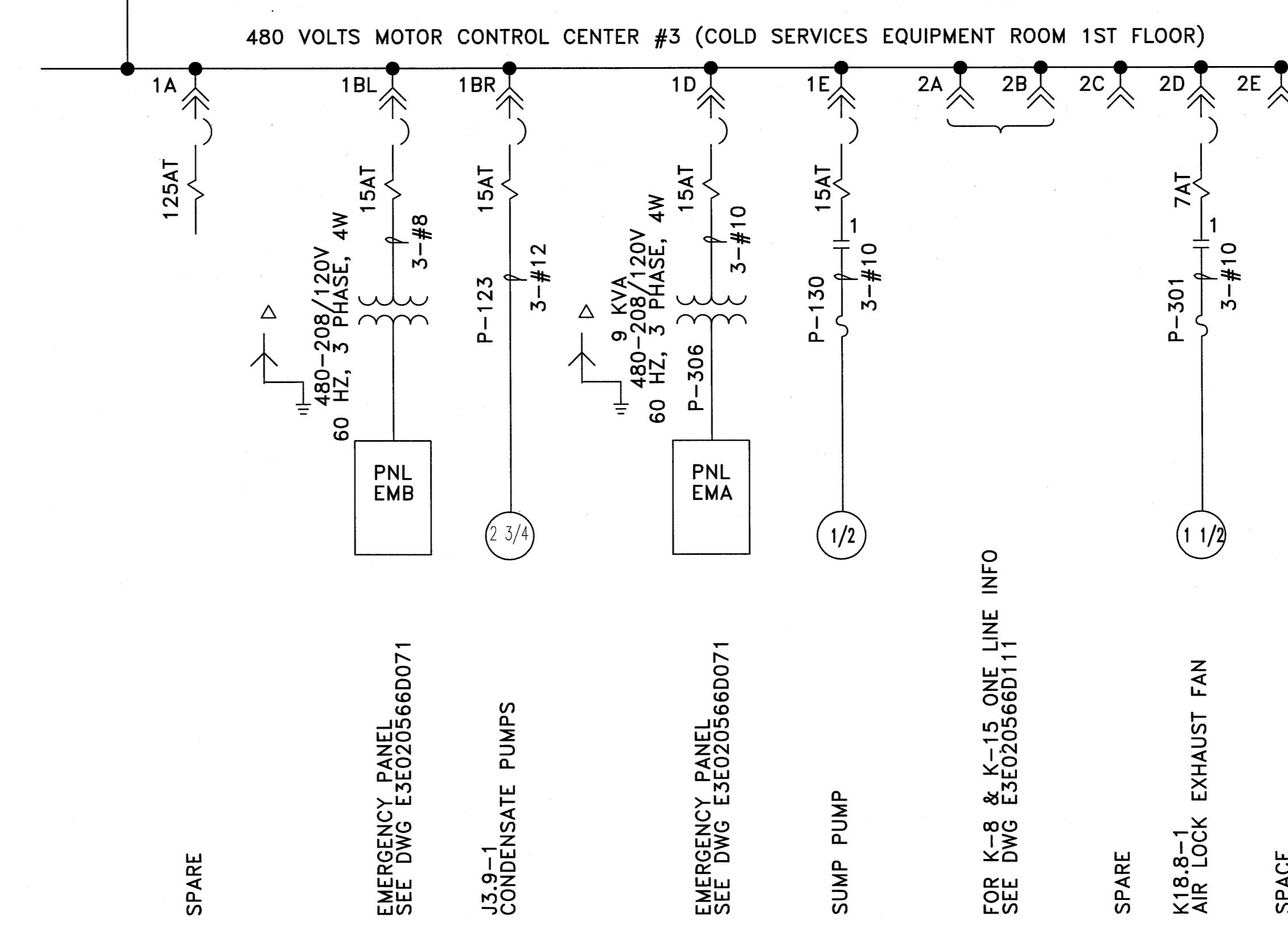


K9.8-1
OFFICE AREA SUPPLY FAN
K10.8-1
OFFICE AREA EXHAUST FAN
K13.8-1
EQUIP. RM. SUPPLY FAN
SPACE
SPACE
SPACE
SPACE

FOR K-8 & K-15 ONE LINE INFO
SEE DWG E3E020566D111

SEE DWG E3E020566D069

FROM ATS MCC#3
SEE DWG E3E020566D065



EMERGENCY PANEL EMB
SEE DWG E3E020566D071

J3.9-1
CONDENSATE PUMPS
SEE DWG E3E020566D071

EMERGENCY PANEL EMA
SEE DWG E3E020566D071

SUMP PUMP
SEE DWG E3E020566D071

K18.8-1
AIR LOCK EXHAUST FAN
SPACE

THIS DRAWING
SUPERCEDES
DWG E20566Y500E
AND E20566Y517E

BLDG 3525 HOT CELL ELECTRICAL
MCC#2 & MCC#3 ONE-LINE DIAGRAM
ELECTRICAL MOTOR CONTROL CENTER
AND POWER PANEL SCHEDULES
E20566Y517E

ELECTRICAL ONE LINE DIAGRAM
E20566Y500E

BLDG 3525 EMERGENCY/GM POWER
PANEL SCHEDULES
BLDG 3525 DISTRIBUTION PANELS
E20566D069

BLDG 3525 ELECTRICAL
ONE-LINE DIAGRAM
BLDG 3525 ELECTRICAL SYMBOLS
AND GENERAL NOTES
E20566D064

REFERENCE DRAWING
DWG NUM

BLDG 3525
ELECTRICAL MCC #2 &
ONE LINE DIAGRAM

CERTIFIED
FOR
CONSTRUCTION

NONREACTOR NUCLEAR FACILITIES DIVISION
OAK RIDGE NATIONAL LABORATORY
Operated by UT-Battelle for the Department of Energy under U.S.
Government contract DE-AC05-00OR22725+ Oak Ridge, Tennessee

BLDG 3525
ELECTRICAL MCC #2 &
ONE LINE DIAGRAM

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DRAWING, ON WHICH ELEVATION,
SECTION, OR DETAIL IS TAKEN.

