PROJECT MANAGEMENT TECHNOLOGY TRANSFER FOR THE QINSHAN CANDU PROJECT: AN INTEGRATED TEAM APPROACH

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ABSTRACT

This paper describes how technology for project management is being transferred from Atomic Energy of Canada Limited to Third Qinshan Nuclear Power Company Ltd. It includes a description of the Contract model and participants, software used, specific activities planned and progress to date in initiating the transfer of know-how to the Qinshan Site in China.

CONTRACT MODEL AND PARTICIPANTS

Third Qinshan Nuclear Power Company Ltd. (TQNPC) has contracted with Atomic Energy of Canada Limited (AECL) for two 700 MWe CANDU Power Stations (Figure 1) under construction in Haiyan County, Zhejiang Province, China (Figure 2). The Contract Effective Date was February 12, 1997 and the units are scheduled to go into service in February and November 2003 respectively.

The Contract model (Figure 3) has AECL as the turnkey supplier of the two CANDU units, with the scope of work being subcontracted to an international group of participants. The major participants and their roles are:

- Third Qinshan Nuclear Power Company Ltd. (referred to as TQNPC) - Owner, Balance of Plant (BOP) construction management
- China National Nuclear Company (CNNC) - Majority Owner of TQNPC
- China Nuclear Energy Industry Corporation (CNEIC) - Organization responsible for international trade, which will manage the fuel and heavy water contracts on behalf of TQNPC
- AECL - Main Contractor, Nuclear Steam Plant (NSP) design, fuel supply, and heavy water supply
- Hitachi-Bechtel Consortium - Subcontractor to AECL, responsible for BOP design and equipment supply
- Nuclear Project Managers Canada Inc. (NPM) - Subcontractor to AECL, responsible for Site project management, NSP construction management, commissioning management, and NSP equipment supply
- Hitachi - Subcontractor to AECL, responsible for NSP equipment supply under the management of NPM
- HANJUNG (Korea Heavy Industries &Construction Co., Ltd.) - Subcontractor to AECL, responsible for NSP equipment supply under the management of NPM

- Canatom - Subcontractor to AECL, responsible for Balance of Nuclear Steam Plant (BNSP) design
- Hydro Quebec International - Subcontractor to AECL, responsible for specified training scope
- Chinese Construction Contractors - Construction

PROJECT SYSTEMS

The Contract model is translated into a project organization in Canada (Figure 4) and at Site in China (Figure 5). Initially the focus of project management is in Canada but it will be transferred to Site as the construction work advances.

The key features of the implementation of the project at Site in China are the use of AECL state-of-the-art engineering and project management systems, and an integrated project management team which at its peak will consist of about 170 expatriates and about 300 local staff supplied by TQNPC.

AECL's project management systems are in use in Canada and at Site in China (Figure 6). These systems allow for electronic data management and communications among the major participants. The key tools are described below:

- A Local Area Network (LAN) is already in place at Site, which allows TQNPC, AECL and the local construction contractors to transfer data and communicate instantaneously.
- The design is being modeled in a 3D CADDS system that will allow resolution of clashes and interferences.
- The CANDU Material Management System (CMMS) is a comprehensive material management system installed in Canada and at Site, which allows identification and tracking of all equipment and material required for construction of the project. CMMS is fully integrated with 3D CADDS for accurate material demand identification.
- The project is using a state-of-the-art electronic document and drawing storage and management system (AIM) together with an information control management system (TRAK).
- Planning and scheduling are done by Primavera (P3). AECL has produced Level 1 and Level 2 project schedules and is assisting the contractors in developing detail schedules.

These systems are electronically linked on the LAN and allow TQNPC, AECL and contractors to share, use and input data so that all have the same information to manage and carry out the work.

TQNPC and AECL have committed to manage the project using state-of-the-art systems. The electronic systems are the tools which are used to ensure that project work is planned and managed to meet the project schedule. Of key importance is how the tools are used. The plan is to transfer the know-how of project management from AECL to TQNPC. The key to this will be in the participation of local staff in the Site Project Management Organization (SPMO) which has expatriate and local staff working together at Site. Local staff will participate in the hands-on management execution of the project in planning, material management, document management and engineering.

CURRENT STATUS OF ACTIVITIES AT SITE

Even though the project is only slightly more than one year old, significant progress has been made in the transfer of project management systems and technology.

