

**JOB NAME:** E-907 JHA/Work Permit/Assembly Procedure for  
Jolly Green Giant Magnet

**LOCATION:** Meson Experimental Area – MC7 Building

**E-907 SPOKESMAN:** Rajendran Raja

**E-907 INSTALLATION PROJECT MANAGERS:** Peter Barnes  
Leon Beverly

**E-907 MAGNET INSTALLATION TASK MANAGERS:** Mike Mascione  
Jim Ellermeier

**PERSONELL PERFORMING WORK:** Mike Mascione and a Contract  
Rigging Crew

**Description of Work:** One of the experimental apparatuses required for running E-907 in the Meson center line at MC-7 will be the analysis magnet known as the Jolly Green Giant. (Hereafter referred to as JGG) Since being disassembled and removed from the Neutrino experimental area several years ago, this magnet has been stored in the outdoors just to the west of the M west line and just south of the MAB . In its disassembled state, the magnet consist of the following component:

- 1.) One top and one bottom steel piece, each weighing 32.9 tons. Each is rigged with 4 each 1-1/2”-6 drilled and tapped holes for lifting/rigging.
- 2.) One top and one bottom coil-retaining steel pieces, each wighing 31 tons. Each is r rigged with 4 each 1-1/2”-6 d/t holes for lifting /rigging.
- 3.) Four side pole steel pieces, each weighing 16.6 tons. Each is rigged with 2 each d/t 3”-4 holes for lifting/rigging.
- 4.) 24 corner steel pieces, each weighing 4.25 tons. Each has one 3/4”-10 d/t hole for lifting/rigging.
- 5.) Four corner/side steel pieces, each weighing 500 lbs. Each has one 3/4”-10 d/t hole for lifting/rigging.
- 6.) Four magnet coils, each weighing 4.5 tons. Each will be rigged with a fork lift and slings.
- 7.) Four 4” bolts approximately 12’ long, each about 500 lbs. Each will be rigged with slings.

Each of these magnet components will be staged from their present storage area to the hard-stand area just east of the MC-7 area where the JGG will be assembled. Staging will be done by Fermi personnel and contract rigging crews. Rigging equipment will consist of properly rated cranes, forklifts and flat bed trucks. The magnet components will be staged and assembled in the order given by the assembly procedure described later in this document.

**Setup:** All magnet components for magnet assembly will be rigged into MC-7 with a \_\_\_ ton crane operated by a contract rigging crew and will be task managed by Mike Mascione or Jim Ellermeier in his absence.

**Safety:** The following safety issues will be addresses and will be mitigated as they become a concern.

*Familiarity with the project:* All personnel involved with any phase of the magnet assembly will have been briefed on the scope of the task and the possible safety issues involved. All personnel involved with the task will have read and signed this document prior to the start of work.

*Possible injuries from pinching/crushing:* Because of the nature of this task with its very large pieces of steel, special care will be taken to prevent injuries from pinching and crushing. All personnel involved with rigging and assemble will wear hard toed shoes, hard hats and gloves.

*Eye protection:* Safety eye wear will be worn as needed/required.

*Two man rule:* Whenever a piece of the magnet is being moved, at least 2 people, in addition to the crane operator, will be monitoring and helping with this move.

*Working at heights:* Personnel will be working at heights up to 13 feet and in an open roof situation. Appropriate caution will be taken when working at these heights, and tie-offs with safety harnesses will be used when possible. The appropriate and safe use of ladders will be exercised.

*Securing work area:* All areas within 100 feet of the rigging /assembly area will be roped off and marked as a “stay clear” area in order to avoid unauthorized personnel from entering the work area.

**Procedure For Assembly of JGG:** An exploded view diagram with the 8 major steel pieces of the magnet labeled #1- #8, as well as a diagram that shows the 4 stacked corner/side assemblies will be furnished to the task manager for assembly. The four coils will be labeled upper-upper, upper-lower, lower-upper, and lower-lower.

The assembly of the magnet starts by rigging into position the bottom steel piece (#1) onto the concrete pad. The pad will be pre-marked by the alignment group for the proper location of this piece in the x and z directions. The height of beam center will determine the height of the top of this piece. The top should be straight and level in all directions. At present, beam center is set at 80.5” above the floor elevation, thus the height of the top of this piece of steel is to be 26” above the floor elevation. The down stream face of this piece should be perpendicular to the beam. This piece will be shimmed to its proper position by use of a transit that will be

supplied and operated by experienced PPD personnel. Once this is done, the alignment group will verify the correct position to 1/8". The correct position of this first piece of magnet steel is very crucial, as the rest of the magnet will stack off of this piece and result in magnet center being on beam center.