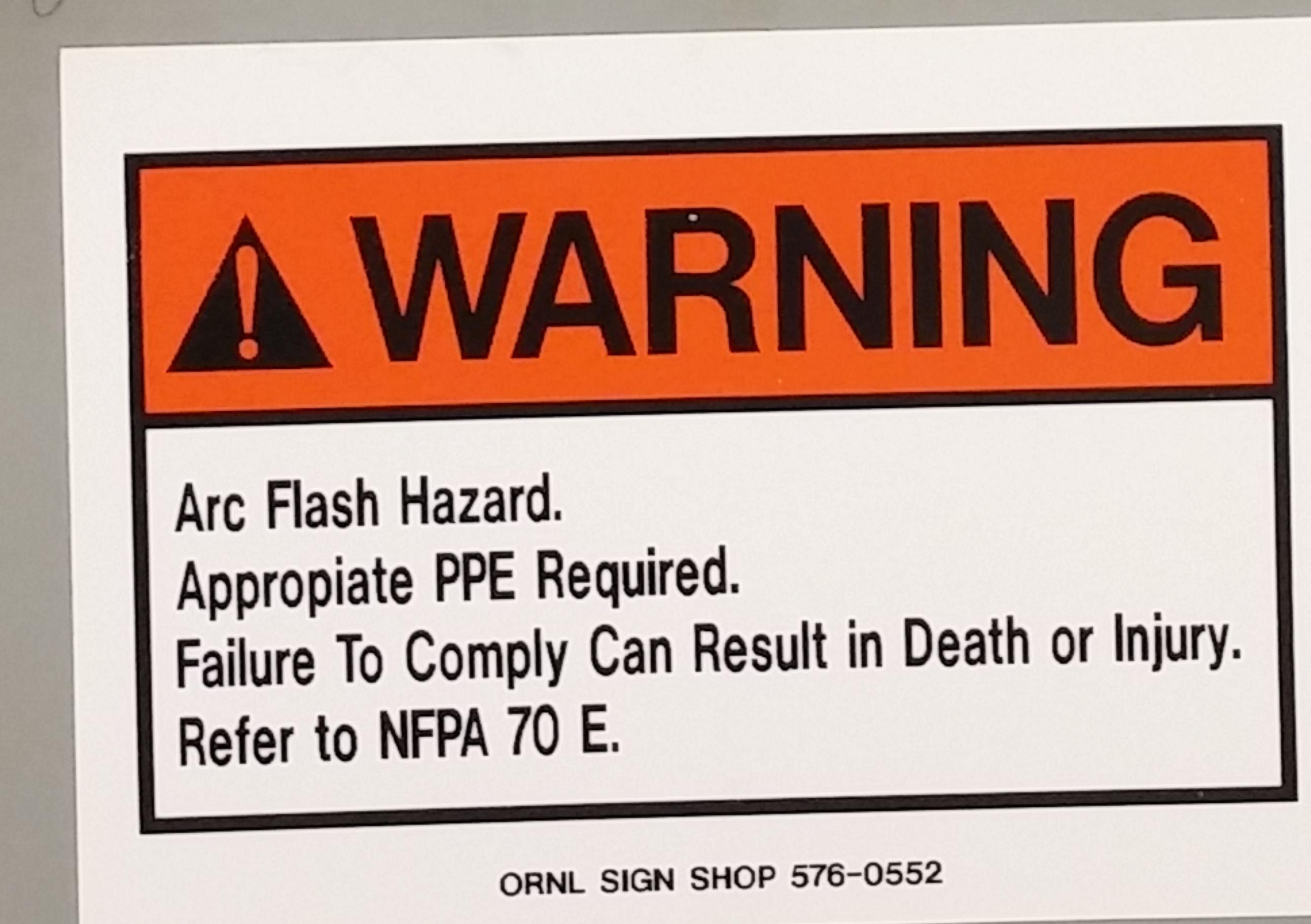
B	△NNFD-3525-DCN-121	DJK	ZAR	LEG	CDC	N/A	NMS	N/A	VUL	Q1519	N/A	N/A	N/A	N/A	N/A	DEFAULT STANDARDS UNLESS OTHERWISE SPECIFIED
A	△NNFD-3525-DCN-100	LBD	CDC	DJK	N/A	N/A	NMS	N/A	DEC 7/7/16	N/A	N/A	N/A	N/A	N/A	N/A	FRACTIONS ± 1/64 DECIMALS ± 0.01 XXX DECIMALS 0.000 ANGLES 0°-360° BEG. DIMENSIONS 1/64 MAX. FINISH = 125 RMS
<small>WHENEVER A MANUFACTURER'S NAME OR CATALOG NUMBER IS INDICATED, AN APPROVED EQUAL MAY BE SUBSTITUTED</small>																
<small>THIS DRAWING CREATED IN ACCORDANCE WITH ANSI Y14.5M-1994</small>																
<small>REVISION OR ISSUE PURPOSE</small>																
<small>REVISION APPROVALS</small>																
<small>DRAWING APPROVALS DATE</small>																
<small>SCALE NONE ID X3525ENG E3E020566D067</small>																
<small>REV B</small>																

