

Awaiting Approval
ORNL WORK PLAN

Operations, Maintenance and Services



62398

Work Plan Name / Rev: MU-PA-2519_AC2 / 0

WORK SCOPE/DESCRIPTION

Requester (Name/Badge/Division):	McLemore, Jason / 00965677 / X111
Location of work (Bldg/Rm/Other):	2519 / / Air Compressor 2
Work Plan Title:	Preapproved Work Plan for 2519 Air Compressor 2

Description of Service/Work Needed:

The objective of this work package is to perform routine activities on the 2519 Air Compressor 2. The 2519 Air Compressor 2 is comprised of valves, piping systems, pressure vessels, pressure relief valves, flex hoses, pumps, coolant, fans, compressed air systems, electrical distribution panels and disconnects, electrical wiring systems, UPS systems, variable frequency drives, and HMI and PLC systems. Routine activities are limited to simple troubleshooting, maintenance tasks, and basic parts replacement or repairs. Specific work instructions will be found in the work order. Work covered by this work package are limited to the following activities:

MILLWRIGHT TASKS: valve and valve actuator repair; coolant refilling, removal and replacement; cooling system repairs and replacement; filter replacement; and air end replacement.

PIPEFITTER AND WELDING TASKS: valve repair and replacement; gasket repair and replacement (including asbestos); gauge replacement; piping and fitting repair using cutting, grinding, welding, threading, flanged and compression fitting methods; hose repair and replacement; pressure vessel repairs; pressure relief valve testing and replacement; pump replacement; and instrumentation replacement.

ELECTRICIAN TASKS: taking voltage readings; operating breakers; troubleshooting power issues to equipment; performing electrical LTV activities; preventative maintenance activities; replacing existing wiring, conduit, breakers, relays, contactors, fuses, and control and monitoring devices; ARC flash maintenance activities; electric motor repair and replacement; variable frequency drive repair and replacement; unwire and rewire equipment; heat trace repair and replacement, and HMI repair and replacement.

I&C TASKS: instrumentation calibrations; instrumentation and transmitter repair and replacement; control system troubleshooting and repair; and performing electrical LTV activities.

LABORER TASKS: general cleanup during work activities; material handling in support of other craft work.

BOILERMAKER TASKS: pressure vessel repairs; removing and installing pressure vessel access points; pressure vessel cleaning.

PAINTER: remove and apply coatings to piping, valves, pressure vessels, compressors and structural members.

CARPENTER TASKS: erect scaffolding and platforms for equipment access, and construct forms to repair concrete/grout structures.

INSULATOR TASKS: abate and replace insulation

Activities include the encapsulation, removal and/or disposal of installed insulation materials to include the following:

- Fiberglass
- Armaflex
- Foam Glass
- Perlite
- Calcium Silicate

Maintenance activities not included in the scope of work for this work package include: Any maintenance activity that is non-routine.

Work start authorization must be obtained from the Supervisor

Charge Number, if required:	3126CAGS		
Work Plan Grade/Worktype:	2 / 0		
Author (Name/Badge):	McLemore, Jason / 00965677		
File Attachments:	Badge	Name	Attachment Desc

00965677	McLemore, Jason	Glove Selection Chart	ANSI glove cut levels.pdf
00965677	McLemore, Jason	Silica control measures and exemptions	Silica Exposure Control Methods Exhibits.pdf
00965677	McLemore, Jason	dust generated by cleanup of site	2022 QEA for Nuisance Dust.pdf
00965677	McLemore, Jason	Silica QEA for dust producing activities	silica QEA for silica activities 2022.pdf
00965677	McLemore, Jason	Noise from equipment	Noise generic tools 6-14-22.pdf
00965677	McLemore, Jason	Heat stress 2023	Heat Stress Controls 2023.pdf
00965677	McLemore, Jason	2023 Lifting Guidance	2023 Lifting Guidance.pdf
00965677	McLemore, Jason	1550 lbs 45 degree lift plan	1550 lbs 45 degree Lift Plan.pdf
00965677	McLemore, Jason	1550 lbs 90 degree lift plan	1550 lbs 90 degree Lift Plan.pdf
00965677	McLemore, Jason	1750 lbs 45 degree lift plan	1750 lbs 45 degree Lift Plan.pdf
00965677	McLemore, Jason	1750 lbs 90 degree lift plan	1750 lbs 90 degree Lift Plan.pdf
00965677	McLemore, Jason	Welding, grinding stainless steel 2024	Welding, grinding, stainless steel Nov 2024.pdf
00965677	McLemore, Jason	Welding grinding carbon steel 2024	Welding, grinding, pipefitting Nov 2024.pdf
00965677	McLemore, Jason	SDS for air compressor Ultra Coolant	air comopressor Ultra coolant.pdf
00965677	McLemore, Jason	QEA for air compressor coolant	Single Hazard QEA for air compressor coolant.docx
03077143	Massaro, Bekkah	IChem Spray Adhesive 2024	IChemWebSprayAdhesiveQEA2024.pdf
03077143	Massaro, Bekkah	Armaflex 520 2023	Armaflex520QEA2023.pdf
03077143	Massaro, Bekkah	CP11 QEA 2024	CP11QEA2024 DRJ.pdf

INSTRUCTIONS

Prerequisites/Precautions:

PRECAUTIONS:

Not all hazards and controls from the Job Hazard Evaluation (JHE) will apply for each job scope.

PRESTART CHECKLIST:

- * Review Scope of Work in the accompanying Work Order to ensure that its request is within the Description of Service for this Work Plan.
- * Confirm proper notifications have been made (i.e. systems outages are approved in the Outage Event Calendar; LSS and Emergency Response Personnel are aware of road closures, pedestrian walkway closures, confined space entry, and life safety system outages; etc.).
- * Confirm support resources have been scheduled (i.e. RCT, Industrial Hygiene, Inspector, etc.).
- * Perform a "Pre-job Safety Review Briefing". Check that appropriate hazards have been identified to help ensure worker safety while performing job duties. Ensure subsequent permits to mitigate the hazards are in the work package. Communicate to the workers the scope of work in the accompanying work order, noting potential hazards and work controls.

After completion of the Pre-Job Safety Briefing, confirm that each person in attendance has had the opportunity to ask questions about the scope of work/hazards/permits/PPE/etc. Once all questions have been addressed, ensure that each attendee signs the Pre-Job Checklist, indicating an understanding of the scope of work/hazards/permits/PPE/etc., and that all questions have been answered to each person's satisfaction.

- * Assess work area and implement/perform preventive measures as necessary to enhance worker safety.
- * Establish jobsite boundary. Implement pedestrian and/or traffic control measures as needed to prevent entry into the jobsite. Ensure emergency response pathways remain clear in and around the work area.
- * Establish a staging area and path for the disposal of waste in accordance with ORNL procedures.
- * Confirm that equipment used to complete the scope of work are within inspection dates.
- * Confirm that any pressure relief device has been inspected by the ORNL Test and Inspection Shop prior to installation.
- * Confirm material is on-hand that is needed to effectively complete the task.
- * Review LTV paperwork for completeness and perform a walkdown of the LTV prior to acceptance.
- * Confirm that workers have appropriate training for the tools and equipment to be utilized for the project.
- * Ensure that the Supervisor and Workers share a common understanding of work scope, hazards and associated controls.
- * Verify that all personnel performing work tasks associated with this project have participated in the Pre-Job Safety Briefing, reviewed the Work Order Pre-job Checklist, reviewed all applicable permits, and have participated in discussions pertaining to the project's work tasks, activities, hazards(included in the Work Plan JHE), hazard controls, and required PPE as needed to thoroughly understand the tasks, steps and controls required to safely complete this work.

FIRE PROTECTION ENGINEERING

* Fire Protection Engineering shall be contacted on all items associated with Fire Protection. Below are some examples, but not all inclusive:

- Fire barriers
- Blocking exits(stairwells, hallways, corridors, doors, etc.)
- Non-flame producing soldering machines
- Smoke or dust producing operations
- Suppression systems
- Detection/Alarm systems
- Electrical power outages

MISCELLANEOUS:

*All code compliance for pressure vessel fabrication and piping system repairs and inspections will follow ORNL Engineering Standard ES-MECH-G-01.

* Tasks on the Work Order may be worked out of sequence and/or simultaneously at the direction of the Supervisor.

Directions:

* See Work Order for specific work scope, steps, and instructions.

* If at any time during work execution the following occurs, the workers are to suspend work, place the equipment in a safe condition, and notify the Supervisor:

- hazards not identified are encountered

- the scope of work changes

-uncertainty arises concerning how to perform a work task

* All personnel shall work in a manner to protect against injury by following safe work practices as well as job-related hazard controls.

* Properly secure unused tools, equipment, etc. during work and at the end of each workday.

* Maintain a clean work area. Remove any unnecessary items before starting work and at the end of the day as applicable.

Post Work Testing:

* Coordinate with Operations or Responsible System Owner to verify proper operation of the equipment/system.

Closeout:

* Leave the worksite in a clean, orderly and safe condition.

* Report any abnormal conditions, concerns, and/or process improvements to the Supervisor.

* Sign Work Order noting job task completion.

* Ensure all permits and inspection reports are correctly closed and return work package to the appropriate Work Coordinator.

* Submit redline drawings, equipment information, installation date, and utility map reconfigurations to System Engineer.

JOB HAZARD EVALUATION

HAZARDS	PERMITS / CONTROLS
Confined Space: Boiler Drum, Firebox, Fan Housing, Duct	<ul style="list-style-type: none"> Confined Space Entry Permit
Deenergized Hazardous Energy Sources (LTV)	<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">i No potential for stored, residual energy or re-accumulation of energy after shutdowni For a single hazardous energy source that can be: Identified, isolated, and lockedi Isolation of single energy source completely de-energizes & deactivates equipment/systemi Energy source is isolated and locked out during service/maintenancei Single lockout device will achieve a locked-out condition.i Lockout is under personal control for each staff performing worki Work creates no hazard for other staffi Equipment/system has no known history of unexpected activation or re-energization during maintenance or servicing Otherwise: Perform Complex Lock/Tag/Verify<ul style="list-style-type: none"> Perform Complex Lock/Tag/Verify - PERMIT - OR Equipment-Specific Hazardous Energy Control Procedure Manage Lock/Tag/Verify for Subcontract/Vendor Work (ORNL-1113 Subcontractor/Vendor LTV Job-Briefing Checklist) Simple LTV may be utilized as required(PPE is required for zero energy verification, and operation of

	<p>disconnects and breakers. Reference SBMS Electrical Work for PPE requirements.)</p>
Energized Electrical (>50v)	<ul style="list-style-type: none"> ORNL-646, Energized Electrical Work Permit (EEWP) (Formerly used UT-T-ELEC-002, Power Distribution Work Permit (PDWP)) Verify Absence of Hazardous Electrical Energy for Lock/Tag/Verify (LTV) All energized work must be performed in accordance with the SBMS subject area Electrical Work.
Excavation/penetration (includes trenching and shoring)	<ul style="list-style-type: none"> ORNL-648, Penetration Permit Form Penetration Permit (PERX) For excavation/penetration activities that are exempt from permit requirements, document the exemption criteria on the work order.
Hoisting and Rigging: Ordinary lifts only	<ul style="list-style-type: none"> Inspections and preventive maintenance is complete: <ul style="list-style-type: none"> Initial inspection Pre-operational inspection Monthly inspection Annual/preventive inspection for H&R equipment [Formerly Verification of current certification / inspections for H&R equipment]: Ensure hoisting and rigging equipment is in good condition and inspections are current. Lift Plans: Use Lift Classification exhibit: Ordinary Lift Plan Only Instructions for Completion of Ordinary Lift Form (ORNL-544, Ordinary Lift Plan) Hard hats: Required when performing any hoisting and rigging activities Safety shoes Qualified personnel: Personnel performing hoisting and rigging are to be trained and qualified.) Traffic control: As Required
Lead: Paint and Pipe Coating	<ul style="list-style-type: none"> Approved HEPA Vacuum Cleaner: Use wet method or HEPA vacuum 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): EA will be completed per task due to variability in work performed under this work plan Lead Exposure Control: Paint or coatings containing lead will be required to be stripped back from cut site or taped over. No hot work shall be performed on lead painted or coated surfaces.
Radiological Work: For tasks in contamination and/or radiation areas	<ul style="list-style-type: none"> Radiological Work Permit (Enter RWP no.): PPE requirements as specified on RWP
Welding/burning/hot work	<ul style="list-style-type: none"> Welding/Burning/Hot Work Permit 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): Ensure an exposure assessment is completed and documented noting applicable controls prior to hot work activities
Boiler, Pressure Vessels, Relief Valves: Boiler, Economizer, Flash Tanks	<ul style="list-style-type: none"> Inspection of vessels

