

# Copy of Tower Shipping Readiness Review Response to Recommendations

The following table summarizes the response to the recommendations contained in the [Tower Shipping Readiness Review Report](#). At this point all recommendations have been addressed.

#	Recommendation	Action	Addressed?
1A	Assess duration of cosmic ray exposure during tower testing.	The following times encompass the period between when the detectors leave SUF until the tower is stored underground and includes Tower Assembly and Tower Testing.  Tower 1: 4154 hrs; Tower 2: 291 hrs; Tower 3: 291 hrs; Tower 4: 314 hrs.	Yes
2A	Means should be identified to minimize the risk of the towers being over-delayed, especially at customs.	We have carried out multiple FedEx shipments from SLAC to SNOLAB and have observed no significant delays at customs. The planned border crossing is at Sault Ste. Marie, which is a 3 hour drive from SNOLAB in case there is an unexpected problem. We have added a contingency day to the schedule to provide a buffer against delay.	Yes
2B	Test shipment of the full path from the SNOLAB warehouse to the underground car wash.	Completed. Accelerometer data from movement of two crates from the dilution refrigerator system (crates 9 and 11) were analyzed. The accelerometer measurements were comparable to those measure in the tower shipping test and that moving the Tower Shipping Crates underground using a method analogous to the one employed for crates 9 and 11 is not expected to damage the towers. SLAC analysis is <a href="#">here</a> . SNOLAB analysis is <a href="#">here</a> .	Yes
2C	The "closer to SNOLAB" point should be defined as "After passing through El Paso, TX".	Added "In the event of poor conditions, the truck should be directed to return to SLAC if has not yet reached El Paso, TX." to step 11 of MP06 phase 2.	Yes
3A	Have SNOLAB develop a detailed plan for staffing requirements and consider any special arrangements that may be required, making sure the SNOLAB plan aligns with the SuperCDMS Plan.	Allan Barr has list of staffing needs and is making arrangements for surface and underground support. SuperCDMS shift crew has been organized.	Yes
3B	Develop a plan for use of the alternative underground storage location in Sudbury, including the movement plan for bringing towers to the alternative location.	Selected NORCAT as alternative underground storage location. Alex and Mitch Seguin (PM office manager) have inspected location. Arranging for trucking to site if needed.	Yes
3C	Further detail MP07 and the associated FMEA, including solidifying the plan to deal with rail crossings, identifying the minimum number of people to do the work, and their requisite qualifications.	Plan to use same procedure as for DR crates, where accelerometers monitored shipments and no significant shocks were associated with rail crossings. The minimum number of people required are 3-4 from SNOLAB (surface fork lift operator, underground forklift operator, project manager, logistics supervisor) and 3-4 SuperCDMS personnel to assist with the move. We could manage the move with a single fork lift operator for both surface and underground work, but our default plan is to have two operators.	Yes
4A	Further detail plans for minimizing shocks when traveling over rails and other obstacles.	The test shipments were deemed satisfactory. No additional measures are required.	Yes
4B	Formalize a plan to deal with a call to refuge (including a fire).	Done. See contingency plan at the bottom of MP07.	Yes
4C	Incorporate analysis of existing and future planned accelerometer data into MP07.	The route and techniques used to move crates 9 and 11 underground will be applied to this move. See response to item 3C above.	Yes
9A	Add written permission from SNOLAB's Director of Operations as a precursor for shipment to ensure SNOLAB has completed the detailed planning required and are ready to receive the towers.	Added requirement to obtain written permission from SNOLAB's Director of Operations prior to shipment in MP06 and MP07 procedures.	Yes
10A	Provide Tower Shipping Readiness Review committee the opportunity to review the detailed resource plan developed by SNOLAB.	The detailed resource plan has been developed and shared with the review committee.	Yes
12A	The customs issue should be vetted /addressed before shipping towers.	There is progress in getting the customs exemption, but it is not clear if it will happen before the first shipment. U. Toronto will be the importer of record and we will use their customs broker Ahern & Thompson (none of this will change if the customs exemption is obtained). We have done a number of shipments to SNOLAB and have not had customs issues that would indicate a problem for shipping the towers. After discussions with Ken and the SLAC export control expert, we will use the acquisition cost for the Ge crystals to value the towers.	Yes
12B	SNOLAB's detailed receiving plan must be in place, which will likely include using a similarly sized and weighted crate to exercise the SNOLAB end of receiving towers.	MP06/MP07 have receiving plan in place. A test shipment using the DR crates 9 and 11 has been completed. The accelerometer data collected from this test shipment has been analyzed and found to indicate an acceptable level of shock/vibration.	Yes

12C	The windy drift should be ready to accommodate tower transportation and enable SNOLAB to fully develop the receiving plan.	The windy drift is not expected to be open for the planned shipment date. We will take the same route the dilution refrigerator crates took, which produced acceptable shocks.	No longer applicable.
12D	Shipping organizers should work with SNOLAB to ensure adequate space in the warehouse for receipt of the towers.	Warehouse manager (Justin) is aware of the shipments and will ensure that space is available either in the warehouse or machine shop (backup option).	Yes