15 Amp

K10.8-I
OFFICE AREA
EXHAUST FAN P-206



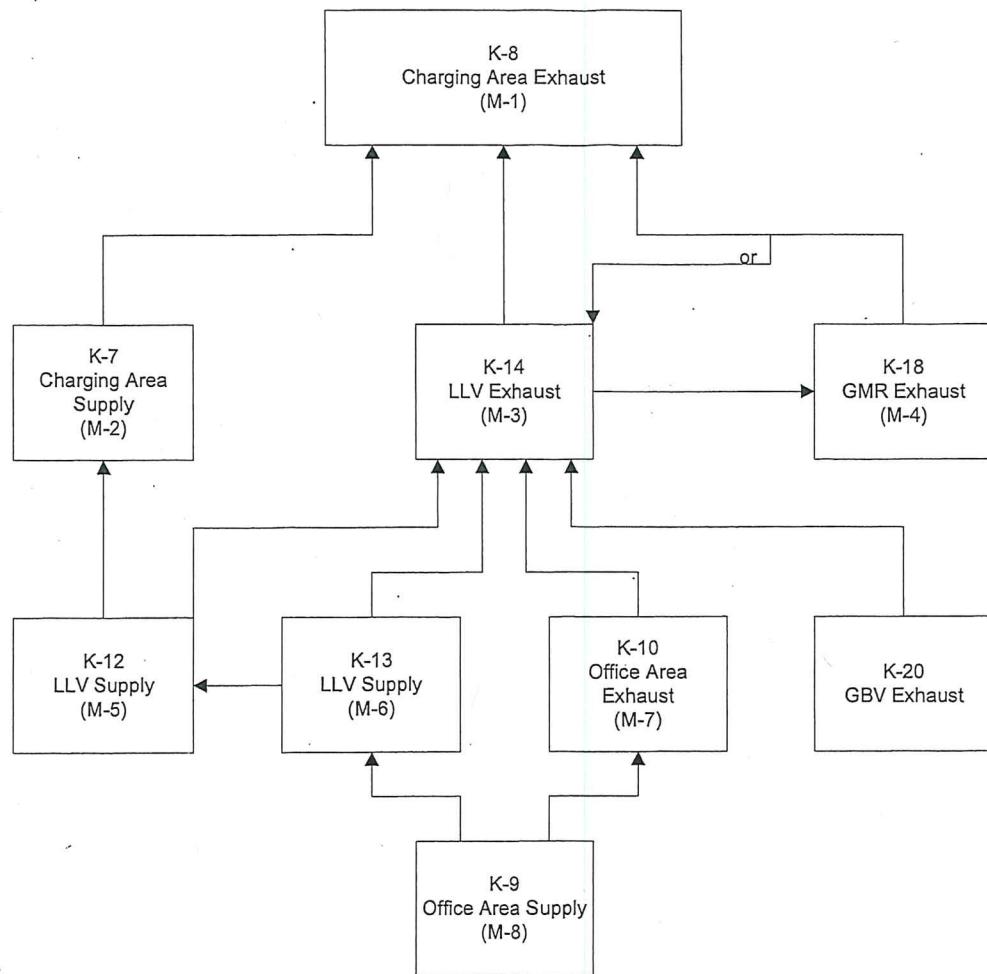
ON OFF



CAUTION
OSHA REGULATIONS
AREA IN FRONT OF
ELECTRICAL
PANEL
MUST BE
KEPT CLEAR
FOR 36 INCHES



3525 Ventilation Fan Interlocks



Meaning of the arrows: Arrows point to the required operating fan

Examples:

For K-7 to run, K-8 must be running

For K-12 to run, both K-7 and K-14 must be running



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

Part I - Introduction

1. EUSQD#: EUSQD-3525-24-016 Revision #: 0 Facility/Activity: 3525 Facility

2. Subject of Evaluation:

Balance of Plant Modification Form 3525-BOPM-189, *Replace Motor Controls for K-7 Charging Area Supply Fan*

3. Description of the change:

The subject of this evaluation is Balance of Plant Modification (BOPM) Form 3525-BOPM-189, *Replace Motor Controls for K-7 Charging Area Supply Fan*. While performing the monthly Generator Run Test an issue occurred when the ventilation system shut down to transfer to generator power, it was noticed that the K-7 supply fan did not restart as expected. Upon closer inspection, it was identified the starter contactor had failed and needed to be replaced.

The existing MCC#1 bucket 2B (K-7) will be upgraded by installing new electrical components in the existing or replacement bucket. The existing MCP and operator handle may be reused or replaced with new 30-amp MCP with cradle, operator handle, and door. The existing starter, overloads, control power transformer, and indication lights will be removed and replaced as indicated on new and revised drawings. The supply fan motor is rated 3 hp with a rated full load current of 4.8 amps. NEC Table 430.52 indicates the Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protection Devices as being 175% for Dual Element (Time Delay) Fuses or 800% for Instantaneous Trip Breaker. The new MCP and adjustable overload relay will be set to the nearest FLA setting to what's indicated on the motor nameplate. A size 1 starter was selected that is rated for up to 10 hp.

NNFD-3525-DCN-157 provides the document changes to be made to the 3525 Facility to accommodate the changes made in this BOPM.

New power and control wiring may be installed if required in new and existing conduit between the MCC, the HVAC control panel, and the supply fan motor if required.

All work shall be performed in accordance with NFPA-70 and NFPA-70E.

All electrical components may be substituted with an engineering-approved equal part.

The work will be completed under Revision 1 of Work Plan MWP057337, *Replace Motor Controls for K-9 and K-7 Office Area Supply and Charging Area Supply*. This work plan covers the work associated with the rebuild and upgrades of motor control components and wiring for the K-9 and K-7 Systems which supply air to the office areas as well as the Charging Area. The existing electrical and mechanical components have been operated beyond their designed life and are beginning to malfunction; they will be replaced with modern, approved electrical and mechanical components. K-9 bucket, which feeds the office area supply fan, is located in compartment 1-A of Motor Control Center (MCC) #2, whereas K-7 bucket that feeds the charging area supply fan is located in compartment 2-B of Motor Control Center (MCC) #1.