Compressed Gas: must be secured at all times and capped when not in use.	<ul style="list-style-type: none"> Securing of cylinders Segregation of incompatible gases: bottles shall be segregated and stored pertaining to hazard class. Transportation of cylinders controls Prominently posted hazard class(es): bottles shall be segregated and stored pertaining to hazard class.
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)
Electrical Work	<ul style="list-style-type: none"> Additional Electrical qualifications required for task (e.g. Direct Current, Batteries, Capacitors, or Inductors): Specify. UPS Systems, Control Systems and Voltage Verify and establish limited approach boundary and restricted approach boundary. See Table 1 for AC or Table 2 for DC: Specify. Two-person rule Verify Absence of Hazardous Electrical Energy for Lock/Tag/Verify (LTV)
Elevated Work	<ul style="list-style-type: none"> Inspecting Ladders Guide [Step & Fixed] Work at unprotected heights over 4 feet - Fall Protection Fall Protection Competent Person: Specify. When a fall protection plan is needed Scaffolding - Scaffold Competent Person Evaluates Work Scope Inspect Scaffold (Scaffold Tagging and Inspection exhibit) Work platform Aerial Lifts (Boom, Articulating, Telescoping, Scissor, Bucket, etc.): Personell must be trained/qualified to operate Safety Harness/Fall Protection Equipment: Specify. Ensure fall protection equipment is in good condition and inspected before use Several fixed ladders do not meet current OSHA standards. Discuss in pre-job brief.
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) Special Tools (Lifts, etc.) Stretch breaks/exercises Worker rotation
Flammables: Natural Gas, Propane, Fuel Oil, Compressed Gasses, Solvents, Thinners, etc.	<ul style="list-style-type: none"> Approved storage units Fire extinguisher If flammable materials are required, e.g. thinners, solvents etc., use minimum amount required to perform task, store unused portion in appropriate manner, follow manufacturer recommendations, and/or remove from site upon completion of work.
Heat/Cold Stress: May be encountered due to environmental conditions and/or PPE	<ul style="list-style-type: none"> Exposure Assessment: Enter or attach justification to classify exposure scenario as low risk, qualitative

	<ul style="list-style-type: none"> exposure assessment (QEA), or requirement to conduct quantitative exposure monitoring (QEM) Work/rest regimen: Specify. Follow Work Rest Regiment Guidelines Worker rotation Frequent breaks Follow SBMS Management System: Worker Safety and Health, Directive: Heat and Cold Stress Program for guidance related to heat and cold stress safety when the activities expose workers to an extreme temperature environment or expose workers to conditions that prevent the body from maintaining proper body temperature (e.g. hot weather, outside work in the winter, wearing of PPE).
Low Clearance	<ul style="list-style-type: none"> Maintain awareness of potential overhead hazards.: In situations where hard hats will not create additional hazards, hard hats should be worn to provide protection from overhead obstructions.
Manual Material Handling	<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 Team Lifting (Guideline) 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) Consider forklifts or powered industrial trucks: See Power Equipment hazard (formerly Lifting Aides) Use 30-50-30 F&O Lifting Guidance
Mechanical Material Handling: Lift Tables, Pallet Jackets, or similar devices	<ul style="list-style-type: none"> Consider forklifts or powered industrial trucks: See Power Equipment hazard (formerly Lifting Aides)
Noise	<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) Hearing protection (plugs or muffs): Selecting Hearing Protection Ensure hearing protection is used for maintenance activities in posted high noise areas and when work activities produce high noise levels.
Obstructed Access/Egress	<ul style="list-style-type: none"> Ensure that at least one path to egress is available during work activity
Other Mechanical Hazards (Machine guarding issues, rotating equipment, sharp objects, pinch points, etc.)	<ul style="list-style-type: none"> Ensure guards are in place if applicable. Workers in area shall not wear loose fitting clothing, jewelry, or other articles that might catch in moving equipment
Power Equipment	<ul style="list-style-type: none"> Qualified operator

	<ul style="list-style-type: none"> Seat belts: Shall be worn when operating heavy equipment and when provided Hearing protection: Required if using equipment >85db
Thermal Sources: Steam Piping/Systems, Boiler, Combustion Equipment	<ul style="list-style-type: none"> Allow time for equipment to cool down: If equipment has to be maintained while warm/hot then don appropriate PPE (Gloves, Long Sleeves, Long Pants) before working on hot equipment.
Chemical/Rec ID 1: Ultra Coolant - RECID L0971	<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): Reference attached QEA
Chemical/Rec ID 2: H.B. FULLER CHILDERS CP-11 - RECID D3046	<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): Reference attached QEA Consult SDS and contact IS/IH for QEA prior to chemical use Ensure chemical/material has been approved for use and is in CREAS
Chemical/Rec ID 3: I-CHEM WEB SPRAY ADHESIVE - RECID E0499	<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): Reference attached QEA
Respirable Crystalline Silica: Concrete/grout	<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). Example: QEA required for respirable silica generating construction activities and where Respirable Silica is above action level. Specify. Reference attached QEA
Insects/animals/wildlife/parasites: Be alert for insects and wildlife while performing maint. activities	<ul style="list-style-type: none"> PPE: Specify. Insect spray
Potential Eye Injury	<ul style="list-style-type: none"> Safety glasses w/side shields shall be worn while working and in posted areas.
Hand Injuries	<ul style="list-style-type: none"> PPE: Wear appropriate glove for work being performed. See attached glove selection chart as a reference or SDS for chemical applications.

DOCUMENTATION REVIEW AUTHORIZATION
(Approvals are certification of hazards assessment)

Reviewer/Approver Roles	Signature	Date
Accountable Management (Service Provider, Line, Equipment Owner, or Facility Management)	Parkison, Michael Lee	3/19/2025
Fire Protection Engineer	Migun, Peter	3/17/2025
IS/IH	Joyce, David R	3/14/2025
IS/IH	Massaro, Bekkah	3/14/2025
Operations Manager	McLemore, Jason	3/14/2025
System Engineer,		

Accountable Equipment Owner, or Facility Engineer	Jinks, Michael	
Task Leader	Brummitt, Jeff	
Task Leader	Heidel, Robert	
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:		

FOR INFORMATION ONLY. WORK RELEASE AND SYSTEM HOLD POINTS

TASK DESCRIPTION	RESOURCES	DUR
[Hold Point] - Ensure the job scope is routine, is applicable under the work plan scope and all hazards are addressed in the JHE and/or the JHA	Supervisor	0
[Hold Point] - Ensure that tasks performed using this pre-approved work plan have an associated "Ready to Work" work order assigned.	Supervisor	0
[Hold Point] - Obtain work start authorization from the supervisor	Supervisor	0

WORK DETAILS - Prerequisites/Precautions

Hazards	Permits/Controls	Resources	Dur
[Hold Point] - 1) - Ensure the job scope is routine, is applicable under the work plan scope and all hazards are addressed in the JHE and/or the JHA			
Signature:		Supervisor	0
[Hold Point] - 2) - Ensure that tasks performed using this pre-approved work plan have an associated "Ready to Work" work order assigned.			
Signature:		Supervisor	0

WORK DETAILS - Directions

Hazards	Permits/Controls	Resources	Dur
1) - Conduct pre-job brief using the work order, JHE and/or the JHA to identify scope of work, hazards, controls, etc. Include input from all personnel involved in performance of task.			
A pre-job briefing will be performed on each job and each task will be discussed with the craft that will be performing the task.			
		Supervisor	1
2) - Perform work per service request/work order			
			1
[Hold Point] - 3) - Obtain work start authorization from the supervisor			
Signature:		Supervisor	0

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PRE-JOB SAFETY REVIEW GUIDE

ID: 62398

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).

- ε 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:

- ε Written permits for the work activity.
- ε Precautions, step warnings, Hold Points ...
- ε Personal Protective Equipment (PPE)

- ε Work instructions for information - e.g., steps where hazards are introduced.
- ε ORNL subject area requirements - e.g., non-permit hazard controls.

Performing Work:

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

→ **Potential Error Traps:**

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

Old ANSI Cut-Resistant Levels (Grams)	New ANSI Cut-Resistant Levels (Grams)	Applications By Cut Level	
		Cut-Resistant Levels (Grams)	ASTM ANSI CUT LEVEL
1 (200)	A1 Light cut hazards (200)	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction	A1
2 (500)	A2 Light/medium cut hazards (500)	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction, pulp ad paper, automotive assembly	A2
3 (1000)	A3 Light/medium cut hazards (1000)	Material handling, small parts assembly (sharp edges), packaging, warehouse, general purpose, forestry, construction, pulp ad paper, automotive assembly	A3
4 (1500)	A4 Medium cut hazards (1500)	Appliance manufacturing, bottle and light glass handling, canning, drywall work, electrical, carpet installation, HVAC, pulp ad paper, automotive assembly, metal fabrication and handling, packaging, warehouse, aerospace industry, food prep/processing	A4
5 (3500)	A5 Medium/heavy cut hazards (2200)	Appliance manufacturing, bottle and light glass handling, canning, drywall work, electrical, carpet installation, HVAC, pulp ad paper, automotive assembly, metal fabrication and handling, packaging, warehouse, aerospace industry, food prep/processing	A5
	A6 High cut hazards (3000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/processing, meat processing, aerospace industry	A6
	A7 High cut hazards (4000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/processing, meat processing, aerospace industry	A7
	A8 High cut hazards (5000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/processing, meat processing, aerospace industry	A8
	A9 High cut hazards (6000)	Metal stamping, metal recycling, pulp and paper (changing slitter blades), automotive assembly, metal fabrication, sharp metal stampings, glass manufacturing, window manufacturing, recycling plant/sorting, HVAC, food prep/processing, meat processing, aerospace industry	A9

Exhibit: Respirable Crystalline Silica Exclusions

Respirable Crystalline Silica (RCS) dust producing activities listed in this exhibit, with requisite controls as indicated below, have been evaluated for their potential to cause exposure to staff in excess of RCS occupational exposure limit (OEL). Exposure assessment for these tasks has taken into account amount of material to be disturbed, potential for activity to produce respirable size particles, duration of activity, and effectiveness of controls listed. Based upon assessment of these variables, it has been determined that there is very low risk/potential for staff exposure to exceed the OEL. Where specified, activities described below must be conducted using manufacturer approved tools/equipment in accordance with manufacturer operation and maintenance instructions. If activity cannot be conducted according to controls listed below then the activity does not meet the exclusion in this exhibit and additional work control and planning procedures must be implemented (see [Work Control](#)).

Respirable Crystalline Silica Task Exclusions

- Drilling holes less than or equal to ½" diameter to maximum allowed by Excavation/Penetration Exclusions exhibit, that meet the following requirements:
 - Holes drilled are associated with installation of fasteners into shield blocks, floors, ceilings, and walls for anchoring or mounting wall features such as dry boards, whiteboards, monitors/displays, conduit/mechanical system supports, surface mounted raceways, shelving/shelving supports, storage lockers, HVAC thermostats/control panels, or filter housings
 - Number of holes drilled per day does not exceed 30 holes drilled with an approved dust control system such as an integrated dust extraction system with HEPA filtration attached to a hammer drill, or dust collection shroud or hollow core drill bit attached via hose to HEPA vacuum used to collect dust during drilling
- Cutting sheet rock using approved knife to score sheet rock and snapping sheet rock along score line or using large-toothed dry wall hand saw to cut holes in sheet rock
- Mixing small amounts of mortar (less than 2 bags); small amounts of concrete (less than 2 bags); bagged, silica-free drywall compound; bagged exterior insulation finishing system (EIFS) base and finish coat; removing concrete formwork; using block or tile splitters; and using manual (i.e., non-powered) chisels, shears, and utility knives
- Tasks where employees are working with silica-containing products that are, and are intended to be, handled while wet (examples include finishing and hand wiping block walls to remove excess wet mortar, pouring concrete, and grouting floor and wall tiles).
- Removing, replacing and handling less than 25 four by two feet ceiling tiles (< 200 square feet of other size tiles) that are shown to contain silica per safety data sheet - Non-silica tiles are excluded from this exhibit.

RCS dust producing activities not on this exempt list and are not in the Silica Exposure Control Methods for Construction Activities exhibit are required to be performed using work control documentation and controls that are evaluated by a QHSP.

Exhibit: Silica Exposure Control Methods for Construction Activities

This exhibit has been developed to meet the Respirable Crystalline Silica threshold limit value (TLV) published by the American Conference of Governmental Industrial Hygienist (ACGIH), in the "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," as referenced in the latest edition of 10 CFR 851 Worker Safety and Health Program. For staff engaged in a task identified in the table below, the engineering controls, work practices, and respiratory protection specified for the task must be fully and properly implemented to mitigate potential for staff to be exposed in excess of the occupational exposure limit (OEL). All tools and equipment listed in this table must be operated and maintained per manufacturer's instructions to minimize dust emissions. See [Respiratory Protection](#) subject area regarding assignment of type of respiratory protection needed to meet specified assigned protection factor (APF).

Note: For each equipment/task description in the table there is a link to an OSHA Fact Sheet for that equipment/task which describes dust controls to be used to minimize the amount of airborne dust when engaged in referenced equipment/task.

