DUNE TC Risk Registry

ID	Title	System	Explanation	Risk Level	Mitigation
1	Personal injury	TC	Constructing the detector requires working underground, work at heights, handling heavy equipment, tests with high voltage, laser operation and other hazards.	H	The FNAL safety program will be followed. This includes proceedures for all work, training, use of personal protective equipment, and multiple levels of safety oversight. All reasonable measures to prevent workplace incidents will be
2	Cryostat damaged during installation	TC	Work in the cryostat includes transport of heavy objects and work at heights with tools. Dropping objects could damage the 1.2mm thick membrane floor. If heavy objects strike the walls they can be damaged.	L	A false floor is constructed inside the cryostat that will protect the cryostat floor during installation. The floor will be removed as late as possible to protect the floor for as long as possible. If work is done after the floor is
3	Transportation delay cause delays in the installation	TC	Delay in component shipping can produce delays in the installation schedule. In ProtoDUNE-SP some components were delayed by as much as 3 weeks due to customs. Installation palnning was driven by part availalbility.	H	A 1-month buffer of materials stored locally is planned for the DUNE installation.
4	Snow leads to lab closing	TC	Snow closures of 1-2 days occur several times per year.	L	The schedule will assume the average number of snow days.
5	Misplaced or missing components delay installation	TC	Workpackages will require several components before the work can be done. If some parts of an assembly are not available then the work installing that assembly cannot start. This is most disruptive if work starts before the missing components are identified.	H	A detailed Inventory system will be used based on the parts breakdown structure. This system will be used to verify all necessary compoents are available before shipping underground.
6	Customs/Visa Work Permit	TC	Difficulty bringing equipment or contract labor into the US can prevent necessary workfrom being performed.	H	The FNAL South Dakota division will provide support for DUNE. Import/Export and visa related issues will be expided by this division.
7	Underground Evacuation	TC	Mechanical equipment failure, ODH hazard and power failures can cause an underground evacuation.	L	Evacuation proceedures will be in place. Underground occupancy will be limited.
8	Local trained workers may not be available	TC	Local availability of trained people may be limited.	H	Hiring of key TC personel will start early and substantial trianing will be provided. The Ash River prototype will be used to train the installation crew and optimize proceedures.
9	Equipment failure during/after installation	DUNE	The process of installaing and cooling the detector down produces stress on the components that could cause failures.	M	All components are tested prior to delivery to SURF. The tests are sufficient to eliminate infant mortality failures. The APA assemblies are cold tested after all cabling and assembly is complete. The detector is installed in rows to prevent work on/near parts already installed. The detector is continuously readout to detect failures.
10	Mechanical interference problems prevent installaiton	TC	The detector is a complex device with many components. The risk exists that as the detector is assembled a mismatch in dimensions or runout in tolerances cause the components to not fit together.	H	An integration model of the full detector is being generated. Integration drawings defining key dimensions are generated to control the interfaces. Acceptance tests will be performed to assure that all components meet the interface requirements.