The work covered by this work plan includes the following major evolutions:

- perform Complex L/T/V as detailed in the work directions section
- removal of MCC buckets to rebuilt with listed components as detailed in the BOPM, and by following the electrical schematic(s) attached to it



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

- install new MCC bucket control components
- as needed, install new power and control wiring in new and existing conduit between MCC, the HVAC control panel, and the supply fan motors
- complete all field installation
- perform functional testing on the pump motors before returning to service
- perform 3525 ventilation fan interlocks testing

MCC #2 is fed from Switchgear Station 31-5. The Switchgear Station is located at the southside part of Building 3525.

Because MCC#2 has generator back up power a Complex Lockout/Tagout/Verification will be performed by opening and locking MCC #2 feeder breaker located in Switchgear Station 31-5 and removing and locking Generator 80-3525 battery cable lead. MCC#1 is fed from Switchgear Station 31-5. MCC#1 will be a simple lock out.

NOTE: Work Plan MWP057337 includes replacement of motor controls for the K-9 System but 3525-BOPM-189 does not. Balance of Plant Modification Form 3525-BOPM-182, *Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*, was produced in CY2022 which included the motor controls for both the K-9 and K-10. The installation work was to be completed under Work Package No. MWP057337, *Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*. EUSQD-3525-22-002, *Balance of Plant Modification Form 3525-BOPM-182, Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*, concluded that neither 3525-BOPM-182 nor Work Package No. MWP057337 represented a USQ. However, resources only allowed for the work to be completed on the K-10 System. As a result, 3525-BOPM-189 only covers the replacement of motor control on K-7 since the ones for K-9 have already been documents and evaluated.

DSA change? Yes No

4. Primary Safety Basis Document:

- 1) ORNL/3525/SAR, Rev. 11, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525*
- 2) ORNL/3525/TSR, Rev. 12D, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525*
- 3) ORNL/3525/SBS/2018-001, Rev. 1, *Safety Basis Supplement Irradiated Fuel Examination Laboratory, Building 3525, Functional Testing of the K-15 System Ventilation Upgrade Project*
- 4) ORNL/3525/SBS/2020-001, Rev. 1, *Safety Basis Supplement for the Operation of the Upgraded K-15 System in Building 3525* (approved but not implemented)
- 5) ORNL/3525/TSR, Rev. 13, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (approved but not implemented)
- 6) ORNL/NNFD/3525/SAR, Rev. 0, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 7) ORNL/NNFD/3525/SAR, Rev. 0A, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 8) ORNL/NNFD/3525/TSR, Rev. 0, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 9) ORNL/NNFD/SSAR, Rev. 20, *Oak Ridge National Laboratory Standardized Safety Analysis Report*

Part II – Expert Determination

The current 3525 Facility safety basis acknowledges that structures, systems, and components (SSCs) within the facility will require periodic maintenance and repair. The analysis attempts to make amenities for these activities and the hazards they present by identifying and evaluating the anticipated tools (hand, power, electrical, etc.) and methods used in the repairs. Also, the impacts of these SSCs being unavailable during the repair are also evaluated.



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

The safety-class, safety-significant, and defense-in-depth SSCs, which are equipment important to safety, are listed in SAR Table 3-7, *Defense-in-depth SSCs*, and Table 4-1, *Summary list of safety-significant SSCs*. The K-7 System is not equipment important to safety and is absent from these SAR tables. Fans K-7 helps provide conditioned air to the office areas while K-9 is the supply fan for the Charging Area (Room 130).

The new fan motor controls are expected to operate, malfunctions, and fail at the same rates as the existing ones (despite their improved integrity). The BOPM form seeks to restore the office and Charging Area supply systems to a more reliable condition. The fan motor controls will be extensively tested before bringing the supply fans systems back online. Thus, assumptions made in the SAR regarding these elements will remain valid.

If new conduit or other hardware is needed to be mounted, anchors will be needed for mounting on the solid concrete or other facility walls. None of the penetrations will be through the confinement boundary wall and all will be less than 2" in depth. Appropriate Hilti adhesive or drop-in anchors will be used. For concrete or masonry walls, anchors consisting of a threaded stud or internally threaded insert that is either (1) inserted into a hole drilled into the concrete and the hole filled with adhesive grout or (2) inserted into a metal or plastic mesh sleeve that is inserted into the hole drilled into the concrete and sleeve filled with adhesive. The Hilti adhesive anchors form a leak tight seal. The penetrations nor the mass of the new hardware installation are considered to be sufficient to negatively impact the integrity of the facility structure.

The facility also has procedures and protocols for maintaining the radiological and hazardous material inventories below the SAR evaluated quantities. NNFD-3525-AP-003 limits the total amount of radioactive materials permitted in the evaluated areas and the total facility to quantities (or to levels slightly less than) already evaluated in the current SAR. Before radiological materials are brought onto the facility footprint or transferred between areas, they are screened and approved to ensure the quantities approved by the SAR analyses are not exceeded. There are no new radiological materials associated with the change. Thus, the material forms and quantities evaluated in the SAR are not increased as a result of the BOPM form and work plan.

The work plan identifies such hazards as respirable crystalline silica, chemicals, ergonomic conditions, asbestos/man-made mineral fibers, radiological work, electrical work, electrical equipment and tools, elevated work, heat/cold stress, noise, lead, manual material handling, deenergized hazardous equipment sources, pinch points and sharp edges, debris in eyes, and slips, trips, and falls. Of those listed hazards, respirable crystalline silica, ergonomic conditions, asbestos/man-made mineral fibers, electrical work, electrical equipment and tools, elevated work, heat/cold stress, noise, lead, manual material handling, deenergized hazardous equipment sources, pinch points and sharp edges, debris in eyes, and slips, trips, and falls are all standard industrial or routine hazards that do not warrant further evaluation. Standard industrial and routine hazards are already identified and evaluated in the safety basis for their potential to impact the unique hazards (radiological materials). There is nothing unique about these hazards within the scope of the work plan that modifies or nullifies and assumption or conclusion in the facility safety basis.