Equipment/Task	Engineering and Work Practice Control Methods	ORNL Required Respiratory Protection and Minimum APF		
		≤ 1 hr/shift	≤ 4 hr/shift	> 4 hr/shift
Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to blade. ² Note: See OSHA Fact Sheet 3631	None	None	APF 10
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to blade. ² <ul style="list-style-type: none">• When used outdoors• When used indoors or enclosed area³ Note: See OSHA Fact Sheet 3627	None APF 10	APF 10 APF 10	APF 10 APF 25
Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Dust collector must provide air flow recommended by tool manufacturer, or greater, and have a filter with 99% or greater efficiency. Note: See OSHA Fact Sheet 3927	None	None	APF 10

Walk-behind saws	<p>Use saw equipped with integrated water delivery system that continuously feeds water to blade.²</p> <ul style="list-style-type: none"> • When used outdoors • When used indoors or enclosed area³ <p>Note: See OSHA Fact Sheet 3633</p>	None APF 10	None APF 10	APF 10 APF 25
Drivable saws	<p>For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to blade.²</p> <p>Note: See OSHA Fact Sheet 3928</p>	None	None	APF 10
Rig-mounted core saws or drills	<p>Use tool equipped with integrated water delivery system that supplies water to cutting surface.²</p> <p>Note: See OSHA Fact Sheet 3929</p>	None	None	APF 10
Handheld and stand-mounted drills (including impact and rotary hammer drills)	<p>Use drill equipped with commercially available shroud or cowling with dust collection system.</p> <p>Dust collector must provide air flow recommended by tool manufacturer, or greater, and have HEPA filter and filter-cleaning mechanism⁴. Use HEPA-filtered vacuum when cleaning holes.</p> <p>Note: See OSHA Fact Sheet 3630</p>	None	None	APF 10
Dowel drilling rigs for concrete	<p>For tasks performed outdoors only: Use shroud around drill bit with dust collection system. Dust collector must have a HEPA filter and filter cleaning mechanism. Use HEPA-filtered vacuum when cleaning holes.</p> <p>Note: See OSHA Fact Sheet 3930</p>	APF 10	APF 10	APF 25
Vehicle-mounted drilling rigs for rock and concrete	<p>Use dust collection system with close capture hood or shroud around drill bit with low-flow water spray to wet dust at dust collector discharge point.²</p> <p>or</p> <p>Operate from within an enclosed cab and use water for dust suppression on drill bit.^{2,5}</p> <p>Note: See OSHA Fact Sheet 3931</p>	None	None	APF 10

Jackhammers and handheld powered chipping tools	<p>Use tool with water delivery system that supplies continuous stream or spray of water at point of impact:²</p> <ul style="list-style-type: none"> • When used outdoors • When used indoors or enclosed area³ <p>or</p> <p>Use tool equipped with commercially available shroud and dust collection system. Dust collector must provide air flow recommended by tool manufacturer, or greater, and have HEPA filter and filter-cleaning mechanism.⁴</p> <ul style="list-style-type: none"> • When used outdoors • When used indoors or enclosed area³ 	None APF 10	APF 10 APF 10	APF 10 APF 25
Note: See OSHA Fact Sheet 3629				
Handheld grinders for mortar removal (i.e., tuckpointing)	<p>Use grinder equipped with commercially available shroud and dust collection system</p> <p>When used indoors or in enclosed area, use HEPA-filtered vacuum to remove loose dust between passes.³</p>	APF 10	APF 25	APF 50
Note: See OSHA Fact Sheet 3632				
Handheld grinders for uses other than mortar removal.				

Walk-behind milling machines and floor grinders	<p>Use machine equipped with integrated water delivery system that continuously feeds water to cutting surface.</p> <p>or</p> <p>Use machine equipped with dust collection system recommended by manufacturer. Dust collector must provide air flow recommended by manufacturer, or greater, and have HEPA filter and filter-cleaning mechanism.⁴ When used indoors or enclosed area use HEPA-filtered vacuum to remove loose dust between passes.</p> <p>Note: See OSHA Fact Sheet 3932</p>	None	None	APF 10
Small drivable milling machines (less than half-lane)	<p>Use machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with surfactant.²</p> <p>Note: See OSHA Fact Sheet 3933</p>	None	None	APF 10
Large drivable milling machines (half-lane and larger)	<p>For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.²</p>	None	None	APF 10
	<p>For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.²</p> <p>or</p> <p>Use machine equipped with supplemental water spray designed to suppress dust. Water must be combined with surfactant.²</p> <p>Note: See OSHA Fact Sheet 3934</p>	None	None	APF 10
Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (hoppers, conveyors, sieves/sizing or vibrating components, and discharge points). Use ventilated booth that provides fresh, climate-controlled air to operator, or a remote-control station.^{2, 5}</p> <p>Note: See OSHA Fact Sheet 3935</p>	None	None	APF 10

Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	<p>Operate equipment from within an enclosed cab.⁵</p> <p>When staff outside of cab are engaged in task, apply water and/or dust suppressants as necessary to minimize dust emission.² Note: See OSHA Fact Sheet 3936</p>	None	None	APF 10
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including demolishing, abrading, or fracturing silica-containing materials	<p>Apply water and/or dust suppressants as necessary to minimize dust emissions.²</p> <p>or</p> <p>When equipment operator is only staff engaged in task, operate equipment from within enclosed cab.⁵ Note: See OSHA Fact Sheet 3937</p>	None	None	APF 10

Table Footnotes:

¹ Where staff perform more than one task on table during shift, and total duration of all tasks combined is more than four hours, required respiratory protection for each task is respiratory protection specified for more than four hours per shift. If total duration of all tasks on table combined is less than four hours, required respiratory protection for each task is respiratory protection specified for less than four hours per shift. If total duration of all tasks on table combined is less than one hour, required respiratory protection for each task is the highest respiratory protection listed for any of less than 1-hour tasks. .

² For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust.

³ For tasks performed indoors or enclosed areas, provide means of exhaust as needed to minimize accumulation of visible airborne dust.

⁴ Full and proper implementation of dust collection systems requires employer to ensure the following:

- Shroud or cowling is intact and installed in accordance with manufacturer's instructions
- Hose connecting tool to vacuum is intact and without kinks or tight bends
- Filter on vacuum is cleaned or changed in accordance with manufacturer's instructions
- Dust collection bags are emptied to avoid overfilling

⁵ For measures implemented that include enclosed cab or booth, ensure enclosed cab or booth meets the following criteria:

- Cab or booth maintained as free as practicable from settled dust
- Door seals and closing mechanisms work properly
- Gaskets and seals are in good condition and work properly
- Cab or booth is under positive pressure maintained through continuous delivery of fresh air
- Intake air is filtered through filter that is 95% efficient in 0.3-10.0 µm range (e.g., MERV-16 or better)
- Cab or booth has heating and cooling capabilities

<https://sbms.ornl.gov/sbms/SBMSearch/SubjArea/Silica/ExhibitMethods.cfm>

Single Hazard Qualitative Exposure Assessment Form

Project Information

<input type="checkbox"/> No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task	
<input checked="" type="checkbox"/> QEA could not be conducted at the time the RSS/Work Plan was reviewed/approved due to inadequate information on the agent(s)/hazards provided by the PI, Work Planner/Package author. Discuss controls incorporated into <i>Work Control</i> to assure EA is conducted in the future: <u>Contact Health and Safety before cutting/drilling/grinding silica containing materials</u>	
Process/Job/Task: (SEG/SET Name)	Cutting/drilling/grinding non-silica containing materials
Work Description: See specific work plan	
Facility #: Various	Room/Lab/Shop #:
Organization: Utilities	RSS/Work Plan #: Various

Hazard Information

Agent/Hazard (for chemical products, list multiple components)	Quantity	*OEL	Unit	Percent (if applicable)
Nuisance Dust		15	mg/m3	

* Optional field

Source of OEL: ACGIH OSHA DOE NIOSH None Other:

CHEMICAL HAZARD

Chemical Product Name:

Potential Routes of Entry

Inhalation Penetration Ingestion Splash Absorption Other

Primary Exposure Forms

Solid Liquid Gas Fume Particulate Vapor Mist Nano Other

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

PHYSICAL HAZARD

Type of Hazard

Thermal Stress: Heat Cold

Ergonomic (Specify): |

Acoustic: Infrasound and low-frequency sound Noise Ultrasound

Electromagnetic Radiation & Fields (Specify):

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

Single Hazard Qualitative Exposure Assessment Form

Control Strategy

No controls in-place or specified in RSS or Work Plan/Package

¹Engineering: GV, W

²Administrative: T, P

1. 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; **2. 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

Controls Effective:

Yes No Uncertain Comments:

Exposure Assessment Rating

$$\begin{array}{c} \text{(Health Severity} \\ \text{Rating (1-4)} \\ \text{4} \end{array} + \begin{array}{c} \text{Exposure Rating} \\ \text{Rating (1-4)} \\ \text{2} \end{array} \times \begin{array}{c} \text{Certainty} \\ \text{Rating (1-3)} \\ \text{1} \end{array} = \begin{array}{c} \text{QEA Rating} \\ \text{(2-24)} \\ \text{6} \end{array}$$

Exposure Decision

Acceptable (2-7) <input checked="" type="checkbox"/> document and schedule follow-up assessment	Uncertain (8-15) <input type="checkbox"/> prioritize for further information gathering	Unacceptable (16-24) Implement control measures and prioritize for Follow-up assessment
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Was hazard considered Low Risk (Acceptable)?

No, proceed with Follow-up section **Yes**, describe justification for classification as acceptable or "Low Risk"

Acceptable Exposure Justification: Short duration task using wet methods and ventilation as controls. If lead based paint is to be encountered, taping area prior to cutting is a sufficient control to keep dust hazard at a minimum.

Follow-up

Follow-up Assessment Priority: Low Schedule: Month 6 months 1 year 3 years Other:

Is Quantitative Exposure Monitoring recommended? Yes No

Recommendations/Comments: Contact Health and Safety before cutting/drilling/grinding silica containing materials. Silica work is not to be included with this QEA.

Qualified H&S Professional: David Joyce 612878

Date: 7/15/22

QEA Rating Tables

Table 1: Health Severity Rating

Rating		Criteria
HSR		Effects from Over Exposure
1	Negligible	Negligible or reversible effects of little concern
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.

**See the [Hodge and Sterner toxicity classification scale](#)

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 routine 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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating.

Table 3: Certainty Rating

Rating		Criteria
1	Certain	The environmental agent's exposure profile and/or 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.

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

Single Hazard Qualitative Exposure Assessment Form

Project Information

<input type="checkbox"/> No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task	
<input checked="" type="checkbox"/> QEA could not be conducted at the time the RSS/Work Plan was reviewed/approved due to inadequate information on the agent(s)/hazards provided by the PI, Work Planner/Package author. Discuss controls incorporated into <i>Work Control</i> to assure EA is conducted in the future: _____	
Process/Job/Task: (SEG/SET Name)	Activities that produce silica dust.
Work Description:	Activities that produce silica dust, such as concrete demolition, chipping, jackhammering, mixing concrete, etc
Facility #: multiple locations	Room/Lab/Shop #: N/A
Organization: Utilities	RSS/Work Plan #: various

Hazard Information

Agent/Hazard (for chemical products, list multiple components)	Quantity	*OEL	Unit	Percent (if applicable)
Crystalline Silica	.025	mg/m3		

* Optional field

Source of OEL: ACGIH OSHA DOE NIOSH None Other:

CHEMICAL HAZARD

Chemical Product Name: silica

Potential Routes of Entry

Inhalation Penetration Ingestion Splash Absorption Other

Primary Exposure Forms

Solid Liquid Gas Fume Particulate Vapor Mist Nano Other

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

PHYSICAL HAZARD

Type of Hazard

Thermal Stress: Heat Cold

Ergonomic (Specify): |

Acoustic: Infrasound and low-frequency sound Noise Ultrasound

Electromagnetic Radiation & Fields (Specify):

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

Single Hazard Qualitative Exposure Assessment Form

Control Strategy

No controls in-place or specified in RSS or Work Plan/Package

¹Engineering: W, GV, T, P

²Administrative: T

1. 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; **2. 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

Controls Effective:

Yes No Uncertain Comments:

Exposure Assessment Rating

$$\begin{array}{c} \text{(Health Severity} \\ \text{Rating (1-4)} \\ \text{3} \end{array} + \begin{array}{c} \text{Exposure Rating} \\ \text{Rating (1-4)} \\ \text{1} \end{array} \times \begin{array}{c} \text{Certainty} \\ \text{Rating (1-3)} \\ \text{2} \end{array} = \begin{array}{c} \text{QEA Rating} \\ \text{(2-24)} \\ \text{8} \end{array}$$

Exposure Decision

Acceptable (2-7) <input type="checkbox"/> document and schedule follow-up assessment	Uncertain (8-15) <input checked="" type="checkbox"/> prioritize for further information gathering	Unacceptable (16-24) Implement control measures and prioritize for Follow-up assessment <input type="checkbox"/>
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Was hazard considered Low Risk (Acceptable)?

No, proceed with Follow-up section Yes, describe justification for classification as acceptable or "Low Risk"

Acceptable Exposure Justification:

Follow-up

Follow-up Assessment Priority: mediu Schedule: Month 6 months 1 year 3 years Other:

Is Quantitative Exposure Monitoring recommended? Yes No

Recommendations/Comments: Sampling will be conducted to demonstrate negative exposures.

Qualified H&S Professional: David Joyce

Date: 12/17/2021

QEA Rating Tables

Table 1: Health Severity Rating

Rating		Criteria
HSR		Effects from Over Exposure
1	Negligible	Negligible or reversible effects of little concern
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.

**See the [Hodge and Sterner toxicity classification scale](#)

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 routine 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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating.

Table 3: Certainty Rating

Rating		Criteria
1	Certain	The environmental agent's exposure profile and/or 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.