In the area of document management, training of the Chinese staff took place in Canada in 1997 and these staff have returned to Site as part of the SPMO to operate the document and drawing management systems. Drawings and documents are archived and retrieved in electronic format and are readily accessible.

In material management, the hardware, software and data were established at Site in December 1997, with local staff assigned from TQNPC learning via on-the-job training. In addition, CMMS has been made available to local construction contractors that are in the process of training staff and using the material management system to monitor the arrival of offshore-supplied equipment at Site and also to set up local supply and demand files on the system. The material for each area of construction work can readily be defined and extracted.

For planning and scheduling, AECL is providing training to TQNPC and to local contractors on using the Primavera (P3) software. Level 3 schedules have been developed in preliminary form by the local construction installation contractors. These schedules tie in directly with the project Level 2 coordination and control Level 2 schedules prepared by AECL for overall project management. TQNPC staff are using these systems and data for monitoring of project profiles.

A key function in the communication and management of the project is LAN access by TQNPC to the Site project management data. AECL, TQNPC and local contractors communicate and report quickly and efficiently.

TQNPC effectively participates at two levels: first, through the staff in the SPMO who are working on a day-to-day basis in project management and second, through access as owner to the project management data on the LAN systems (Figure 7).

The decision and commitment of TQNPC and AECL to adopt and fully utilize state-of-the-art project management systems on the Qinshan CANDU Project extend to the local contractors. These systems were put in place early in the project and are well ahead of first concrete scheduled for June of 1998.

CONCLUSION

The transfer of AECL experience and technology is allowing TQNPC to participate effectively in the project management of the work. This experience and capability will continue to develop and grow as the project moves ahead. SPMO staff monitor and update schedules monthly to identify the status or any corrective action needed. The participation of TQNPC and AECL in project management using state-of-the-art systems will support the successful and timely completion of the two CANDU units at Qinshan.

In the longer term, TQNPC will acquire the tools, technology and know-how required to manage large projects. This experience will be important in the future for management of new projects and will serve to build project management models and options with which to effectively plan, develop and execute new power stations in China.

AECL as turnkey project manager is committed to working closely with TQNPC to support and facilitate the transfer of know-how through the integrated team at Site who are successfully executing the Qinshan CANDU Project.

