



Fermi National Accelerator Laboratory

Hazard Analysis

Work Package # 28201 - Routing NMR cables

Hazard Analysis - Form 2023-19864

Dates 24-JAN-2023 — 24-JAN-2023**Managed By** PPD — Particle Physics Division**Performed On** Particle Physics Division**Authorizing Supervisor** Tesarek, Rick (12680N) 630.840.8609**Prepared By** Fernando, M.A. Ishara (41284V) 630.840.**Job Description** Routing NMR cables between the cryo platform and the target cave at NM4 with appropriate fall protection equipment.**Workflow Status** Approved**Comments** I provisionally approve with the understanding that the use of a ladder represents an industrial hazard that wasn't checked.**Point of Contact** _____**Pre-job Briefing Conducted by** _____

Package Location

| Type | Name | Building Manager | Org |
|----------|------------------|--|-----|
| Property | KTeV / NM4 [630] | AFM: (Huey, Steve) TL: (Nelson, Leonard) | 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

Fall Protection rescue plan : Call 3131 and wait for the Fire Department

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
- Below-the-Hook Lifting Device
- 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.

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 | We will use two strings (one from the cryoplatfrom and one from the cave with the help of 1/4 stainless steel tube through the penetration where ODH tubing in was installed into the target cave) to route the NMR cable(s). | N/A | N/A |
| 2 | No | One person (Person A) with cable ties and cable cutter, will wear the fall protection equipment and attach it to the anchor point located near the stairs where the quite-power supply isolation transformers located at. Step over the hand rail across the ventilation duct to reach the shielding blocks. | Fall Hazard | Use Fall Protection equipment with Fall protection training. |
| 3 | No | Another person (Person B) needs go to the cryoplatfrom with one of the ~20ft string, and pass one-end of the string to Person A. | No Hazard | N/A |
| 4 | No | Person A will rout the string through the PVC pipe and let the string's end fall down to the ground-floor near the ODH fan area in front of the east penetration; and also will check PVC pipe attached to the cable tray is stable, otherwise tight it with more cable ties. | No Hazard | N/A |
| 5 | No | Then Person A should come back safely to the stairs and remove the fall protection equipment and then go to the ODH fan area on the ground-floor in front of the east penetration and hold that end of the string. | No Hazard | N/A |
| 6 | No | Person C will be in the cave and attach the 1/4" stainless-steel tube to the end of the NMR cable(s); then attach a ~20ft string to the other end of the 1/4" stainless-steel tube, and route through the penetration. | No Hazard | N/A |
| 7 | No | Person A near the ODH fan, use a ladder to help receiving the string coming from the penetration from Person C. And, once that string reached Person A will attach both strings (one from the cryoplatfrom and the one from the cave). | Fall Hazard | Use ladder with Fall protection training. |

| | | | | |
|----|----|---|-----------|-----|
| 8 | No | After communicating to Person B on the cryoplatfrom, will start pulling the string gently. | No Hazard | N/A |
| 9 | No | Person A needs to be watching all the time and communicate to B and C, to make sure the cable move towards the cryoplatfrom properly and safely. | No Hazard | N/A |
| 10 | No | Once Person B receives the NMR cable completely, detach the string from the NMR cable(s) and keep pulling until Persons A and C confirms that the cable routing is completed. | No Hazard | N/A |

Workflow | State Complete | Outcome Approved

Workflow Tasks

| Role | State | Submitted | Responder | Comments | Responded | Outcome |
|-------------------------|----------|-------------------|---------------|---|-------------------|----------|
| Start Notification | Complete | 20-JAN-2023 11:42 | | | 20-JAN-2023 11:42 | Notified |
| WPC_Construction_Safety | Complete | 20-JAN-2023 11:42 | Beebe, Robby | Looks good. Please remember to inspect all of the fall protection equipment prior to use. Tag and damaged equipment out of service. | 20-JAN-2023 13:00 | Reviewed |
| WPC_Fall Protection | Complete | 20-JAN-2023 11:42 | Cathey, David | To ensure each job step is understood and hazards associated with each step please have a verbal job walk down of the entire job.. Please discuss hazard mitigation during the job walk down. | 20-JAN-2023 12:12 | Reviewed |
| WPC_Hazardous_Work_SME | Complete | 20-JAN-2023 11:42 | Satti, Paul | | 20-JAN-2023 15:59 | Reviewed |
| Supervisor 12680N | Complete | 20-JAN-2023 16:00 | Tesarek, Rick | I provisionally approve noting that the use of a ladder is an industrial hazard that is not checked, though called out in the steps. | 21-JAN-2023 09:31 | Approved |
| Notify | Complete | 21-JAN-2023 09:31 | | | 21-JAN-2023 09:31 | Notified |

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