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

Single Hazard Qualitative Exposure Assessment Form

Project Information

<input type="checkbox"/> No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task	
<input type="checkbox"/> QEA could not be conducted at the time the RSS/Work Plan was reviewed/approved due to inadequate information on the agent(s)/hazards provided by the PI, Work Planner/Package author. Discuss controls incorporated into <i>Work Control</i> to assure EA is conducted in the future: _____	
Process/Job/Task: (SEG/SET Name)	General site specific task
Work Description:	See specific work plan - use of power tools, cut off saws, generators, pumps and other small equipment
Facility #: Various	Room/Lab/Shop #:
Organization: Utilities	RSS/Work Plan #: Various

Hazard Information

Agent/Hazard (for chemical products, list multiple components)	Quantity	*OEL	Unit	Percent (if applicable)
Noise	>85	85	db	

* Optional field

Source of OEL: ACGIH OSHA DOE NIOSH None Other:

CHEMICAL HAZARD

Chemical Product Name:

Potential Routes of Entry

Inhalation Penetration Ingestion Splash Absorption Other

Primary Exposure Forms

Solid Liquid Gas Fume Particulate Vapor Mist Nano Other

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

PHYSICAL HAZARD

Type of Hazard

Thermal Stress: Heat Cold

Ergonomic (Specify): |

Acoustic: Infrasound and low-frequency sound Noise Ultrasound

Electromagnetic Radiation & Fields (Specify):

Frequency of Exposure

One Time Daily Weekly Monthly Quarterly Annually Variable

Duration of Exposure (per exposure event)

<1/2 hour 1/2 - 2 hours 2 - 6 hours 6 - 8 hours > 8 hours Variable

Single Hazard Qualitative Exposure Assessment Form

Control Strategy

No controls in-place or specified in RSS or Work Plan/Package

¹Engineering:

²Administrative: T, P, LT

1. 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; **2. 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

Controls Effective:

Yes No Uncertain Comments:

Exposure Assessment Rating

$$\begin{array}{c} \text{(Health Severity} \\ \text{Rating (1-4)} \\ \text{4} \end{array} + \begin{array}{c} \text{Exposure Rating} \\ \text{Rating (1-4)} \\ \text{2} \end{array} \times \begin{array}{c} \text{Certainty} \\ \text{Rating (1-3)} \\ \text{1} \end{array} = \begin{array}{c} \text{QEA Rating} \\ \text{(2-24)} \\ \text{6} \end{array}$$

Exposure Decision

Acceptable (2-7) <input checked="" type="checkbox"/> document and schedule follow-up assessment	Uncertain (8-15) <input type="checkbox"/> prioritize for further information gathering	Unacceptable (16-24) Implement control measures and prioritize for Follow-up assessment <input type="checkbox"/>
--	---	---

Was hazard considered Low Risk (Acceptable)?

No, proceed with Follow-up section Yes, describe justification for classification as acceptable or "Low Risk"

Acceptable Exposure Justification:

Follow-up

Follow-up Assessment Priority: Schedule: Month 6 months 1 year 3 years Other:

Is Quantitative Exposure Monitoring recommended? Yes No

Recommendations/Comments: Staff shall wear HPD with a minimum NRR 25 when using small handtools or equipment is running, use of the cut off saw will require double hearing protection with a minimum of 25 NRR for ear plugs and then muffs over top of the plugs.

Qualified H&S Professional: David Joyce

Date: 6/14/22

QEA Rating Tables

Table 1: Health Severity Rating

Rating		Criteria
HSR		Effects from Over Exposure
1	Negligible	Negligible or reversible effects of little concern
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.

**See the [Hodge and Sterner toxicity classification scale](#)

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 routine 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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating.

Table 3: Certainty Rating

Rating		Criteria
1	Certain	The environmental agent's exposure profile and/or 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.

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

American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) for cold stress and heat stress and heat Strain, 2016 edition

TLVs Work/Warm-up Schedule for a 4-hour Shift

Air Temperature – Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C Approx.)	°F (Approx.)	Max. Work Period	No. of Breaks								
-26 to -28	-15 to -19	(Norm. Breaks) 1		(Norm. Breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29 to -31	-20 to -24	(Norm. Breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32 to -34	-25 to -29	75 min.	2	55 min.	3	40 min.	4	30 min.	5		
-35 to -37	-30 to -34	55 min.	3	40 min.	4	30 min.	5				
-38 to -39	-35 to -39	40 min.	4	30 min.	5						
-40 to -42	-40 to -44	30 min.	5								
-43 & below	-45 & below	Non-emergency work should cease									

Schedule applies to any 4-hour work period with moderate to heavy work activity, with warm-up periods of ten minutes in a warm location and 30th extended break (e.g. lunch) at the end of the 4-hour work period in a warm location. For Light-to-Moderate Work (limited physical activity): apply the schedule one step blower. For example, at -35°C (-35°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum worker period of 40 minutes with 4 breaks in a 5-hour period (Step 5).

Screening Criteria for TLVs and Action Limit for Heat Stress Exposure

Allocation of Work in a Cycle of Work and Recovery	TLV (WBGT values in °C)*				Action Limit (WBGT values in °C)**			
	Metabolic Rate Category				Metabolic Rate Category			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75% to 100%	31.0	28.0			28.0	25.0		
50% to 75%	31.0	29.0	27.5		28.5	26.0	24.0	
25% to 50%	32.0	30.0	29.0	28.0	29.5	27.0	25.5	24.5
0% to 25%	32.5	31.5	30.5	30.0	30.0	29.0	28.0	27.0

* TLV applies to acclimatized, adequately hydrated, unmedicated, healthy workers.

** Action Limit applies to unacclimatized workers

Metabolic Rate Categories and the Representative Metabolic Rate with Example Activities

Category	Metabolic Rate (W)*	Examples
Rest	115	Sitting
Light	180	Sitting with light manual work with hands or hands and arms and, driving. Standing with some light arm work and occasional walking.
Moderate	300	Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling. Normal walking.
Heavy	415	Intense arm and trunk work, carrying, shoveling, and manual sawing; pushing and pulling heavy loads; and walking at a fast pace.
Very Heavy	520	Very intense activity at fast to maximum pace.

* The effect of body weight on the estimated metabolic rate can be accounted for by multiplying the estimated rate by the ratio of actual body weight divided by 70 kg (154 lbs)

Clothing-Adjustment Factors (°C) for Some Clothing Ensembles*

Clothing Type	WBGT Addition* °C
Work Clothes (Long sleeve shirt and Pants)	0
Cloth (woven material) overalls	0
Double-layer woven clothing	3
SMS polypropylene coveralls	0.5
Polyolefin coveralls	1
Limited-Use Vapor-Barrier	11

* These values must not be used for encapsulating suits, often called Level A. Clothing Adjustment Factors cannot be added for multiple layers. The coveralls assume that only modesty clothing is worn underneath, not a second layer of clothing.

Heat Strain (Physiological TLV) - One or more of the following

- Sustained (several minutes) heart rate is $> [180 \text{ beats per minute (bpm)} - \text{individual's age}]$, for individuals with assessed normal cardiac performance; or
- Recovery heart rate at one minute after a peak work effort is $> 120 \text{ bpm}$; or
- Body core Temperature
 - 38.5°C (101.3°F) for medically selected and acclimatized individuals or,
 - 38°C (100.4°F) for unselected and unacclimatized individuals
- Appearance of symptoms of sudden and severe fatigue, nausea, dizziness or lightheadedness.

Note: Heart rate monitoring watches may be used for physiological monitoring.

Heat Stress Controls

Hazard	Controls
Thermal Stressor – Heat Stress including Heat Cramps, Heat Stroke, Heat Exhaustion	<ul style="list-style-type: none"> • Worker rotation • Acclimatization • Frequent breaks(Workers self-pace work activities and consume hydrating beverages (i.e. water, Gatorade or similar) during breaks in the field) • Follow the SBMS document “<i>Occupational Hazard Controls - Evaluating Temperature Extremes.</i>”
Hazard	Controls
Thermal Stressor – Heat Stress including Heat Cramps, Heat Stroke, Heat Exhaustion	<ul style="list-style-type: none"> • Worker rotation • See table below table for definitions for work categories. • Contact Health and Safety for work/rest regimen for work that is defined as very heavy or for temperatures that are not on the table. Physiological may be needed. • Personnel shall be trained in Heat Stress Training. • Avoid alcohol, coffee, tea, energy drinks, and carbonated drinks. Caffeine is a diuretic which causes your body to drive water out of your system • Check medications that may inhibit perspiration, increase metabolism, and beta blockers. • Keep yourself hydrated through drinking water! Drink at least as much liquid as you sweat out. Do not drink too much at one time but maintain your fluid intake. Thirst is not a good indicator of inadequate fluid intake. • Watch out for symptoms of heat-related illness: fatigue, nausea, headache, excessive thirst, muscle aches and cramps, weakness, confusion or anxiety. <p>What Happens to the Body: Heat Cramps Symptoms: Heavy sweating during intense exercise; muscle pain or spasms</p> <p>What Should Be Done:</p> <ul style="list-style-type: none"> • Stop physical activity and move to a cool shaded or indoor area. • Drink water or sports drink • Wait for cramps to go away before proceeding physical activity <p>What Happens to the Body: Heat Stroke Symptoms: High body temperature (103 °F or higher); Hot, red, dry, or damp skin; fast, strong pulse; headache; dizziness; nausea; confusion; losing consciousness</p> <p>What Should Be Done:</p> <ul style="list-style-type: none"> • Call for emergency help [i.e., <u>Call 574-6606 (LSS)</u> or 911 from landline].

	<ul style="list-style-type: none"> Move the person to a cool shaded or indoor area. Don't leave the person alone. Help lower person's body temperature with cool cloths or cool bath. <p>What Happens to the Body: Heat Exhaustion</p> <p>Symptoms:</p> <p>Heavy sweating; cold, pale, and clammy skin; fast, weak pulse; nausea or vomiting; muscle cramps; tiredness or weakness; dizziness; headache; losing consciousness</p> <p>What Should Be Done:</p> <ul style="list-style-type: none"> Call for emergency help [i.e., <u>Call 574-6606 (LSS)</u> or 911 from landline]. Move the person to a cool shaded or indoor area. Don't leave the person alone. Loosen clothes Place cool, wet cloths on body or take cool bath Sip water
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Temperature Conversion Guidance Chart

Centigrade (°C)	Fahrenheit (°F)
0	32
10	50
15	59
20	68
25	77
30	86
35	95
40	104

$$\text{Degrees Fahrenheit} = 1.8 \times \text{degrees C} + 32$$

Definitions and Examples of Work Tasks

Work Category	Example Motions	Example Tasks
Light	<ul style="list-style-type: none"> • Sitting with light manual work with hands and arms • Driving • Standing with some light arm work and occasional walking • Casual walking (2 miles per hour) • Lifting 10 pounds fewer than eight times per minute, or 25 pounds less than four times per minute 	<ul style="list-style-type: none"> • Using small bench tools or small power tools • Inspecting and sorting produce • Sorting light materials • Assembling small parts • Driving vehicle on roads • Nailing
Moderate	<ul style="list-style-type: none"> ▪ Sustained moderate hand and arm work ▪ Moderate arm and leg work ▪ Moderate arm and trunk work ▪ Moderate pushing and pulling ▪ Walking at a moderate speed ▪ Lifting 10 pounds 10 times per minute, or 25 pounds six times per minute 	<ul style="list-style-type: none"> ▪ Work activities requiring bending/ squatting ▪ Painting with a brush ▪ Pushing or pulling lightweight carts or wheelbarrows ▪ Off road operation of trucks, tractors, or construction equipment ▪ Operating an air hammer ▪ Weeding or hoeing
Heavy	<ul style="list-style-type: none"> ▪ Intense arm and trunk work ▪ Carrying, shoveling, manual sawing ▪ Pushing or pulling heavy loads ▪ Walking at a fast pace (4 miles per hour) ▪ Lifting 10 pounds 14 times per minute, or 25 pounds 10 times per minute 	<ul style="list-style-type: none"> ▪ Transferring heavy materials, shoveling ▪ Sledgehammer work ▪ Hand mowing, digging ▪ Concrete block laying ▪ Pushing or pulling loaded hand carts or wheelbarrow
Very Heavy	<ul style="list-style-type: none"> ▪ Very intense activity at fast to maximum pace ▪ Jogging, running or walking faster than 4 miles per hour ▪ Lifting 10 pounds more than 18 times per minute, or 25 pounds more than 13 times per minute 	<ul style="list-style-type: none"> ▪ Heavy shoveling or digging ▪ Ax work ▪ Climbing stairs, ramps or ladders



MANUAL LIFTING GUIDELINE: 30/50/30



How much can I safely lift?

While there is no single weight that everyone can lift, this guideline can help simplify your decision.

KEY POINTS:

30/50/30 is the weight, in pounds, that may be lifted with minimal risk of injury. This guidance does not establish lifting limits because the amount of weight that can be safely lifted varies from person-to-person. Before making a lift, consider your personal capability.

- 30 lbs can be lifted from floor to head level
- 50 lbs should only be lifted between knuckle and elbow height (e.g. lifting items off a shelf or cart and placing them at the same height)
- Lift with two hands, keep the load close to your body, and avoid twisting your torso
- Again, use judgement as to your individual physical capability, especially if you have any medical conditions that could be aggravated by manual lifting

Note: This 30/50/30 pound guideline is for casual/non-repetitive manual lifts. It has a sound scientific basis, following the NIOSH Lifting Equation, and meets regulatory requirements. Health and Safety professionals should be consulted to assist in conducting hazard assessments and development of controls for repetitive lifts or lifts outside the limits of the 30/50/30 guidelines.