Figure 1 Artist's Conception - Qinshan CANDU - 2 X 700 MWe CANDU Units

Figure 2 Site - Detailed Location in China

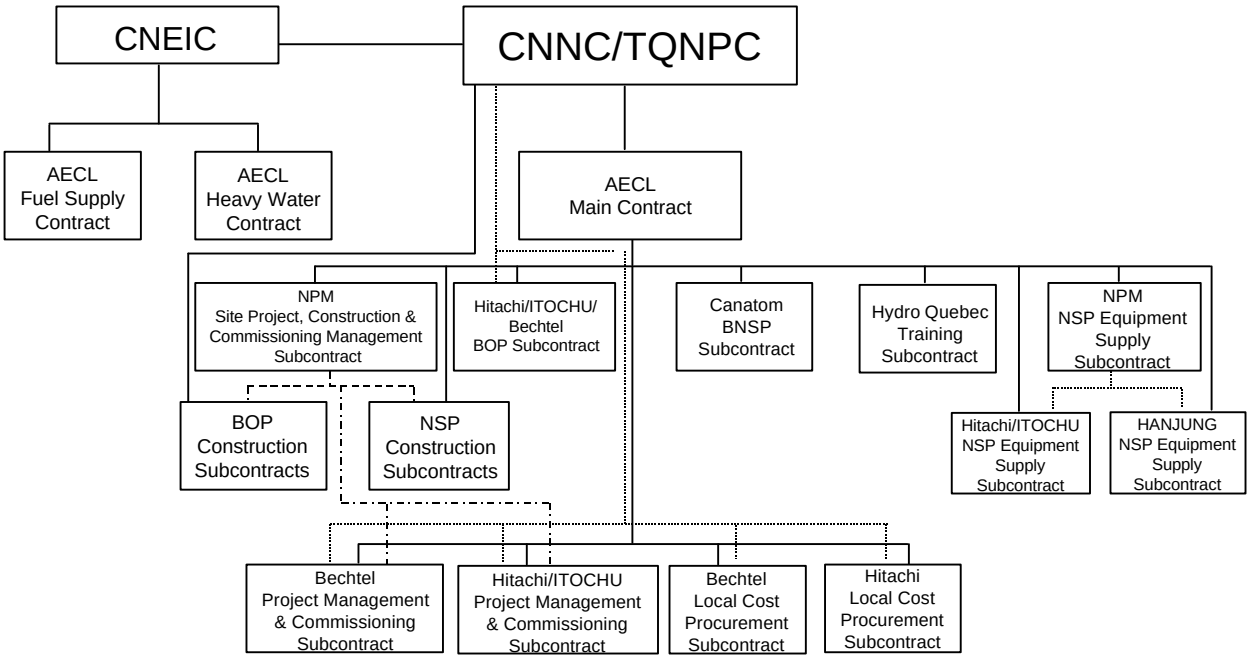

Figure 3 Qinshan CANDU Project - Contract Model

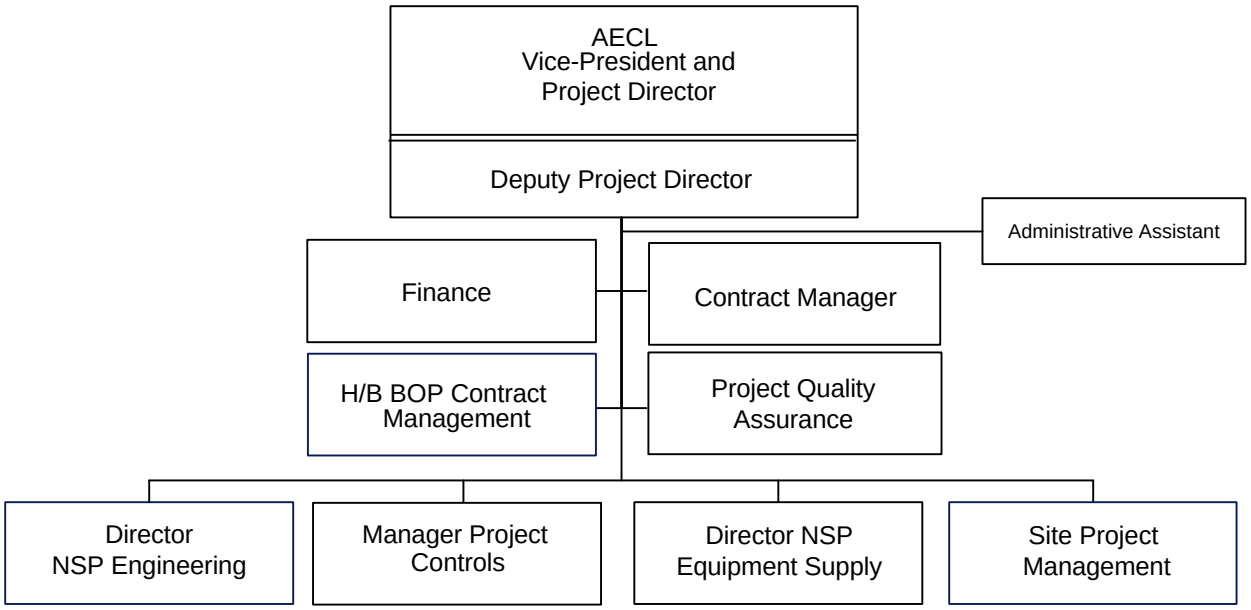

Figure 4 Qinshan CANDU Project - AECL Project Organization (Canada)

