

Fermi National Accelerator Laboratory

Hazard Analysis

Work Package # 21201 - LHe transfer to QT storage dewars

Hazard Analysis - Form 2022-12284

Dates 30-MAR-2022 — 02-APR-2022

Managed By PPD — Particle Physics Division

Performed On Particle Physics Division

Authorizing Supervisor Tesarek, Rick (12680N) 630.840.8609

Project Name E1039

Prepared By Keller, Dustin (13081V) 630.840.

Job Description This is for the filling of two cryogenic purifier dewars using a commercial LHe dewar delivered. To ensure it is done safely and no hazards are introduced.

Point of Contact

Dustin Keller

Pre-job Briefing Conducted by

Dustin Keller

Package Location

Type	Name	Building Manager	Org
Floor	KTeV / NM4 Ground Floor [630]	Nelson, Leonard (05172N) 630.840.2564	PPD

Hazard Analysis

Check the MS Equipment Database for equipment you can use to complete your job: ([MS Equipment DB](#))

Check out questions that should be used when job planning or conducting pre-job briefing: ([Job Planning/Pre-Job Brief Questions](#))

Emergency Work

Check this box to indicate this is emergency work that is required to be done immediately before electronic approvals can be obtained. (NOTE: Electronic approvals should still be obtained retroactively.)

Additional Details

Check the boxes next to all types of work and known hazards you may encounter on this job.

COVID-19 Protective Measures ([Guidance Documents](#))

- Maintain 6 ft. or greater social distance when possible
- Surgical Mask or other Lab-approved Mask
- Face Shield
- Safety Glasses / Goggles
- Impervious Gloves
- Clean Surfaces Used
- Wash/Sanitize Hands
- Other Protective Measures Not Listed Above (List in Text Box below)

Close Proximity Work < 6 feet

- 1. Check this box to select the D/S personnel performing the close proximity work (check ALL that apply)
 - 2. Check this box to select where the close proximity work will be performed (check ALL that apply).
-

Industrial Hazards

- Flammable Gas Areas
- Heat Stress / Cold Stress
- Structural Demolition
- Excavation
- Scaffold Erection
- Scaffold Use
- Ladder Use
- Steel Erection
- Fall Protection - Fall Exposures >4 feet (>6 feet for construction)
- Overhead Crane
- Powered Industrial Truck (e.g. forklift)
- Mobile Elevating Work Platform (MEWP) (e.g. Scissor Lift, Aerial Lift, Bucket Truck, etc.)
- Mobile Crane
- Critical Crane Lift
- Crane Personnel Basket
- Rotating Equipment
- High Pressure air/fluids
- Welding/Cutting/Brazing/Grinding
- Lead (Lead paint, moving bricks, cutting sheets, soldering)
- Chemical Use (cleaners, solvents, adhesives, etc.) - If checked attach or link SDS to the HA [Upload Files](#)
- [Add Hyperlinks](#)
- Lasers
- Non-ionizing radiation (RF, UV, magnets)
- Confined Space
- Ergonomics (overexertion, repetition, heavy lifting, awkward lifting, static posture)
- Silica (machining - concrete, asphalt, grout, mortar)
- Loud Noise (continuous, instantaneous)
- Asbestos (presumed or suspect building materials, e.g. tile, pipe insulation, roofing materials, etc.)

- Nanomaterial (1-100nm, ex. buffing solutions, surface material coating, 3d printing)
- Beryllium
- Potential Oxygen Deficiency - ODH 1 or ODH 2 Area
- Robotics

Electrical Hazards

- Manipulative Energized Work
- Diagnostic Energized Work (inc. LOTO verification)
- Working within 25 feet of 345kV overhead utilities
- Working within 10 feet of overhead utilities

Environmental Hazards

- Impact or release to surface, sanitary, or ground water
- Impact to new or existing air emission sources, including equipment/generators
- Generation of regulated waste (hazardous, special, universal)
- Use of refrigerants (NOTE: Refrigerant work must be performed by an EPA certified technician and coordinated through the FESS Refrigerant Manager.)
- Use of Oil (> 55 gal) or new oil filled equipment
- Release of a chemical or use of a new chemical
- Impact to a naturally sensitive area or historical site

Radiation Safety

- Posted Radiological Area (Radiation Area, HRA, Contamination, Airborne)
- Radioactive Material, Ionizing Radiation, Radiation Sources, RGDs, RAW systems, Exhaust Systems, Beamline Components - including targets & absorbers
- Area working in ≥ 100 mrem/hr
- Worker receiving ≥ 50 mrem for the job

General Hazards

- Traffic Control
- Working above others
- Biological Hazards
- Other Hazards not listed here? Enter them in the text box below.