GUIDANCE TIPS FOR LIFTING

- | | |
|---|--|
| <ul style="list-style-type: none">❖ Do not lift an object if you have physical limitations (i.e. on restrictions, pregnant, have lower back pain, pre-existing injuries, etc.)❖ Lift performed using proper lifting techniques (i.e. Keep your back straight, bend with your knees and lift with your legs)❖ No twisting at waist during lift or while carrying or lowering the object❖ Weight of object is stable and evenly distributed❖ Good hand grip on object❖ Use lifting aids❖ Walking surface is even, firm, and non-slippery❖ Look at environment stressors – Temperature, Humidity, Lighting, Obstacles❖ Don't overdo it – Don't try to lift something too heavy for you. If you must strain to carry the load, it is too heavy for you.❖ Make sure you have enough room to lift safely. Clear a space around the object before lifting it.❖ Reduce the weight of the load when possible❖ Rest your back – Take frequent, short breaks and stretch❖ Exercise | <ul style="list-style-type: none">❖ Assess the situation:<ul style="list-style-type: none">➢ Weight, Size, Shape of the load➢ Can you grip the load?➢ Can you reach the load?➢ Clear obstacles near the load and near/in the path you will travel with the load➢ Ensure you can see where you are walking➢ Know the distance you will be traveling with the load➢ How is the terrain on the path you plan to take? Slippery, Icy, Damaged, Uneven, etc.➢ Any pre-existing injuries? |
|---|--|

ORNL Ordinary Lift Plan

Section 1

Work Package, Work Order, or RSS Number:	Various work packages	Plan Prepared by:	Badge Number:
		Mike Foy	693731

Section 2

Lift Description

Lift includes various size valves, PRV, piping, motors, pumps, and associated pieces. Pipe sizes range from 1 inch to 24 inches in diameter to 1 ft to 15 ft long. Max total weight to be lifted for this lift plan is 1 lb. to 1,550 lbs. including rigging and load block. An assigned trained designated leader will review hoisting and rigging activity to determine crane set-up and the specific equipment to be used based on weight of objects and service truck set-up location. Lifts will be performed using a service auto crane with the hitch types being vertical, choker or basket. Shackles may be used. For this lift plan, A minimum of 2 legs of rigging will be used for each lift. Rigging will utilize a 45-degree angle or greater below the crane load hook Calculations must be based on 2- legs. See Special requirements for lifting in a basket hitch and sling angles. **THIS PLAN DOES NOT ALLOW A WIRE ROPE BASKET HITCH THRU RIGGING HARDWARE (E.G. SHACKLE, SWIVEL HOIST RING) OR THE USE OF EYEBOLTS.**

Lift Information

Center of Gravity determined by:

- Manufacturer Trial and Error Calculations
 Other (Describe) If object is uniform, it is assumed the COG is centrally located. Trial and Error will be used on all lifts.

Sling angle: min 45 deg.

Load angle factor/multiplier: 1.414 min

Weight of item: max 1,550 lbs.

D/d ratio reduction in efficiency for wire rope slings: 50 %

No. of Legs: 2 – 4 legs

Sling Tension/Loading: max 1,095 lbs.

Size: See Section 3

Limited capacity of rigging as configured:

Hitch Type: Vertical Choker Basket

Sling Type/Bridle Information:

EE2-902 sling – 6,789 lbs.

Nylon Wire Metal Other:

EE2-902 sling – 3,395 lbs.

3/8" Wire rope – 2,630 lbs.

3/8" Shackle – 2,828 lbs.

7/16" Shackle – 4,243 lbs.

½" Shackle – 5,657 lbs.

5/8" Shackle – 9,193 lbs.

¾" Shackle -13, 437 lbs.

Section 3

Hoisting Equipment/Below the Hook/Lifting Equipment	Capacity
Autocrane 17-8149	3,200 lbs.
Autocrane 17-8229	2,000 lbs.

Section 4

Rigging Equipment	Capacity	Rigging Hardware	Capacity
Nylon sling EE2-902	V: 6,400 lbs. CH: 4,800 lbs.	3/8" Shackle	2,000 lbs.

ORNL Ordinary Lift Plan

	B: 12,800 lbs. Reduction for 45 deg angle 9,051 lbs.	7/16" Shackle	3000 lbs.
Nylon Sling EE2-901	V: 3,200 lbs. CH: 2,400 lbs. B: 6,400 lbs. Reduction for 45 deg angle 4,525 lbs.	1/2" Shackle	4,000 lbs.
3/8" Wire Rope (12 ft)	V: 2,400 lbs. CH: 1,860 lbs. B: 4,800 lbs. Reduction for 45 deg angle 3,394 lbs. D/d @ 50 % efficiency: 2,400 lbs. for a load with a 1-inch diameter.	5/8" Shackle	6,500 lbs.
		3/4" Shackle	9,500 lbs.
3/8" Wire Rope (4-ft)	V: 2,800 lbs. CH: 2,200 lbs. B: 5,800 lbs. Reduction for 45 deg angle 4,000 lbs. D/d @ 50 % efficiency: 2,900 lbs. for a load with a 1-inch diameter.		

Section 5

Special requirements (facility requirements, communication methods, etc.):

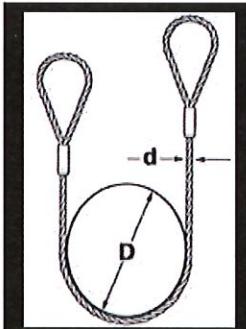
Supervision will assign a trained designated leader to review crane set-up (crane boom reach & angle), load chart, sling angles, and rigging equipment. In addition, sling angles need to be reviewed for items in a basket configuration prior to lift for D/d ration efficiency.

Lifts must not exceed 85% of crane capacity.

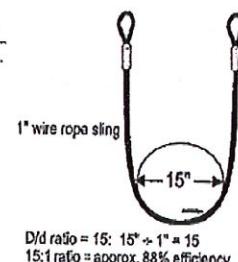
Basket hitches are not allowed to go below a 45-degree load which equals a 0.7071 loss factor in the working load.

Wire Rope D/d ratio example and info for designated leader. When a wire rope is used in a basket configuration, the designated leader must review the D/d ratio and the wire rope sling capacity adjusted (as needed) based on the given chart's efficiency rating. The wire load capacity must not be exceeded.

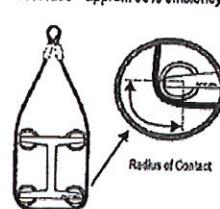
Example and information



D/d	Efficiency	D/d	Efficiency
25	100%	3.5	73%
20	92%	3.25	72%
16	88%	3	71%
10	86%	2.75	70%
8	84%	2.5	68%
6	80%	2.25	67%
5	78%	2	65%
4.75	77%	1.76	62%
4.5	76%	1.5	59%
4	75%	1.25	55%
3.75	74%	1	50%



Softeners can be used to improve the radius of contact when using a wire rope sling around a 90° corner. The softener's purpose is to create a contact radius of at least 6 times the wire rope diameter.



Lift must comply with the following:

- Load attachment points must be above the center of gravity
- Inspect all H&R equipment prior to lift.
- Ensure all H&R equipment has a current annual inspection.
- Softeners must be used on sharp edges.



ORNL Ordinary Lift Plan

Pre-Lift Checklist (To be performed prior to lift):

- | | | | |
|---|---|--|---|
| <ul style="list-style-type: none"> Pre-Job Brief Designated Signal Person Annual Inspections currents on H&R equipment | <ul style="list-style-type: none"> Equipment Inspected prior to lift Center of gravity identified capacities reduced | <ul style="list-style-type: none"> Edge protectors used as needed Attachment points identified Load path and landing area clear | <ul style="list-style-type: none"> Evacuation paths identified Load drop zone controlled Load will lift freely |
|---|---|--|---|

Section 6

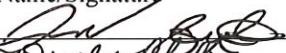
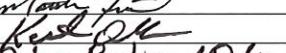
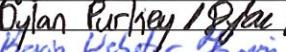
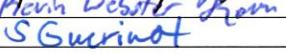
Approvals – Valid for up to two (2) years

Hoisting and Rigging Designated Leader or Hoisting and Rigging Competent Person	Print Name	Signature	Badge #	Date
	Mike Foy <small>Digitally signed by Mike Foy Date: 2023.08.15 14:20:47 -04'00'</small>		693731	

Section 7

Pre-Lift Briefing

The following hoisting and lifting personnel have attended the pre-lift meeting, reviewed the approved lift plan, and understand the procedure and equipment to be used (sign on back as necessary)

Name/Signature	Badge #	Date
	208021	8-28-23
	26708	8-28-23
	73702	8-28-23
	3064007	8-28-23
	3097799	8-28-23
	983297	8-28-23
	743560	8/28/23
		

Section 8: Additional Information (I.e., Applicable Load Travel Path/ Load Schematic and Rigging Method) (May also be attached to back of plan)

N/A

ORNL-544 (4/18/2019)

ORNL Ordinary Lift Plan

Section 1

Work Package, Work Order, or RSS Number:	Various work packages	Plan Prepared by:	Badge Number:
		Mike Foy	693731

Section 2

Lift Description

Lift includes various size valves, fire hydrant, piping, motors, fittings, tapping sleeves, pumps, and similar items. Pipe sizes range from 1 inch to 24 inches in diameter to 1 ft to 15 ft long. Max total weight to be lifted for this lift plan is 1 lb. to 1,550 lbs. including rigging and load block. An assigned trained designated leader will review hoisting and rigging activity to determine crane set-up and the specific equipment to be used based on weight of objects and service truck set-up location. Lifts will be performed using a service auto crane with the hitch types being vertical, choker or basket. Shackles may be used. For this lift plan, one leg of rigging will be used for each lift or crane load will attach directly to rigging hardware. Rigging will utilize a 90-degree angle below the crane load hook. See Special requirements for lifting in a basket hitch and sling angles. **THIS PLAN DOES NOT ALLOW A WIRE ROPE BASKET HITCH THRU RIGGING HARDWARE (E.G. SHACKLE, SWIVEL HOIST RING) OR THE USE OF EYEBOLTS.**

Lift Information

Center of Gravity determined by:

- Manufacturer Trial and Error Calculations
 Other (Describe) If object is uniform, it is assumed the COG is centrally located. Trial and Error will be used on all lifts.

Weight of item: max 1,550 lbs. (includes rigging & load block)

Sling angle: 90 deg.

No. of Legs: 1 leg

Load angle factor/multiplier: 1

Size: See Section 3

D/d ratio reduction in efficiency for wire rope slings: 50 %

Length: various

Sling Tension/Loading: max 1,550 lbs. (Weight of load will be the tension on sling)

Hitch Type: Vertical Choker Basket

Limited capacity of rigging as configured: 2,000 lbs.

Sling Type/Bridle Information:

- Nylon Wire Metal Other:

Section 3

Hoisting Equipment/Below the Hook/Lifting Equipment	Capacity
Autocrane 17-8149	3,200 lbs.
Autocrane 17-8229	2,000 lbs.

Section 4

Rigging Equipment	Capacity	Rigging Hardware	Capacity
Nylon sling EE2-902	V: 6,400 lbs. CH: 4,800 lbs. B: 12,800 lbs. Reduction for 45 deg angle 9,051 lbs.	3/8" Shackle	2,000 lbs.
		7/16" Shackle	3000 lbs.
Nylon Sling EE2-901	V: 3,200 lbs. CH: 2,400 lbs. B: 6,400 lbs. Reduction for 45 deg angle 4,525 lbs.	1/2" Shackle	4,000 lbs.

ORNL Ordinary Lift Plan

3/8" Wire Rope (12 ft)	V: 2,400 lbs. CH: 1,860 lbs. B: 4,800 lbs. Reduction for 45 deg angle 3,394 lbs. D/d @ 50 % efficiency: 2,400 lbs. for a load with a 1-inch diameter.	5/8" Shackle 3/4" Shackle	6,500 lbs. 9,500 lbs.
3/8" Wire Rope (4-ft.)	V: 2,800 lbs. CH: 2,200 lbs. B: 5,800 lbs. Reduction for 45 deg angle 4,000 lbs. D/d @ 50 % efficiency: 2,900 lbs. for a load with a 1-inch diameter.		

Section 5

Special requirements (facility requirements, communication methods, etc.):

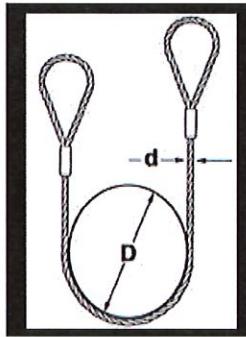
Supervision will assign a trained designated leader to review crane set-up (crane boom reach & angle), load chart, and rigging equipment. In addition, sling angles need to be reviewed for items in a one leg basket configuration prior to lift for D/d ration efficiency.

Lifts must not exceed 85% of crane capacity.

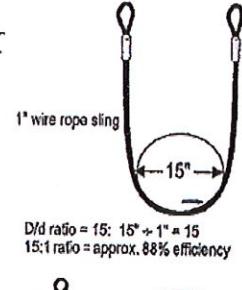
Basket hitches are not allowed to go below a 45-degree load which equals a 0.7071 loss factor in the working load.

Wire Rope D/d ratio example and info for designated leader. When a wire rope is used in a basket configuration, the designated leader must review the D/d ratio and the wire rope sling capacity adjusted (as needed) based on the given chart's efficiency rating. The wire load capacity must not be exceeded.