The upgraded 3525 Facility SAR (submitted to DOE but not approved) follows the similar methodologies as the current SAR when addressing the BOPM form and work plan.

Conclusion

The change will not introduce any new hazards or energy sources nor affect the quantity, form, or dispersibility of radiological materials in the 3525 Facility. Moreover, existing energy sources are not increased, no new energy sources are introduced, and the consequences of analyzed accidents will not change from those documented in the SAR. No new accident scenarios are possible. The change will not impact any identified initiating event in any of the SAR accident scenarios. Thus, the frequencies stated in the SAR are not affected. Equipment will operate, malfunction, and fail as evaluated in the SAR. The change will not result in any new or altered equipment interactions.

Part III – Conclusion and Approval

Based on this determination, the proposed change does NOT represent a USQ.



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

This document has been electronically approved for use. Documentation of electronic concurrence and approval of this document is maintained in EDRM.

Approver Name	Role	Approval Status	Approval St
Bailey, Brian (00744255)	Safety Basis Engineer	Approved	03/18/2024
Keeton, Wesley (00740916)	Final Approver	Approved	03/18/2024

BOP Modification Form

SECTION 1: CHANGE ORIGINATION / IDENTIFICATION			
Work Package No. MWP057337	Facility 3525	Date 3-11-2024	Originator Name / uid L. Aaron Webb / lwu
Title of Change: Replace Motor Controls for K-7 Charging Area Supply Fan			
Component / System MCC #1 / 480V Electrical Power			
Description of Change / Reason for Change (add attachments or redline drawings if needed) This BOPM covers upgrading and replacing motor controls for K-7 Charging Area Supply Fan.			
<p>The existing MCC#1 bucket 2B (K-7) will be upgraded by installing new electrical components in the existing or a replacement bucket. The existing MCP and operator handle may be reused or replaced with new 30-amp MCP with cradle, operator handle, and door. The existing starter, overloads, control power transformer, and indication lights will be removed and replaced as indicated on new and revised drawings.</p> <p>NNFD-3525-DCN-157 provides the document changes to be made to the 3525 facility to accommodate the changes made in this BOPM.</p> <p>New power and control wiring may be installed if required in new and existing conduit between the MCC, the HVAC control panel, and the supply fan motor if required.</p> <p>All work shall be performed in accordance with NFPA-70 and NFPA-70E.</p> <p>All electrical components may be substituted with an engineering-approved equal part.</p>			
Does this change impact other components/systems <input type="checkbox"/> Yes (list below) <input checked="" type="checkbox"/> No			
Does this change involve penetrations(s) of SSC's credited in the DSA for confinement of radioactive materials or shielding of personnel? <input type="checkbox"/> Yes refer to NNFD-002, <i>Change Control of Modifications</i> <input checked="" type="checkbox"/> No, proceed to Section 2. Do the penetration(s) meet the permit exclusions (refer to NNFD-002, <i>Change Control of Modifications</i>)?*** <input type="checkbox"/> Yes <input type="checkbox"/> No, Initiate CCP.			

SECTION 2: CHANGE DOCUMENTATION LIST existing and/or newly required documents (drawings, specifications, calculations, procedures etc.) N/A <input type="checkbox"/> if change is below documentation threshold.			
Document Number	Document Title	Rev # BEFORE Change	Required for Return to Service
E3E020566D066	BLDG 3525 ELECTRICAL MCC #1 ONE LINE DIAGRAM	D	<input type="checkbox"/>
E20566Y514E	ELECTRICAL MISCELLANEOUS SCHEMATICS AND DIAGRAMS	E	<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
ACTS entry made to revise High Priority or Electrical drawings <input type="checkbox"/>			

SECTION 3: APPLICABLE CODES / STANDARDS	
NFPA 70 National Electrical Code	
NFPA 70E Standard for Electrical Safety in the Workplace	
SECTION 4: MODIFICATION EVALUATION	

Modification Background / Description / Reason / Type:

While performing the monthly Generator Run Test an issue occurred when the ventilation system shut down to transfer to generator power, it was noticed that the K-7 supply fan did not restart as expected. Upon closer inspection, it was identified that the starter contactor had failed and needed to be replaced.

Design Basis & Functional Requirements / Justification:

This supply fan motor is rated 3 hp with a rated full load current of 4.8 amps. NEC Table 430.52 indicates the Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protection Devices as being 175% for Dual Element (Time Delay) Fuses or 800% for Instantaneous Trip Breaker. The new MCP and adjustable overload relay will be set to the nearest FLA setting to what's indicated on the motor nameplate. A size 1 starter was selected that is rated for up to 10 hp.

Additional conduits to complete this installation shall be field routed as required.

All changes detailed in this BOPM are required to be installed in accordance with all applicable ORNL and NEC requirements.

Acceptance Criteria & Testing Requirements:

Perform visual inspection of all added equipment & labeling to ensure accuracy with respect to design documentation.

Perform visual inspection of electrical connections to ensure proper sizing of wiring and proper connections.

Perform absence/ presence of voltage checks as required to ensure wiring is installed correctly.

Upon completion of installation when power is restored, perform functional testing on the pump motor before returning to service.

Controls Required During Modifications:

Coordinate all lockout / tagout and other activities with the facility manager before beginning work.

SAFETY AND TECHNICAL REVIEWS

Discipline	N/A	Approval Signature	uid	Date
Facility Safety Basis Engineer OR USQD or USQDSCREEN Number (attach copy) <u>EUSQD-3525-24-016</u>				
Independent Design Reviewer	LAW			
Informed Training Group to evaluate training needs	LAW			
Design Authority (if multiple disciplines involved and/or if *** answer is yes)	LAW			
Additional SME	LAW			
Additional SME	LAW			
Process/System Engineer	 Digitally signed by Leslie Aaron Webb Date: 2024.03.19 10:26:32 -04'00'	lwu	3-19-24	

CN-3

Instructions:

General: All signatures should be accompanied by the signers' ORNL user ID (uid). If a uid is not available, the signer's badge number may be substituted.

