NPS4 First Layer of Reactor Pedestal
Resume of Construction

I. Background

Since the irregularity of the welding of second to fifth layers of steel structures for the NPS 4, Unit 1, occurred in the second half of April this year, Atomic Energy Council (AEC) conducted the quality investigation over the 1st layer of steel plate which was already delivered. Since one gusset plate weld line appeared to have a crack line, and some high strength filler metal (E8016-G) were in the place of low strength filler metal (E7018), to make know the effect the above discovery might have over the first layer of pedestal, AEC has asked Taiwan Power Company (TPC) to stop related construction and starting assessment in the first half of May. To summarize this investigation and take the irregularity of the welding of second to fifth layers of steel plates into consideration, points for clarification/consideration for the first layer of pedestal may be concluded as follows:

1. Ensure the weld line is of accurate material,
2. Access the effect of replacing E7018 with E8016-G,
3. Confirm the quality of pedestal welding,
4. Find out the reason for the crack appeared on the gusset weld line and its rectification procedure.

II. Result of Investigation

On top of the above 4 points to be clarified to ensure accurate welding material, aside from document certification and visual inspection, TPC should also drill at appropriate location for sample and sent it out to Institute of Nuclear Energy Research (INER) for material analysis. Since the results show that there is no improper replacement of material, so we conclude the material meets requirement.

Welding material comparison test proved that the chemical components of these two filler metals are very close, and their Shock Resistance Index, by way of testing individual and mixed filler metals, can all meet regulations and designer’s original requirements, so we conclude that the interchange of E7018 and E8016-G in the first layer of pedestal filler metals will not affect the structural safety of the pedestal.

As to the quality of welders’ workmanship, it passed TPC’s welding

nondestructive test, UT or MT is required during manufacture process and additional retest was performed in site for the first layer of pedestal major welding line sample inspection. Thus, we conclude the welders' workmanship meets requirement.

In reference to the cause for the gusset plate welding line crack, after sample was analyzed by INER, it revealed that high stress may be the main reason for the crack. In consideration of the tough workmanship involved, TPC coordinated with original designing supplier--GE to change the gusset design to resolve the cracking problem. This request for design change has been reviewed by AEC, and has been approved.

III. Conclusion

After a 6-month review and appraisal, all problems related to the 1st layer of pedestal has been clarified or rectification approved. Therefore, the quality of the first layer of pedestal is thus considered meeting design requirement. Hence, after conducting all related review, on November 25, AEC announced the construction of first layer of pedestal can resume.