Liquid Helium

Check the boxes next to all types of PPE and Controls you will need for this job.

Personal Protective Equipment (PPE)

- Hardhat
- Bump cap
- Steel-toed boots
- Steel-toed shoes
- Gloves - leather
- Gloves - chemical

- Gloves - electrical
- High visibility clothing
- Gloves - Cryogenic
- Gloves - Nitrile
- Safety Glasses
- Safety goggles
- Safety goggles - chemical
- Safety goggles - impact/face shield
- Welding goggles/helmet
- Fall Protection
- Respirators (air purifying), cartridge
- Respirators - supplied air
- Long Sleeve Shirts
- Long Pants without Cuffs
- Arm - cut protection
- Leg - cut protection
- Apron - Cryogenic
- Whole body - electrical
- Whole body - Dust, chemical, heat
- Tyvek Coveralls
- Tyvek Boot Covers
- Earmuffs (enter noise reduction rating (NRR) in text box below)
- Ear Plugs (enter noise reduction rating (NRR) in text box below)
- Other PPE not listed here? Enter them in the text box below.

Controls

- Danger tape & signage
- Orange Construction Fence / Snow Fence
- Barricades - solid
- Barricades - soft (caution tape)
- Soil/erosion control
- Road Closure
- Site dust control
- Other Controls not listed here? Enter them in the text box below.

Hazard / Mitigation

Step #	Critical Step	Process Step	Hazard Details	Mitigation Details
1	No	Cryogenic Training	Exposure to cryogenics.	Personnel need to have general cryogenic safety training (FN000115) when handling cryogenics. Large portable liquefied gas dewar handling training (FN000475) is required for moving any 160L/240L dewars. Use proper PPE for cryogenics.
2	No	Connecting LHe	Accidental	Ensure the transfer line going from the commercial portable

		250L portable commercial dewar to QT storage dewars using LHe transfer line	exposure to cryogens. Release of cryogens.	dewar to the QT storage dewar has all fittings leak tight. Line should be vacuum insulated. QT storage dewar vent at 1 psi should be open to relieve pressure during the fill when not directly recovering helium through the helium recovery valve.
3	No	Monitor purifier pressure of storage dewar and commercial dewar	Possible over pressure of vessel and lifting of relief valves. Release of cryogens.	The helium space pressure of the QT storage dewar should be continuously monitored to ensure pressure does not increase beyond 5 psig. The QT dewar 1 psi relief port with check valve should be open during fill to ensure little pressure build up. Monitoring is done via the manual gauge on the dewar as well as digital pressure differential indicators in the QT PLC.
4	No	Monitor Liquid Level of QT storage dewar	Over filling of QT storage dewar	The liquid level of the QT storage dewar helium space should be continuously monitored. This is monitored via the PLC.
5	No	Close portable dewar valve when filling is complete.	Over filling of purifier. over pressurizing of purifier.	Ensure that the portable commercial dewars 1 psi relief port and isolation valve are completely closed when done filling.
6	No	Clean any condensation	Slipping/falling	Any condensation that has accumulated should be wiped up to prevent slipping and falling.
7	No	blow vented gas	ODH	Any time that the 1 psi vent is open to relieve helium directly into the Hall, have high powered industrial fan to actively blow the gas away from where personnel are positioned.

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Richard J. Tesarek 3/31/22

Project Name E1039



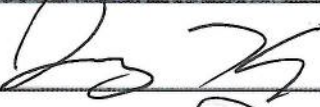

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The tasks have been reviewed in the work area where they will be performed, and the workers on this crew have been through required training.

NAME and ID (Please Print)	Signature	Date
Dustin Keller 13081V		3/31/22
Ishara Fernando		3/31/22
Joseph Herder 42719V		3/31/22
Vibodhan Bhandu		3/31/22
Kenichi Nakano 14459V	Kenichi Nakano	3/31/22

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