Section 1, CHANGE ORIGINATION / IDENTIFICATION: The Originator shall complete Section 1 and submit the BOP Modification Form (BOPM) to the System /Process Engineer.

Description of Change: Describe the Change in enough detail to identify what components are being modified and the scope of the modification.

Impact: If the change impacts other components or systems, check yes then list and describe the impact. If the change involves penetration(s) that meet the exclusions of SBMS SA, *Excavation/Penetration* and are in SSCs credited in the DSA then the BOPM form shall be signed by the Design Authority.

Section 2, CHANGE DOCUMENTATION: The System /Process Engineer lists all output documents that will be changed as a result of this modification including drawings, NCR's, procedures, etc. The "Rev # Before Change" column should be completed with the document/drawing revision number current when the modification begins.

If the change does not alter any existing documents, check N/A.

Those documents which are required to be completed in order for the item to be returned to service shall have the "Required for Return to Service" box checked.

High Priority or electrical drawings shall be revised per NNFD-002, and an associated action shall be entered in ACTS.

Section 3, APPLICABLE CODES AND STANDARDS: The Process/ System Engineer should complete this section. SBMS Area, Creating Engineering Designs, contains an exhibit: Design Codes and Standards, which includes the engineering design standards applicable at ORNL. Designs must incorporate engineering hazard controls to alleviate potential workplace hazards where feasible and appropriate. If a hazard is identified which cannot be alleviated through one of the codes/standards listed in the Work Smart Standard (WSS), a request should be made to add the code/standard to the WSS.

Section 4, MODIFICATION EVALUATION: The Process/System Engineer should complete this section using a graded approach commiserate with the complexity and scope of the change. Information entered in Section 1 – Description of Change does not have to be repeated in this section. This section may include the following:

Modification Background / Description / Reason / Type: Describe the problem and the events leading to the change and include a description of how the system, equipment, or component operated before the proposed modification.

Design Basis & Functional Requirements / Justification: Describe the specific functions to be performed by the item affected by the design modification and the specific values or range of values that bound the design (e.g., pressure, temperature, flow, voltage input, voltage output, etc.). Provide explanation, analysis or calculation on why the proposed modification is within the boundaries of the cited design requirements.

Acceptance Criteria & Testing Requirements: Enter Acceptance Criteria/Testing Requirements that ensures the modification functions as expected.

Controls Required During Modifications: Describe any controls, (i.e. compensatory measures, TSR mode restrictions) required to be in place while this modifications is being installed and normal equipment may be out of service.

SAFETY AND TECHNICAL REVIEWS: The System/Process Engineer initially determines which reviews are required by checking or initializing the "N/A" column for those reviews not required. In addition to the applicable System Engineer, review and approval from the Design Authority is required if multiple engineering disciplines are involved and/or if the change involves penetration(s) that meet the exclusions of SBMS SA, *Excavation/Penetration* and are in SSCs credited in the DSA. In this case, the Design Authority shall ensure all appropriate engineering input is obtained, and may list additional engineers for review. After the System/Process Engineer has determined review applicability the BOPM form should be routed to all reviewers for approval and signature. After approvals, route the BOPM form to the Process/System Engineer for final approval.

The approved BOPM form shall be included with the Maintenance Work Package



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

Part I - Introduction

1. EUSQD#: EUSQD-3525-24-016 Revision #: 0 Facility/Activity: 3525 Facility

2. Subject of Evaluation:

Balance of Plant Modification Form 3525-BOPM-189, *Replace Motor Controls for K-7 Charging Area Supply Fan*

3. Description of the change:

The subject of this evaluation is Balance of Plant Modification (BOPM) Form 3525-BOPM-189, *Replace Motor Controls for K-7 Charging Area Supply Fan*. While performing the monthly Generator Run Test an issue occurred when the ventilation system shut down to transfer to generator power, it was noticed that the K-7 supply fan did not restart as expected. Upon closer inspection, it was identified the starter contactor had failed and needed to be replaced.

The existing MCC#1 bucket 2B (K-7) will be upgraded by installing new electrical components in the existing or replacement bucket. The existing MCP and operator handle may be reused or replaced with new 30-amp MCP with cradle, operator handle, and door. The existing starter, overloads, control power transformer, and indication lights will be removed and replaced as indicated on new and revised drawings. The supply fan motor is rated 3 hp with a rated full load current of 4.8 amps. NEC Table 430.52 indicates the Maximum Rating or Setting of Motor Branch-Circuit Short-Circuit and Ground-Fault Protection Devices as being 175% for Dual Element (Time Delay) Fuses or 800% for Instantaneous Trip Breaker. The new MCP and adjustable overload relay will be set to the nearest FLA setting to what's indicated on the motor nameplate. A size 1 starter was selected that is rated for up to 10 hp.

NNFD-3525-DCN-157 provides the document changes to be made to the 3525 Facility to accommodate the changes made in this BOPM.

New power and control wiring may be installed if required in new and existing conduit between the MCC, the HVAC control panel, and the supply fan motor if required.

All work shall be performed in accordance with NFPA-70 and NFPA-70E.

All electrical components may be substituted with an engineering-approved equal part.

The work will be completed under Revision 1 of Work Plan MWP057337, *Replace Motor Controls for K-9 and K-7 Office Area Supply and Charging Area Supply*. This work plan covers the work associated with the rebuild and upgrades of motor control components and wiring for the K-9 and K-7 Systems which supply air to the office areas as well as the Charging Area. The existing electrical and mechanical components have been operated beyond their designed life and are beginning to malfunction; they will be replaced with modern, approved electrical and mechanical components. K-9 bucket, which feeds the office area supply fan, is located in compartment 1-A of Motor Control Center (MCC) #2, whereas K-7 bucket that feeds the charging area supply fan is located in compartment 2-B of Motor Control Center (MCC) #1.