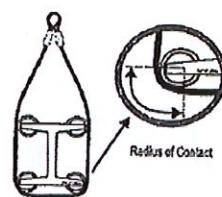
Example and information



D/d	Efficiency	D/d	Efficiency
25	100%	3.5	73%
20	92%	3.25	72%
16	88%	3	71%
10	86%	2.75	70%
8	84%	2.5	68%
6	80%	2.25	67%
5	78%	2	65%
4.75	77%	1.75	62%
4.5	76%	1.5	69%
4	75%	1.25	55%
3.75	74%	1	50%

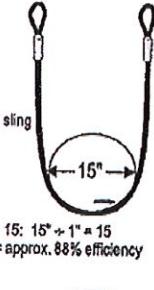


Softeners can be used to improve the radius of contact when using a wire rope sling around a 90° corner. The softener's purpose is to create a contact radius of at least 6 times the wire rope diameter.



Lift must comply with the following:

- Load attachment points must be above the center of gravity
- Inspect all H&R equipment prior to lift.
- Ensure all H&R equipment has a current annual inspection.
- Softeners must be used on sharp edges.



Pre-Lift Checklist (To be performed prior to lift):

• Pre-Job Brief • Designated Signal Person • Annual Inspections currents on H&R equipment	• Equipment Inspected prior to lift • Center of gravity identified • Capacities reduced	• Edge protectors used as needed • Attachment points identified • Load path and landing area clear	• Evacuation paths identified • Load drop zone controlled • Load will lift freely
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Section 6

Approvals – Valid for up to two (2) years

Print Name	Signature	Badge #	Date
Hoisting and Rigging Designated Leader or Hoisting and Rigging Competent Person	Mike Foy <small>Digital signature by Mike Foy Date: 2023.08.15 14:13:12 -04'00'</small>	693731	



ORNL Ordinary Lift Plan

Section 7

Pre-Lift Briefing

The following hoisting and lifting personnel have attended the pre-lift meeting, reviewed the approved lift plan, and understand the procedure and equipment to be used (sign on back as necessary)

Name/Signature	Badge #	Date
Donald Phillips	29709	8/28/2023
Mark Goss	30081	8-28-23
Kevin A. Webb	23202	8-28-23
Dylan Purkey / Dylan Purkey	8064007	8-28-23
Kevin A. Webb	985297	8-28-23
Dylan Purkey / Dylan Purkey	3097799	8-28-23
S Guerinef	143560	

Section 8: Additional Information (I.e., Applicable Load Travel Path/ Load Schematic and Rigging Method) (May also be attached to back of plan)

N/A

ORNL-544 (4/18/2019)

ORNL Ordinary Lift Plan

Section 1

Work Package, Work Order, or RSS Number:	Various work packages	Plan Prepared by:	Badge Number:
		Mike Foy	693731

Section 2

Lift Description

Lift includes various size valves, PRV, piping, motors, pumps, and associated pieces. Pipe sizes range from 1 inch to 24 inches in diameter to 1 ft to 15 ft long. Weight to be lifted for this lift plan is 1 lb. to 1,750 lbs. Total max with rigging is 1,800 lbs. An assigned trained designated leader will review hoisting and rigging activity to determine the specific equipment to be used based on weight of objects and lifting point availability (e.g., structure, A-frame). Lifts will be performed using a manual chain fall or lever hoist with the hitch types being vertical, choker or basket. A minimum of 2 legs will be used for each lift. Shackles may be used. All rigging will utilize a 45-degree angle or greater. Calculations must be based on 2- legs. See Special requirements for lifting in a basket hitch and sling angles. **THIS PLAN DOES NOT ALLOW A WIRE ROPE BASKET HITCH THRU RIGGING HARDWARE (E.G. SHACKLE, SWIVEL HOIST RING) OR THE USE OF EYEBOLTS.**

Lift Information

Center of Gravity determined by:

- Manufacturer Trial and Error Calculations
 Other (Describe) If object is uniform, it is assumed the COG is centrally located. Trial and Error will be used on all lifts.

Sling angle: min 45 deg.

Weight of item: max 1,750 lbs.

D/d ratio reduction in efficiency for wire rope slings: 50 %

No. of Legs: 2 – 4 legs

Sling Tension/Loading: max 1,238 lbs.

Size: various

Limited capacity of rigging as configured:

Hitch Type: Vertical Choker Basket

EE2-902 sling – 6,789 lbs.

Sling Type/Bridle Information:

Nylon Wire Metal Other:

3/8" Wire rope – 2,630 lbs.

3/8" Shackle – 2,828 lbs.

7/16" Shackle – 4,243 lbs.

½" Shackle – 5,657 lbs.

5/8" Shackle – 9,193 lbs.

¾" Shackle -13,437 lbs.

Section 3

Hoisting Equipment/Below the Hook/Lifting Equipment	Capacity
Manual Chain Hoist/Fall	2,000 lbs.
Lever Hoist	3,000 lbs.
A-Frame	2,000 lbs.
Trolley	2,000 lbs.
Beam Clamp (BTH)	4,000 lbs.
Beam Clamp (BTH)	2,000 lbs.

ORNL Ordinary Lift Plan

Section 4

Rigging Equipment	Capacity	Rigging Hardware	Capacity
Nylon sling EE2-902	V: 6,400 lbs. CH: 4,800 lbs. B: 12,800 lbs. Reduction for 45 deg angle 9,051 lbs.	3/8" Shackle	2,000 lbs.
		7/16" Shackle	3000 lbs.
Nylon Sling EE2-901	V: 3,200 lbs. CH: 2,400 lbs. B: 6,400 lbs. Reduction for 45 deg angle 4,525 lbs.	1/2" Shackle	4,000 lbs.
3/8" Wire Rope (12 ft)	V: 2,400 lbs. CH: 1,860 lbs. B: 4,800 lbs. Reduction for 45 deg angle 3,394 lbs. D/d @ 50 % efficiency: 2,400 lbs. for a load with a 1-inch diameter.	5/8" Shackle	6,500 lbs.
		3/4" Shackle	9,500 lbs.
3/8" Wire Rope (4-ft)	V: 2,800 lbs. CH: 2,200 lbs. B: 5,800 lbs. Reduction for 45 deg angle 4,000 lbs. D/d @ 50 % efficiency: 2,900 lbs. for a load with a 1-inch diameter.		

Section 5

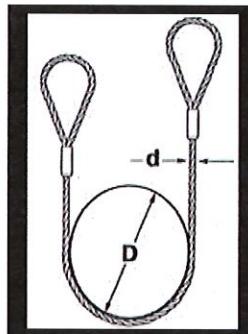
Special requirements (facility requirements, communication methods, etc.):

Supervision will assign a trained designated leader to review sling angles and rigging prior to lift.

Basket hitches are not allowed to go below a 45-degree load which equals a 0.7071 loss factor in the working load.

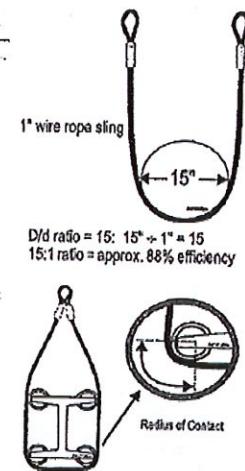
Wire Rope D/d ratio example and info for designated leader. When a wire rope is used in a basket configuration, the designated leader must review the D/d ratio and the wire rope sling capacity adjusted (as needed) based on the given chart's efficiency rating. The wire load capacity must not be exceeded.

Example and information



D/d	Efficiency	D/d	Efficiency
25	100%	3.5	73%
20	92%	3.25	72%
15	88%	3	71%
10	86%	2.75	70%
8	84%	2.5	68%
6	80%	2.25	67%
5	78%	2	65%
4.75	77%	1.75	62%
4.5	76%	1.5	59%
4	75%	1.25	55%
3.75	74%	1	50%

Softeners can be used to improve the radius of contact when using a wire rope sling around a 90° corner. The softener's purpose is to create a contact radius of at least 6 times the wire rope diameter.



Lift must comply with the following:

- Load attachment points must be above the center of gravity
- Inspect all H&R equipment prior to lift.
- Ensure all H&R equipment has a current annual inspection.
- Softeners must be used on sharp edges.



ORNL Ordinary Lift Plan

Pre-Lift Checklist (To be performed prior to lift):				
<ul style="list-style-type: none"> Pre-Job Brief Designated Signal Person Annual Inspections currents on H&R equipment 	<ul style="list-style-type: none"> Equipment Inspected prior to lift Center of gravity identified capacities reduced 	<ul style="list-style-type: none"> Edge protectors used as needed Attachment points identified Load path and landing area clear 	<ul style="list-style-type: none"> Evacuation paths identified Load drop zone controlled Load will lift freely 	
Section 6				
Approvals – Valid for up to two (2) years				
Hoisting and Rigging Designated Leader or Hoisting and Rigging Competent Person	Print Name	Signature	Badge #	Date
	Mike Foy <small>Digitally signed by Mike Foy Date: 2023.08.15 14:26:47-0400</small>		693731	
Section 7				
Pre-Lift Briefing				
<p>The following hoisting and lifting personnel have attended the pre-lift meeting, reviewed the approved lift plan, and understand the procedure and equipment to be used (sign on back as necessary)</p>				
Name/Signature		Badge #	Date	
<i>John Bob</i>		<i>20801</i>	<i>8-28-23</i>	
<i>Ronald J. Phillips</i>		<i>24708</i>	<i>8-28-23</i>	
<i>Jacob Tins</i>		<i>73202</i>	<i>8-28-23</i>	
<i>Kyle Orr</i>		<i>2064007</i>	<i>8-28-23</i>	
<i>Dylan Purkey / Dylan Purkey</i>		<i>3097799</i>	<i>8-28-23</i>	
<i>Kevin Webster / Kevin J. Webster</i>		<i>783247</i>	<i>8-28-23</i>	
<i>S Guerineau</i>		<i>743560</i>	<i>8/28/23</i>	

Section 8: Additional Information (I.e., Applicable Load Travel Path/ Load Schematic and Rigging Method)
(May also be attached to back of plan)

N/A

ORNL-544 (4/18/2019)

ORNL Ordinary Lift Plan

Section 1		
Work Package, Work Order, or RSS Number:	Various work packages	Plan Prepared by: Mike Foy

Section 2	
Lift Description <p>Lift includes various size valves, PRV, piping, motors, pumps, and associated pieces. Pipe sizes range from 1 inch to 24 inches in diameter to 1 ft to 15 ft long. Weight to be lifted for this lift plan is 1 lb. to 1,750 lbs. Total max with rigging is 1,800 lbs. An assigned trained designated leader will review hoisting and rigging activity to determine the specific equipment to be used based on weight of objects and lifting point availability (e.g., structure, A-frame). Lifts will be performed using a manual chain fall or lever hoist with the hitch types being vertical, choker or basket. For this lift plan, one leg of rigging may be used for each lift or chain fall load hook will attach directly to rigging hardware. Shackles may be used. All rigging will utilize a 90-degree angle. See Special requirements for lifting in a basket hitch and sling angles. THIS PLAN DOES NOT ALLOW A WIRE ROPE BASKET HITCH THRU RIGGING HARDWARE (E.G. SHACKLE, SWIVEL HOIST RING) OR THE USE OF EYEBOLTS.</p>	
Lift Information	
<u>Center of Gravity determined by:</u>	
<input checked="" type="checkbox"/> Manufacturer <input checked="" type="checkbox"/> Trial and Error <input checked="" type="checkbox"/> Calculations <input checked="" type="checkbox"/> Other (Describe) If object is uniform, it is assumed the COG is centrally located. Trial and Error will be used on all lifts.	
<u>Weight of item:</u> <u>max 1,750 lbs.</u>	<u>Sling angle:</u> <u>90 deg.</u>
<u>No. of Legs:</u> <u>1 leg</u>	<u>Load angle factor/multiplier:</u> <u>1</u>
<u>Size:</u> <u>various</u>	<u>D/d ratio reduction in efficiency for wire rope slings:</u> <u>50 %</u>
<u>Length:</u> <u>various</u>	<u>Sling Tension>Loading:</u> <u>max 1,750 lbs.</u> (Weight of load will be the tension on sling)
<u>Hitch Type:</u> <input checked="" type="checkbox"/> Vertical <input checked="" type="checkbox"/> Choker <input checked="" type="checkbox"/> Basket	
<u>Sling Type/Bridle Information:</u>	
<input checked="" type="checkbox"/> Nylon <input checked="" type="checkbox"/> Wire <input type="checkbox"/> Metal <input type="checkbox"/> Other:	

Section 3	
Hoisting Equipment/Below the Hook/Lifting Equipment	Capacity
Manual Chain Hoist/Fall	2,000 lbs.
Lever Hoist	3,000 lbs.
A-Frame	2,000 lbs.
Trolley	2,000 lbs.
Beam Clamp (BTH)	4,000 lbs.
Beam Clamp (BTH)	2,000 lbs.

Section 4			
Rigging Equipment	Capacity	Rigging Hardware	Capacity
Nylon sling EE2-902	V: 6,400 lbs. CH: 4,800 lbs. B: 12,800 lbs. Reduction for 45 deg angle 9,051 lbs.	3/8" Shackle	2,000 lbs.
		7/16" Shackle	3000 lbs.
Nylon Sling EE2-901	V: 3,200 lbs. CH: 2,400 lbs. B: 6,400 lbs. Reduction for 45 deg angle 4,525 lbs.	1/2" Shackle	4,000 lbs.

