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TPC PRESSURE CONTAINMENT - BORE TRAIN INSTALLATION AND ALIGNMENT PROCEDURE

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## Engineering & Technical Services Division

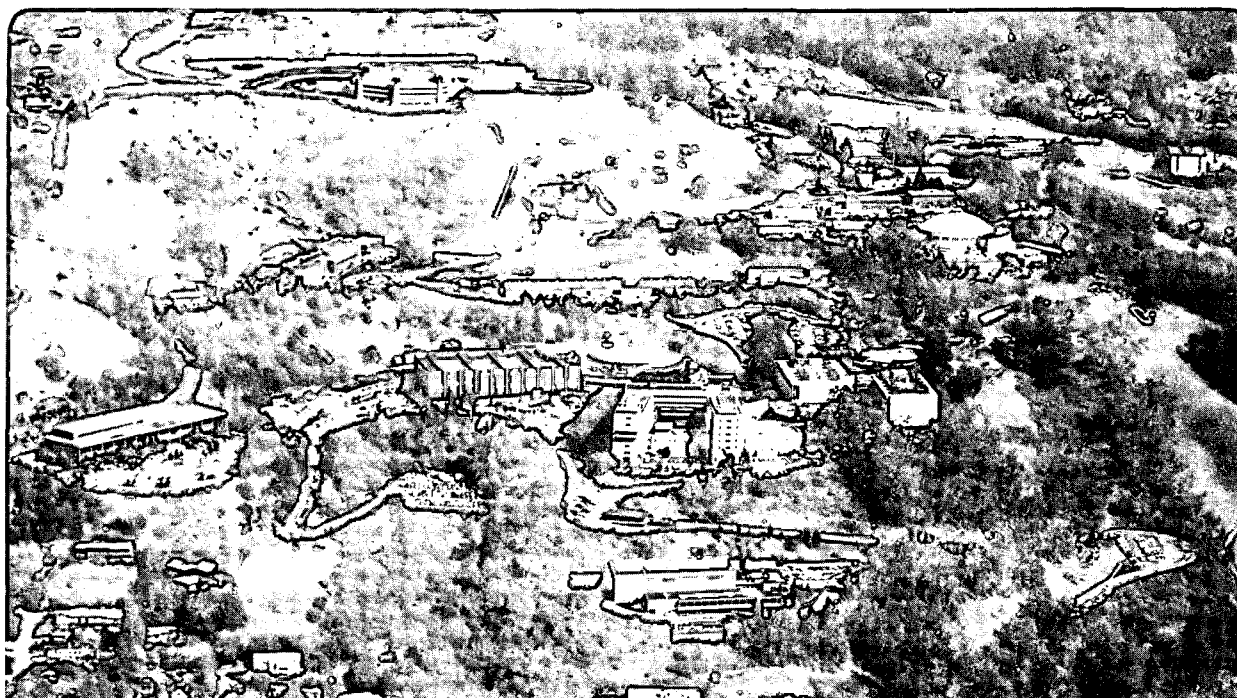
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**ENGINEERING NOTE**

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PROGRAM — PROJECT — JOB

PEP-4

APR 7 1980

TPC PRESSURE CONTAINMENT

TITLE

BORE TRAIN INSTALLATION AND ALIGNMENT PROCEDURE

1. The bore train installation is shown on Drawing 19C3996.
2. Install the pole tip calorimeter pressure wall winding, part 19C4646, and the high Z mask winding, part 19C4626, on each pole tip per Drawing 19C3996.
  - a. DO NOT PIN.
  - b. DO NOT SHIM.
  - c. Use the pole tip calorimeter pressure wall lifting fixture per Drawing 19C4996 for handling and installing the pole tip calorimeter pressure wall winding.
  - d. Use the high Z mask lifting fixture per Drawing 19C4486 for handling and installing the high Z mask winding.
3. Center one pole tip calorimeter pressure wall winding on each pole tip and secure in place with vented cap screws, parts 19C3982 of Drawing 19C3996.
4. Center one high Z mask winding on each pole tip calorimeter pressure wall winding and secure in place with bronze cap screws, items 1 of Drawing 19C3996.
5. Check the runout of the bore of the tubular end of each high Z mask winding with respect to the pole tip on which it is mounted.
  - a. Runout should not exceed .060-inch.
  - b. If runout exceeds .125-inch, the bore of the high Z mask winding is not close enough to perpendicular to the surface of the pole tip on which the pole tip calorimeter pressure wall winding is mounted. The perpendicularity problem might be corrected by selecting a different clocking position (there are 16) for the pole tip calorimeter pressure wall winding. There are only two possible clocking positions for the high Z mask winding because its pumpout tube must be in the horizontal center plane of PEP-4. The perpendicularity problem might also be corrected by switching one or more of the parts. If neither of these solutions works, the offending part must be remachined.
  - c. If runout exceeds .060-inch but not .125-inch, both the pole tip calorimeter pressure wall winding and the high Z mask winding can be adjusted radially by loosening their respective mounting screws, repositioning the walls the correct amount in the required direction, and retightening the screws.