The work covered by this work plan includes the following major evolutions:

- perform Complex L/T/V as detailed in the work directions section
- removal of MCC buckets to rebuilt with listed components as detailed in the BOPM, and by following the electrical schematic(s) attached to it



EXPERT UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) WORKSHEET

- install new MCC bucket control components
- as needed, install new power and control wiring in new and existing conduit between MCC, the HVAC control panel, and the supply fan motors
- complete all field installation
- perform functional testing on the pump motors before returning to service
- perform 3525 ventilation fan interlocks testing

MCC #2 is fed from Switchgear Station 31-5. The Switchgear Station is located at the southside part of Building 3525.

Because MCC#2 has generator back up power a Complex Lockout/Tagout/Verification will be performed by opening and locking MCC #2 feeder breaker located in Switchgear Station 31-5 and removing and locking Generator 80-3525 battery cable lead. MCC#1 is fed from Switchgear Station 31-5. MCC#1 will be a simple lock out.

NOTE: Work Plan MWP057337 includes replacement of motor controls for the K-9 System but 3525-BOPM-189 does not. Balance of Plant Modification Form 3525-BOPM-182, *Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*, was produced in CY2022 which included the motor controls for both the K-9 and K-10. The installation work was to be completed under Work Package No. MWP057337, *Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*. EUSQD-3525-22-002, *Balance of Plant Modification Form 3525-BOPM-182, Replace Motor Controls for K-9 and K-10 Office Area Supply and Exhaust Fans*, concluded that neither 3525-BOPM-182 nor Work Package No. MWP057337 represented a USQ. However, resources only allowed for the work to be completed on the K-10 System. As a result, 3525-BOPM-189 only covers the replacement of motor control on K-7 since the ones for K-9 have already been documents and evaluated.

DSA change? Yes No

4. Primary Safety Basis Document:

- 1) ORNL/3525/SAR, Rev. 11, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525*
- 2) ORNL/3525/TSR, Rev. 12D, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525*
- 3) ORNL/3525/SBS/2018-001, Rev. 1, *Safety Basis Supplement Irradiated Fuel Examination Laboratory, Building 3525, Functional Testing of the K-15 System Ventilation Upgrade Project*
- 4) ORNL/3525/SBS/2020-001, Rev. 1, *Safety Basis Supplement for the Operation of the Upgraded K-15 System in Building 3525* (approved but not implemented)
- 5) ORNL/3525/TSR, Rev. 13, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (approved but not implemented)
- 6) ORNL/NNFD/3525/SAR, Rev. 0, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 7) ORNL/NNFD/3525/SAR, Rev. 0A, *Safety Analysis Report Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 8) ORNL/NNFD/3525/TSR, Rev. 0, *Technical Safety Requirements Irradiated Fuels Examination Laboratory Building 3525* (submitted but not approved)
- 9) ORNL/NNFD/SSAR, Rev. 20, *Oak Ridge National Laboratory Standardized Safety Analysis Report*

Part II – Expert Determination

The current 3525 Facility safety basis acknowledges that structures, systems, and components (SSCs) within the facility will require periodic maintenance and repair. The analysis attempts to make amenities for these activities and the hazards they present by identifying and evaluating the anticipated tools (hand, power, electrical, etc.) and methods used in the repairs. Also, the impacts of these SSCs being unavailable during the repair are also evaluated.



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The safety-class, safety-significant, and defense-in-depth SSCs, which are equipment important to safety, are listed in SAR Table 3-7, *Defense-in-depth SSCs*, and Table 4-1, *Summary list of safety-significant SSCs*. The K-7 System is not equipment important to safety and is absent from these SAR tables. Fans K-7 helps provide conditioned air to the office areas while K-9 is the supply fan for the Charging Area (Room 130).

The new fan motor controls are expected to operate, malfunctions, and fail at the same rates as the existing ones (despite their improved integrity). The BOPM form seeks to restore the office and Charging Area supply systems to a more reliable condition. The fan motor controls will be extensively tested before bringing the supply fans systems back online. Thus, assumptions made in the SAR regarding these elements will remain valid.

If new conduit or other hardware is needed to be mounted, anchors will be needed for mounting on the solid concrete or other facility walls. None of the penetrations will be through the confinement boundary wall and all will be less than 2" in depth. Appropriate Hilti adhesive or drop-in anchors will be used. For concrete or masonry walls, anchors consisting of a threaded stud or internally threaded insert that is either (1) inserted into a hole drilled into the concrete and the hole filled with adhesive grout or (2) inserted into a metal or plastic mesh sleeve that is inserted into the hole drilled into the concrete and sleeve filled with adhesive. The Hilti adhesive anchors form a leak tight seal. The penetrations nor the mass of the new hardware installation are considered to be sufficient to negatively impact the integrity of the facility structure.

The facility also has procedures and protocols for maintaining the radiological and hazardous material inventories below the SAR evaluated quantities. NNFD-3525-AP-003 limits the total amount of radioactive materials permitted in the evaluated areas and the total facility to quantities (or to levels slightly less than) already evaluated in the current SAR. Before radiological materials are brought onto the facility footprint or transferred between areas, they are screened and approved to ensure the quantities approved by the SAR analyses are not exceeded. There are no new radiological materials associated with the change. Thus, the material forms and quantities evaluated in the SAR are not increased as a result of the BOPM form and work plan.