ORNL Ordinary Lift Plan

3/8" Wire Rope (12 ft)	V: 2,400 lbs. CH: 1,860 lbs. B: 4,800 lbs. Reduction for 45 deg angle 3,394 lbs. D/d @ 50 % efficiency: 2,400 lbs. for a load with a 1-inch diameter.	5/8" Shackle 3/4" Shackle	6.500 lbs. 9,500 lbs.
3/8" Wire Rope (4-ft)	V: 2,800 lbs. CH: 2,200 lbs. B: 5,800 lbs. Reduction for 45 deg angle 4,000 lbs. D/d @ 50 % efficiency: 2,900 lbs. for a load with a 1-inch diameter.		

Section 5

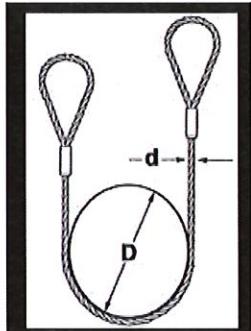
Special requirements (facility requirements, communication methods, etc.):

Supervision will assign a trained designated leader to review rigging equipment. In addition, sling angles for items in a one leg basket configuration prior to lift. for D/d ration efficiency.

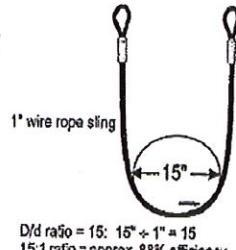
Basket hitches are not allowed to go below a 45-degree load which equals a 0.7071 loss factor in the working load.

Wire Rope D/d ratio example and info for designated leader. When a wire rope is used in a basket configuration, the designated leader must review the D/d ratio and the wire rope sling capacity adjusted (as needed) based on the given chart's efficiency rating. The wire load capacity must not be exceeded.

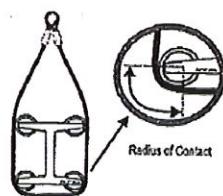
Example and information



D/d	Efficiency	D/d	Efficiency
25	100%	3.5	73%
20	92%	3.25	72%
15	88%	3	71%
10	88%	2.75	70%
8	84%	2.5	68%
6	80%	2.25	67%
5	78%	2	65%
4.75	77%	1.75	62%
4.5	76%	1.5	59%
4	75%	1.25	55%
3.75	74%	1	50%



Softeners can be used to improve the radius of contact when using a wire rope sling around a 90° corner. The softener's purpose is to create a contact radius of at least 6 times the wire rope diameter.



Lift must comply with the following:

- Load attachment points must be above the center of gravity
- Inspect all H&R equipment prior to lift.
- Ensure all H&R equipment has a current annual inspection.
- Softeners must be used on sharp edges.

Pre-Lift Checklist (To be performed prior to lift):

• Pre-Job Brief	• Equipment Inspected prior to lift	• Edge protectors used as needed	• Evacuation paths identified
• Designated Signal Person	• Center of gravity identified	• Attachment points identified	• Load drop zone controlled
• Annual Inspections currents on H&R equipment	• capacities reduced	• Load path and landing area clear	• Load will lift freely

Section 6

Approvals – Valid for up to two (2) years

	Print Name	Signature	Badge #	Date
Hoisting and Rigging Designated Leader or Hoisting and Rigging Competent Person	Mike Foy	<small>Digitally signed by Mike Foy Date: 2023.08.15 14:29:32 -04'00'</small>	693731	



ORNL Ordinary Lift Plan

Section 7

Pre-Lift Briefing

The following hoisting and lifting personnel have attended the pre-lift meeting, reviewed the approved lift plan, and understand the procedure and equipment to be used (sign on back as necessary)

Name/Signature

Donald Phillips
Del Soto
Mike
J. Guirinot
Dylan Purkey / Dylan Purky
Maren Webster / Maren J. Webster

Badge #

28208
300801
73702
3066007
743560
3097799
985297

Date

8/28/2023
8-28-23
8-28-23
8-28-23
8/28/23
8-28-23
8-28-23

Section 8: Additional Information (I.e., Applicable Load Travel Path/ Load Schematic and Rigging Method) (May also be attached to back of plan)

N/A

ORNL-544 (4/18/2019)

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 and the following Low Risk Justification:
- 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 or 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 (list): hexavalent chromium. Discuss controls incorporated into *Work Control* to assure EA is conducted in the future (list):

Process/Job/Task: Facilities Maintenance / Welder-Pipefitter / welding and grinding stainless steel.
(SEG/SET Name)

Work Description: All pressure piping repairs shall be fabricated and installed to the following UT-Battelle engineering standards, pipe specifications and welding specifications.

Facility #:	Plant wide	Organization:	Utilities	Room/Lab/Shop #:	N/A	RSS/Work Plan #:	Various
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Agents and Control Information

Process/Job/Task		Agent	Quantity or Magnitude	¹ Potential Routes of Entry	Primary Exposure Forms	Frequency of Exposure	Duration of exposure per exposure Event	² Engineering/ 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 Fabrication / Welder / SMAW and GTAW stainless steel		hexavalent chromium		inh	Particulate	Quarterly	1/2 - 2 hours	GV, Hood	5 ug/m3	4	2	1	10	Uncertain (8-15)
2				-----	-----	-----	-----		-----
3				-----	-----	-----	-----		-----
4				-----	-----	-----	-----		-----
5				-----	-----	-----	-----		-----
6				-----	-----	-----	-----		-----

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	NO	Use of point source ventilation required for all welding activities in shops and outdoors. Personal air sampling should be conducted for welding activities	Medium	3 years	YES	Conduct air sampling to assess exposure as applicable
2	-----		-----	-----	---	
3	-----		-----	-----	---	
4	-----		-----	-----	---	
5	-----		-----	-----	---	
6	-----		-----	-----	---	

Additional Comments

Qualified H&S Professional: David Joyce 612878

Date: 11/20/2024

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,

*See the [Hodge and Sterner toxicity classification scale](#)

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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating

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

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

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 and the following Low Risk Justification:
- 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 or 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 (list): Mg and iron oxide. Discuss controls incorporated into Work Control to assure EA is conducted in the future (list):

Process/Job/Task: Facilities Maintenance / Welder-Pipefitter / welding and grinding carbon steel.
(SEG/SET Name)

Work Description: All pressure piping repairs shall be fabricated and installed to the following UT-Battelle engineering standards, pipe specifications and welding specifications.

Facility #:	Plant wide	Organization:	Utilities	Room/Lab/Shop #:	N/A	RSS/Work Plan #:	Various
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Agents and Control Information

	Process/Job/Task	Agent	Quantity or Magnitude	¹ Potential Routes of Entry	Primary Exposure Forms	Frequency of Exposure	Duration of exposure per exposure Event	² Engineering/ 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	Fabrication / Welder / SMAW and GTAW carbon steel	Manganese		inh	Particulate	Weekly	< 1/2 hour	GV, Hood	.02 mg/m3	4	2	1	10	Uncertain (8-15)
2	Fabrication / Welder / SMAW and GTAW carbon steel	iron oxide		inh	Particulate	Weekly	< 1/2 hour	GV, Hood	5 mg/m3	3	1	2	8	Uncertain (8-15)
3	Fabrication / Welder/pipefitter gringing	Noise	93 dBA	Other	Other	Weekly	1/2 - 2 hours	T, L/P, P, MS	85 dBA	3	3	1	6	Acceptable (2 - 7)
4				-----	-----	-----	-----	-----	-----
5				-----	-----	-----	-----	-----	-----
6				-----	-----	-----	-----	-----	-----

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	NO	Use of general or point source ventilation required for welding activities. Personal air sampling should be conducted for welding activities	Medium	3 years	YES	Conduct air sampling to assess exposure as applicable.	
2	NO	Use of general or point source ventilation required for welding activities. Personal air sampling should be conducted for welding activities	Low	3 years	YES	Conduct air sampling to assess exposure as applicable	
3	YES	Use of hearing protection with a minimum NRR of 25 required for grinding operations.	-----	-----	---		
4	-----		-----	-----	---		
5	-----		-----	-----	---		
6	-----		-----	-----	---		

Additional Comments

Qualified H&S Professional: David Joyce 612878

Date: 11/20/2024

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,

*See the [Hodge and Sterner toxicity classification scale](#)

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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating

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

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

Lfg71
ORNL INTERNAL USE ONLY**RECID L0971****DATE 11/10/2020**

SAFETY DATA SHEET

INGERSOLL RAND

Product name: Ingersoll Rand Ultra Coolant

Issue Date: 03/19/2019

Print Date: 04/02/2019

INGERSOLL RAND encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: Ingersoll Rand Ultra Coolant

Recommended use of the chemical and restrictions on use

Identified uses: Selection of the appropriate polyglycol product for a specific application requires knowledge of the fluid requirements of the application, awareness of the most important of these requirements, and a match-up with the properties of the various polyglycol materials. Polyglycol products can be formulated for use in numerous industry applications such as hydraulic fluids, quenchants, compressor and refrigeration lubricants, heat transfer fluids, machinery lubricants, solder assist fluids, metalworking lubricants, textile finishing, etc. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated-use, please contact your sales or technical service representative.

COMPANY IDENTIFICATION

Distributed By
INGERSOLL RAND
800D BEATY ST
DAVIDSON, NC 28036
UNITED STATES

Customer Information Number: +01 704-655-4000

EMERGENCY TELEPHONE NUMBER

U.S.A. 24-Hour Emergency # : 800-424-9300
Outside U.S.A. 24-Hour Emergency # : +01 703-527-3887

2. HAZARDS IDENTIFICATION

Hazard classification

This product is not hazardous under the criteria of the Hazardous Products Regulation (HPR) as implemented under the Workplace Hazardous Materials Information System (WHMIS 2015).

Other hazards

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Product name: Ingersoll Rand Ultra Coolant**Issue Date: 03/19/2019**

This product is a mixture.

Component	CASRN	Concentration
Polypropylene glycol monobutyl ether	9003-13-8	> 65.0 - < 70.0 %
Fatty acids, C5-C10, esters with pentaerythritol	68424-31-7	> 25.0 - < 30.0 %
Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	68411-46-1	> 4.0 - < 6.0 %
Barium dinonyl-naphthalene sulfonate	25619-56-1	< 0.3 %

4. FIRST AID MEASURES

Description of first aid measures

General advice:

If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed:

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to section 7, Handling, for additional precautionary measures.

Environmental precautions: Material will float on water. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: No special precautions required. Do not use sodium nitrite or other nitrosating agents in formulations containing this product. Suspected cancer-causing nitrosamines could be formed. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Conditions for safe storage: Store in the following material(s): 316 stainless steel. Carbon steel. Glass-lined container. Polypropylene. Polyethylene-lined container. Stainless steel. Teflon. This material may soften and lift certain paint and surface coatings. Use product promptly after opening.

Store in original unopened container. Unopened containers of material stored beyond the recommended shelf life should be retested against the sales specifications before use. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

Storage stability

Shelf life: Use within
5 year

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Consult local authorities for recommended exposure limits.

Component	Regulation	Type of listing	Value/Notation
Barium dinonyl-naphthalene sulfonate	ACGIH	TWA	0.5 mg/m ³ Barium
	CA AB OEL	TWA	0.5 mg/m ³ Barium
	CA QC OEL	TWAEV	0.5 mg/m ³ Barium
	CA BC OEL	TWA	0.5 mg/m ³ Barium

Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl alcohol ("PVA"). Polyvinyl chloride ("PVC" or "vinyl"). Viton. **NOTICE:** The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: When prolonged or frequently repeated contact could occur, use protective clothing chemically resistant to this material. Selection of specific items such as faceshield, boots, apron, or full-body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk

Product name: Ingersoll Rand Ultra CoolantIssue Date: 03/19/2019

assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator.

||| The following should be effective types of air-purifying respirators: Organic vapor cartridge.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquid.
Color	Brown
Odor	Mild
Odor Threshold	No test data available
pH	8 - 10 ASTM E70 (16% in water/methanol, 1:10)
Melting point/range	Not applicable to liquids
Freezing point	See Pour Point
Boiling point (760 mmHg)	> 200 °C Calculated.
Flash point	closed cup 210 °C ASTM D 93
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not applicable to liquids
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	< 0.01 mmHg at 20 °C ASTM E1719
Relative Vapor Density (air = 1)	No test data available
Relative Density (water = 1)	0.9901 at 25 °C / 25 °C ASTM D891
Water solubility	< 1 g/L at 20 °C Measured
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	388 °C ASTM E659
Decomposition temperature	No test data available
Kinematic Viscosity	49.7 - 56.4 cSt at 37.8 °C ASTM D 445
Explosive properties	No data available
Oxidizing properties	No data available
Liquid Density	0.9872 g/cm3 at 25 °C ASTM D941
Molecular weight	No test data available
Pour point	-28.9 °C ASTM D97

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Product name: Ingersoll Rand Ultra Coolant**Issue Date:** 03/19/2019

Chemical stability: Thermally stable at typical use temperatures.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes. Alcohols. Ethers. Hydrocarbons. Ketones. Organic acids. Polymer fragments.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

LD50, Rat, male, > 5,000 mg/kg

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50, Rabbit, > 2,000 mg/kg No deaths occurred at this concentration.

