Summary of action Items from June 3, 2010, tritium target review at JLab:

Administrative

(1) Appoint a lead person at JLab, a design authority, who will emphasize the engineering aspects of the target system and who will be responsible for the design, fabrication, procurement, installation and operation of the system
(2) Establish an engineering team
(3) Develop clear responsibilities for INL, JLab, and collaboration; and determine who will sign off on safety checkout plans
(4) Administrative requirement that beam blow-up optics are used in experiment
(5) Administrative limit on beam trip rate when cell is in the beam
(6) Make a provision that if the H or He target fails, a failure mode determination is made before the experiment continues with tritium gas
(7) Extensive review of final cell design and test results should be performed by JLab, Argonne and outside experts

Target cell

(8) Develop a modular target design
(9) Use a 1000 Ci source
(10) Determine maximum target window thickness based on physics requirements
(11) Target cell should comply with ASME Boiler and Pressure Vessel Code, sec VIII Div 2 2007
(12) Cell should be filled offsite and be designed to survive transport
(13) Cell should survive cyclic loading (beam trips)
(14) W collimator should be better supported
(15) Valves should have all metal wetted parts
(16) Cell must sustain a full vacuum load
(17) Target system should be designed to be cooled with 90K N2
(18) Verify that Al 2219 is a suitable material for tritium gasDetermine strength of welded Al 2219
(19) Weld coupons should be tensile and bend tested
(20) Al –ss transition piece should be purchased and elbows should be used
(21) An elastic plastic model of the cell (ASME D2 5.2.4) should be used
(22) Proof tests on more than 3 endcaps and at least one complete cell should be performed
(23) Heat cycling tests with a tritium loaded cell should be performed for a period of 6 months
(24) Consult Wayne Kanady at INL and Walter Shmayda at University of Rochester regarding tritium diffusion
(25) If insufficient information exists on beam shock wave tests, perform such tests at JLab
(26) Cell must survive off-normal beam conditions for at least 3 times the amount of time that it takes for an interlock to turn the beam off
(27) Determine DOT and DOE regulations for shipping filled target cells to JLab

Scattering chamber, ventilation, beam line

(28) Secondary containment should be physically isolated from beamline
(29) The scattering chamber pumps shall be vented through tritium stack
(30) The scattering chamber should be monitored for high and low levels of tritium
(31) A U getter bed should be attached to the scattering chamber
(32) An additional long collimator should be placed upstream
(33) Dedicated vent pumps/fans and lines should be installed over the scattering chamber and used for installation and removal procedures
(34) Airborne radioactivity detectors interlocked with the vent/fan stack system should be used
(35) Manual scram buttons in the hall and counting house for the ventilation
(36) Additional beam raster detector and interlock system

ESH tasks

(37) Establish baseline for detectable tritium at the JLab site
(38) Develop algorithm for safety involving amount of tritium, beam current, beam time
(39) Worst-case scenarios for worker exposure and all dose calculations should be analyzed or calculated by qualified personnel
(40) A more detailed assessment of impact of target loss on Hall A should be performed by qualified personnel
(41) Use a 15 m elevation and a vertical tritium stack as necessary for limiting site boundary doses
(42) Use the ICRP-68 dose coefficient of 1.8E-11 Sv/Bq reference for exposure evaluations
(43) Use 10 mrem as the maximum allowed site boundary dose
(44) The risk analysis should follow tables 4.2-4.5 of JLab's FSAD, rev. 6 and use realistic target failure probabilities