The work plan identifies such hazards as respirable crystalline silica, chemicals, ergonomic conditions, asbestos/man-made mineral fibers, radiological work, electrical work, electrical equipment and tools, elevated work, heat/cold stress, noise, lead, manual material handling, deenergized hazardous equipment sources, pinch points and sharp edges, debris in eyes, and slips, trips, and falls. Of those listed hazards, respirable crystalline silica, ergonomic conditions, asbestos/man-made mineral fibers, electrical work, electrical equipment and tools, elevated work, heat/cold stress, noise, lead, manual material handling, deenergized hazardous equipment sources, pinch points and sharp edges, debris in eyes, and slips, trips, and falls are all standard industrial or routine hazards that do not warrant further evaluation. Standard industrial and routine hazards are already identified and evaluated in the safety basis for their potential to impact the unique hazards (radiological materials). There is nothing unique about these hazards within the scope of the work plan that modifies or nullifies and assumption or conclusion in the facility safety basis.

The upgraded 3525 Facility SAR (submitted to DOE but not approved) follows the similar methodologies as the current SAR when addressing the BOPM form and work plan.

Conclusion

The change will not introduce any new hazards or energy sources nor affect the quantity, form, or dispersibility of radiological materials in the 3525 Facility. Moreover, existing energy sources are not increased, no new energy sources are introduced, and the consequences of analyzed accidents will not change from those documented in the SAR. No new accident scenarios are possible. The change will not impact any identified initiating event in any of the SAR accident scenarios. Thus, the frequencies stated in the SAR are not affected. Equipment will operate, malfunction, and fail as evaluated in the SAR. The change will not result in any new or altered equipment interactions.

Part III – Conclusion and Approval

Based on this determination, the proposed change does NOT represent a USQ.

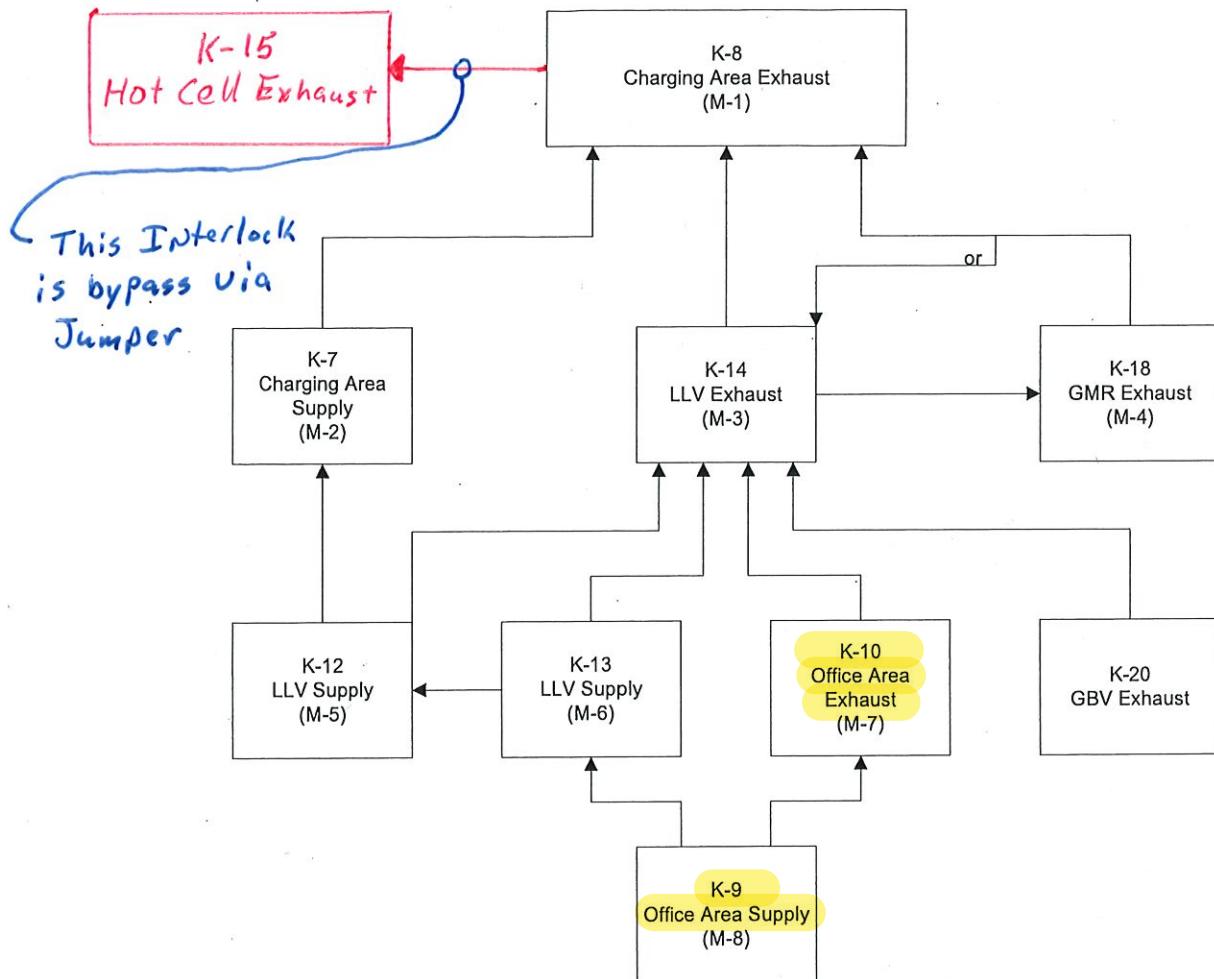


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This document has been electronically approved for use. Documentation of electronic concurrence and approval of this document is maintained in EDRM.

Approver Name	Role	Approval Status	Approval St
Bailey, Brian (00744255)	Safety Basis Engineer	Approved	03/18/2024
Keeton, Wesley (00740916)	Final Approver	Approved	03/18/2024

3525 Ventilation Fan Interlocks



Meaning of the arrows: Arrows point to the required operating fan

Examples:

For K-7 to run, K-8 must be running

For K-12 to run, both K-7 and K-14 must be running