Acute inhalation toxicity

At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous. For respiratory irritation and narcotic effects: No relevant data found. As product: The LC50 has not been determined.

Skin corrosion/irritation

Brief contact is essentially nonirritating to skin.

Repeated contact may cause severe skin irritation with local redness and discomfort.

Serious eye damage/eye irritation

May cause slight temporary eye irritation.

Corneal injury is unlikely.

Sensitization

Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Based on information for component(s):

Product name: Ingersoll Rand Ultra Coolant**Issue Date: 03/19/2019**

Based on available data, repeated exposures to small amounts are not anticipated to cause significant adverse effects.

Carcinogenicity

No specific, relevant data available for assessment.

Teratogenicity

No specific, relevant data available for assessment.

Reproductive toxicity

No specific, relevant data available for assessment.

Mutagenicity

No specific, relevant data available for assessment.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

COMPONENTS INFLUENCING TOXICOLOGY:**Polypropylene glycol monobutyl ether****Acute inhalation toxicity**

For similar material(s): Rat, 8 Hour, No deaths occurred following exposure to a saturated atmosphere.

Fatty acids, C5-C10, esters with pentaerythritol**Acute inhalation toxicity**

The LC50 has not been determined.

Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene**Acute inhalation toxicity**

As product: The LC50 has not been determined.

Barium dinonyl-naphthalene sulfonate**Acute inhalation toxicity**

LC50, Rat, 1 Hour, dust/mist, > 21 mg/l No deaths occurred at this concentration.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity**Acute toxicity to fish**

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

LL50, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, > 100 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EL50, Daphnia magna (Water flea), static test, 48 Hour, > 100 mg/l, OECD Test Guideline 202 or Equivalent

Persistence and degradability

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

10-day Window: Pass

Biodegradation: 83 %

Exposure time: 29 d

Method: OECD Test Guideline 301A or Equivalent

10-day Window: Not applicable

Biodegradation: 81 %

Exposure time: 28 d

Method: OECD Test Guideline 302B or Equivalent

Theoretical Oxygen Demand: 2.37 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	5 %
10 d	8 %
20 d	10 %
28 d	31 %

Bioaccumulative potential

Bioaccumulation: No specific, relevant data available for assessment.

Mobility in soil

No specific, relevant data available for assessment.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler, Reclaimer, Incinerator or other thermal destruction device.

14. TRANSPORT INFORMATION**TDG**

Not regulated for transport

Product name: Ingersoll Rand Ultra CoolantIssue Date: 03/19/2019**Classification for SEA transport (IMO-IMDG):**

Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Not regulated for transport Consult IMO regulations before transporting ocean bulk
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Classification for AIR transport (IATA/ICAO):

Not regulated for transport

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION**Canadian Domestic Substances List (DSL)**

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. OTHER INFORMATION**Hazard Rating System****NFPA**

Health	Flammability	Instability
0	1	0

Revision

Identification Number: / A208 / Issue Date: 03/19/2019 / Version: 8.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
CA AB OEL	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
CA BC OEL	Canada. British Columbia OEL
CA QC OEL	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
TWA	8-hour time weighted average
TWAEV	Time-weighted average exposure value

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); EC_x - Concentration associated with x% response; EHS - Extremely Hazardous Substance; EL_x - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErC_x - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

INGERSOLL RAND urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

CA

Product name: Ingersoll Rand Ultra Coolant

Issue Date: 03/19/2019

Qualitative Exposure Assessment – Multiple Hazard Form

Project Information

<input type="checkbox"/> No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task <input type="checkbox"/> 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 or some or all agent(s)/hazard(s). List the agent(s) for which a QEA could not be conducted: <input type="checkbox"/> All Agents (see below) or Specific Agent(s) that could not be assessed: . Discuss controls incorporated into <i>Work Control</i> to assure EA is conducted in the future:				
Process/Job/Task: (SEG/SET Name)	GENERIC WORK PLAN FOR INSULATORS GRADE 2 SHOP FABRICATION & FIELD INSTALLATION			
Work Description:	THE FOLLOWING TASKS HAVE BEEN IDENTIFIED TO MEET THAT CRITERIA FOR: PREFABRICATE SHOP WORK AND FIELD INSTALLATION HOT & COLD APPLICATIONS, FOR THE INSTALLATION OF FIBERGLASS, ARMAFLEX AND FOAM GLASS ON PIPING SYSTEMS, PERLITE, CALCIUM SILICATE, CHILLED WATER HVAC PIPING AND DUCT WORK. PREFABRICATE SHOP WORK AND FIELD INSTALLATION. THIS WORK PLAN ALSO COVER THE REMOVAL OF THESE PRODUCTS: COMPACT ASBESTOS, FIBERGLASS, CALCIUM SILICATE AND FOAMGLASS. PLANT WIDE PICK UP OF ASBESTOS, AND FIBEROUS MATERAIL WASTE FOR DISPOSAL. ENCLAPSULATION OF DAMAGED PIPING AND DUCT INSULATION WITH WETTABLE CLOTH, TAPE, METAL JACKET OR CP-11 MASTIC. REPAIRING AND CLEANING OF WATER SPRAYS, VACUUMS AND ABATEMENT TOOLS. NOTE: THE BUILDING AND LOCATION SHALL BE HAND WRITTEN FOR EACH PROJECT. THIS WORK PACKAGE SHALL ALSO CONTAIN THE FOLLOW IF REQUIRED. INSULATION SPECIFICATION, BUILDING CONTACTS, FLOOR PLAN, PICTURES.			
Facility #:	VARIOUS		Room/Lab/Shop #:	VARIOUS
Organization:	MECHANICAL UTILITIES		RSS/Work Plan #:	MU-PA_XXXX

Agents and Control Information

	Process/Job/Task	Agent	Quantity or Magnitude	¹ Potential Routes of Entry	Primary Exposure Forms	Frequency of Exposure	Duration of exposure per exposure Event	² Engineering/ 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	APPLYING I-CHEM WEB SPRAY ADHESIVE - RECID E0499	PROPANE	UNKNOWN	INH	Vapor	Variable	1/2 - 2 hours	GV, P	1000 PPM	3	2	1	6	Acceptable (2-7)
2	APPLYING I-CHEM WEB SPRAY ADHESIVE - RECID E0499	ACETONE	UNKNOWN	INH, A	Vapor	Variable	1/2 - 2 hours	GV, P	250 PPM	3	2	1	6	Acceptable (2-7)
3	APPLYING I-CHEM WEB SPRAY ADHESIVE - RECID E0499	BUTANE	UNKNOWN	INH	Vapor	Variable	1/2 - 2 hours	GV, P	1000 PPM	3	2	1	6	Acceptable (2-7)
4	APPLYING I-CHEM WEB SPRAY ADHESIVE - RECID E0499	METHYL ACETATE	UNKNOWN	INH	Vapor	Variable	1/2 - 2 hours	GV, P	200 PPM	3	2	1	6	Acceptable (2-7)
5				-----	-----	-----	-----	-----	-----	-----
6				-----	-----	-----	-----	-----	-----	-----

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	PRODUCT IS APPLIED OUTDOORS OR IN AREAS WITH SUFFICIENT VENTILATION TO MINIMIZE VAPOR BUILD-UP.		Low	3 years	NO	IF PRODUCT WILL BE APPLIED IN TIGHT SPACES OR IN ANY AREA(S) WITH LIMITED VENTILATION, THE USE OF FANS TO REDUCE VAPOR BUILD-UP IS REQUIRED.
2 YES	PRODUCT IS APPLIED OUTDOORS OR IN AREAS WITH SUFFICIENT VENTILATION TO MINIMIZE VAPOR BUILD-UP.		Low	3 years	NO	IF PRODUCT WILL BE APPLIED IN TIGHT SPACES OR IN ANY AREA(S) WITH LIMITED VENTILATION, THE USE OF FANS TO REDUCE VAPOR BUILD-UP IS REQUIRED.
3 YES	PRODUCT IS APPLIED OUTDOORS OR IN AREAS WITH SUFFICIENT VENTILATION TO MINIMIZE VAPOR BUILD-UP.		Low	3 years	NO	IF PRODUCT WILL BE APPLIED IN TIGHT SPACES OR IN ANY AREA(S) WITH LIMITED

Qualitative Exposure Assessment – Multiple Hazard Form

						VENTILATION, THE USE OF FANS TO REDUCE VAPOR BUILD-UP IS REQUIRED.
4	YES	PRODUCT IS APPLIED OUTDOORS OR IN AREAS WITH SUFFICIENT VENTILATION TO MINIMIZE VAPOR BUILD-UP.	Low	3 years	NO	IF PRODUCT WILL BE APPLIED IN TIGHT SPACES OR IN ANY AREA(S) WITH LIMITED VENTILATION, THE USE OF FANS TO REDUCE VAPOR BUILD-UP IS REQUIRED.
5	-----		-----	-----	---	
6	-----		-----	-----	---	

Additional Comments

Qualified H&S Professional: Bekkah Massaro, 3077143

Date: 12/6/2024

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,

*See the [Hodge and Sterner toxicity classification scale](#)

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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating

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

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

Qualitative Exposure Assessment – Multiple Hazard Form

Project Information

<input type="checkbox"/> No QEA is required based upon a review of the type(s) of hazard(s) associated with the activity/task <input type="checkbox"/> 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: <input type="checkbox"/> All Agents (see below) or Specific Agent(s) that could not be assessed: . Discuss controls incorporated into <i>Work Control</i> to assure EA is conducted in the future:		
Process/Job/Task: (SEG/SET Name)	GENERIC WORK PLAN FOR INSULATORS GRADE 2 SHOP FABRICATION & FIELD INSTALLATION	
Work Description:	THE FOLLOWING TASKS HAVE BEEN IDENTIFIED TO MEET THAT CRITERIA FOR: PREFABRICATE SHOP WORK AND FIELD INSTALLATION HOT & COLD APPLICATIONS, FOR THE INSTALLATION OF FIBERGLASS, ARMAFLEX AND FOAM GLASS ON PIPING SYSTEMS, PERLITE, CALCIUM SILICATE, CHILLED WATER HVAC PIPING AND DUCT WORK. PREFABRICATE SHOP WORK AND FIELD INSTALLATION. THIS WORK PLAN ALSO COVER THE REMOVAL OF THESE PRODUCTS: COMPACT ASBESTOS, FIBERGLASS, CALCIUM SILICATE AND FOAMGLASS. PLANT WIDE PICK UP OF ASBESTOS, AND FIBEROUS MATERAIL WASTE FOR DISPOSAL. ENCLAPSULATION OF DAMAGED PIPING AND DUCT INSULATION WITH WETTABLE CLOTH, TAPE, METAL JACKET OR CP-11 MASTIC. REPAIRING AND CLEANING OF WATER SPRAYS, VACUUMS AND ABATEMENT TOOLS. NOTE: THE BUILDING AND LOCATION SHALL BE HAND WRITTEN FOR EACH PROJECT. THIS WORK PACKAGE SHALL ALSO CONTAIN THE FOLLOWING IF REQUIRED: INSULATION SPECIFICATION, BUILDING CONTACTS, FLOOR PLAN, PICTURES	
Facility #: VARIOUS		Room/Lab/Shop #: VARIOUS
Organization: MECHANICAL UTILITIES		RSS/Work Plan #: MU-PA_XXXX

Agents and Control Information

Process/Job/Task		Agent	Quantity or Magnitude	¹ Potential Routes of Entry	Primary Exposure Forms	Frequency of Exposure	Duration of exposure per exposure Event	² Engineering/ 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	APPYLING/REMOVING CHILDERS CP-11	CRYSTALLINE SILICA	UNKNOWN	INH	Particulate	Variable	1/2 - 2 hours	GV, W, P, T	0.025 mg/m3	4	1	1	4	Acceptable (2)
2	APPYLING/REMOVING CHILDERS CP-11	ATTAPULGITE	UNKNOWN	INH	Particulate	Variable	1/2 - 2 hours	GV, W, P, T	Not Listed	4	1	1	4	Acceptable (2)
3	APPYLING/REMOVING CHILDERS CP-11	TITANIUM DIOXIDE	UNKNOWN	INH	Particulate	Variable	1/2 - 2 hours	GV, W, P, T	10 mg/m3	4	1	1	4	Acceptable (2)
4	APPYLING CHILDERS CP-11	VINYL ACETATE	UNKNOWN	INH	Vapor	Variable	1/2 - 2 hours	GV, P	10 PPM	4	1	1	4	Acceptable (2)
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6				-----	-----	-----	-----	-----	---	---	---	---	-----	

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	Being applied wet therefore particles are bound in liquid; removal is performed with wet methods to minimize dust		Low	3 years	NO	
2 YES	Being applied wet therefore particles are bound in liquid; removal is performed with wet methods to minimize dust		Low	3 years	NO	
3 YES	Being applied wet therefore particles are bound in liquid; removal is performed with wet methods to minimize dust		Low	3 years	NO	
4 YES	Being applied wet therefore particles are bound in liquid; removal is performed with wet methods to minimize dust		Low	3 years	NO	
5 -----			-----	-----	----	

Qualitative Exposure Assessment – Multiple Hazard Form

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Additional Comments					

Qualified H&S Professional: David Joyce, 612878

Date: 11/20/24

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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,

*See the [Hodge and Sterner toxicity classification scale](#)

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% 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

** Use of personal protective equipment (including respirators) shall not be taken into account when determining the exposure rating

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.

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