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6. Check the runout of the bore of one high Z mask winding with respect to the other.
  - a. Install the bore train lighting fixture, part 20C0114, on the high Z mask winding on the south pole tip per Drawing 19C2546.
  - b. Install the bore train target fixture, part 20C0123, on the high Z mask winding on the north pole tip per Drawing 19C2556.
  - c. Install both pole tips.
  - d. Illuminate the target through the lighting fixture and read the direction and magnitude of misalignment on the graticule of the target fixture.
  - e. Misalignment should not exceed .125-inch.
  - f. If misalignment exceeds .125-inch but not .250-inch, adjust radial positions of the pole tip calorimeter pressure wall winding and the high Z mask winding on the north pole tip as in step 5.c. above.
  - g. If misalignment exceeds .250-inch but not .375-inch, adjust radial positions of the pole tip calorimeter pressure wall winding and the high Z mask winding on both pole tips.
  - h. If misalignment exceeds .375-inch, adjust the north pole tip.
7. Check the parallelism of the axis of the bore of one high Z mask winding with respect to the other.
  - a. Record the final position of the light spot on the target fixture.
  - b. Install the bore train lighting fixture on the high Z mask winding on the north pole tip and the bore train target fixture on the high Z mask winding on the south pole tip.
  - c. Repeat sequence 6.c. through 6.h., this time making indicated adjustments at the south pole tip end.
  - d. Continue repeating sequence 6.a. through 7.c. until readings at both pole tip ends are within .125-inch of each other.
8. Check overall alignment.
  - a. Install the low Z pressure wall, part 19C4604, on the south pole tip end per Drawing 19C8126.
  - b. Install the low Z pressure wall position monitor, part 20C4916, on the north pole tip end per Drawing 20C4926.

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- c. Install the south pole tip.
- d. Position the north pole tip 5-inches from its final installed position.
- e. While closely watching the low Z pressure wall position monitor indicators, slowly move the north pole tip toward its final installed position until contact is indicated by the position monitor. Two types of contact indication are expected.
  - 1) Pivoting of one or more levers with no axial movement of lever(s).
  - 2) Axial movement of lever(s) combined with some pivoting of lever(s). This combination of contact means that the tip of the lever is being pushed in the axial direction by the end of the low Z pressure wall and would occur about 4.500-inches from the final installed position of the pole tip. Misalignment in this case is too great to continue insertion. Find the cause and fix it.
- f. Record the position of the pole tip where initial contact per e.1) occurs.
- g. Continue inserting the pole tip while watching the other indicators on the position monitor. All indicators must show contact within .360-inch from the recorded initial contact position. This limit allows .063-inch radial misalignment of the low Z pressure wall with respect to the high Z mask winding. If any indicator does not show contact within this limit, find the cause and fix it. If all indicators show contact within this distance, all levers will also show axial movement within the next .250-inch to .500-inch of pole tip movement. This is normal.
- h. The low Z pressure wall position monitor should indicate uniform radial positioning between the end of the low Z pressure wall and the bore of the high Z mask winding on the north pole tip.
  - 1) If the radial positioning is uniform, finish installing the north pole tip.
  - 2) Withdraw the north pole tip 5-inches and repeat steps 8.e. and 8.h.1).
  - 3) Install the low Z pressure wall restraining mechanism on the north pole tip and the low Z wall position monitor on the south pole tip.
  - 4) Repeat steps 8.d. through 8.h.2), this time moving the south pole tip.
- i. If the radial positioning between the end of the low Z pressure wall and the bore of the high Z mask winding is not uniform, the low Z pressure wall position monitor will indicate the direction of nonuniformity. Hopefully the cause of the problem can be diagnosed and corrected in the field.

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9. When the bore train is completely aligned and both pole tips can be removed and replaced with proper engagement of the low Z pressure wall with either high Z mask winding, pin and shim the pole tip calorimeter windings and the high Z mask windings in place per Drawing 19C3996.
10. After pinning and shimming, repeat step 8.
11. Mark the pole tip calorimeter winding and the high Z mask winding on the south pole tip "south" with an electric pencil.
12. Mark the pole tip calorimeter winding and the high Z mask winding on the north pole tip "north" with an electric pencil.
13. Remove and reinstall the high Z mask windings. DO NOT remove the pole tip calorimeter windings.
14. Repeat step 8.

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