Build a dam for the epoxy grout of 1" or 1 1/2" aluminum angle around the perimeter. The dam should be 2"-3" wider on all side than the footprint of the steel. Caulk all seams. Depending on the temperature of the concrete at the time that the grout is poured, either Unisorb standard V-100 epoxy grout or Unisorb low-temp V-100 epoxy grout will be used to grout the bottom piece to steel in place. Low-temp grout should be used for temperatures between 25 F and 60 F. Magnet assemble can continue the following morning after the epoxy has been poured, as the compressive strength of the epoxy will be 9,000 psi six hours after the pour. The floor loading for the fully assembled JGG will be 30 psi.

Stack the lower coil-retaining steel piece (#2) on top of the bottom piece. These two pieces have 2" diameter alignment pins that will position #2 in the proper x and z position.

Stack the two side pole pieces on the sides of piece #2 and on top of piece #1.

Looking upstream, piece #3 will be located on the left side and piece #4 will be located on the right side. Once again 2" diameter alignment pins will position these two side pieces in the proper x and z positions relative to the base plate.

Stack the four 6-piece stacks, labeled A,B,C, and D, on top of pieces #3 and #4. The footprint left from painting the magnet in conjunction with the through holes for the 4" bolt will indicate the correct position and orientation of these four stacks. The diagram shows the position for the four stacks. All 24 pieces have been marked for identification. Make sure that the rotation and stacking sequence of these 24 pieces is correct so that the 6"x6"x49" can be bolted in place.

Attach the four 6"x6"x49" steel pieces to the above four stacks of steel. These four pieces of steel are identical.

Each of the four 6-piece stacks needs to be at the same elevation. Full size shims should be used to get their respective elevations to be within 0.050" of the tallest stack.

Stack the two upper side pole pieces on top of the 6-piece stacks. Piece #5 should be stacked on the left side and piece #6 should be on the right side. The opening between these two pieces should be just wide enough to accommodate the 111" top coil-retainer piece of steel, which is marked #7. Using a plumb bob, pieces #5 and #6 should be positioned so that they are within 1/8" of the same x and z positions as the two side pole pieces (marked #3 and #4) directly below them.

Stack the top coil-retaining piece between the two upper side pole pieces. The front edge, at the corners should plumb bob to within 1/8" of the position of the bottom coil retaining piece, which is marked #2.

Crib up a working platform on which to stack the two upper coils. Each of these four coils weighs 4.5 tons. First place the upper-lower coil on the cribbing. Stack the upper-upper coil on top of the upper-lower coil. Make sure that the coils are oriented correctly, i.e. right side up and the correct rotation with the power/water connections pointing in the down stream direction. Using a forklift, raise the two coils as a unit into their correct position on the upper coil-retaining piece of steel.

Using 1/16" and 1/8" thick rubber, shim the coils until they fit tight and snug into the three retaining brackets. Secure the retaining brackets in place.  
Stack the lower-lower coil onto the lower coil-retaining piece of steel. Stack the lower-upper coil on top of the lower-lower coil. Make sure that the coils are oriented correctly, i.e. right side up and correct rotation with the power/water connection pointing in the down stream direction. Using 1/16" and 1/8" thick rubber, shim the coil until they fit tight and snug into the three retaining brackets. Secure the retaining brackets in place.  
Install the four 4' bolts and torque to \_\_\_\_ ft.lbs.

**Prepared by:** Jim Ellermeier 2/20/02

**Approved by:** John Cooper (PPD Division Office) \_\_\_\_\_

**Approved by:** Martha Heflin (PPD Sr. Safety Officer) \_\_\_\_\_

**Approved by:** Rajandrn Raja (E-907 Spokesman) \_\_\_\_\_

**Approved by:** Peter Barnes/Leon Beverly  
(Installation Project Managers) \_\_\_\_\_  
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**Approved by:** Mike Mascione/Jim Ellermeier  
(Installation Task Managers) \_\_\_\_\_  
\_\_\_\_\_

**Approved by:** \_\_\_\_\_

**Approved by:** \_\_\_\_\_

**Signature List of Workers Involved With This Task:**

My supervisor has reviewed this JHA and Work Permit with me. I understand the hazards and safety issues involved with this task. I will follow the requirements and instructions of this plan and will notify my supervisor if I an unable to do so.