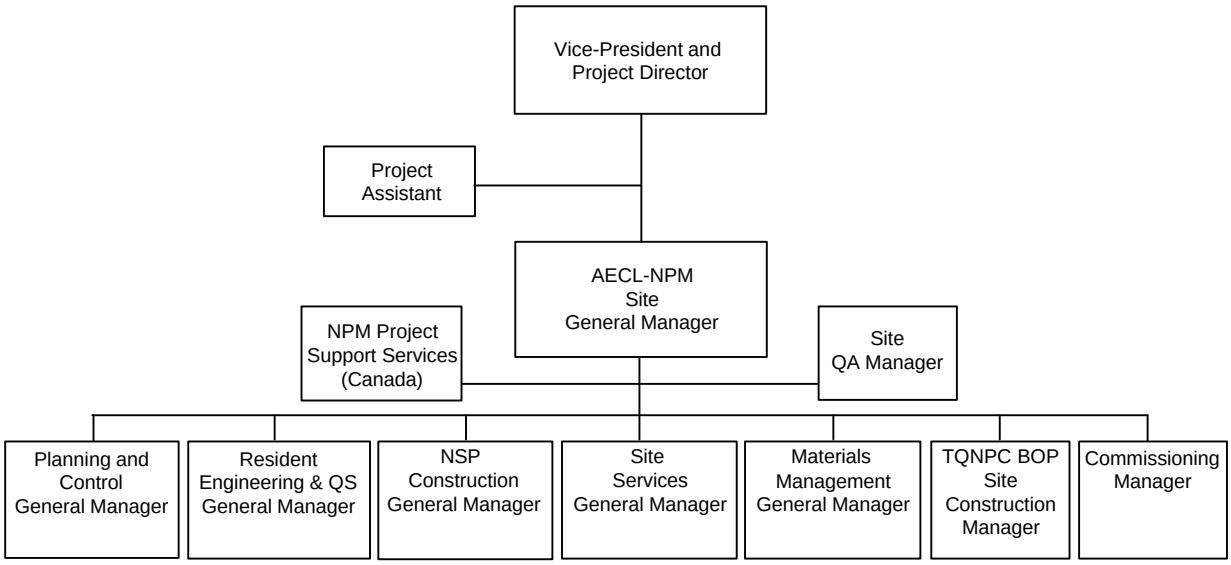

Figure 5 Qinshan CANDU Project - AECL/NPM Site Project Management Organization

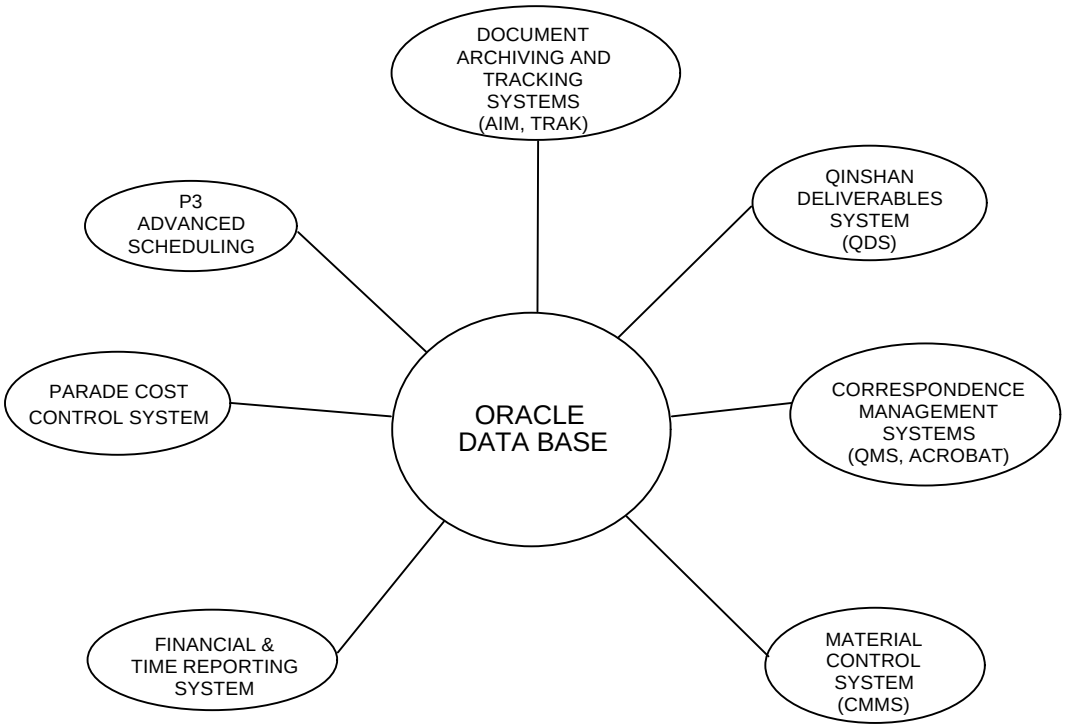

Figure 6 Qinshan AECL Project Control Systems

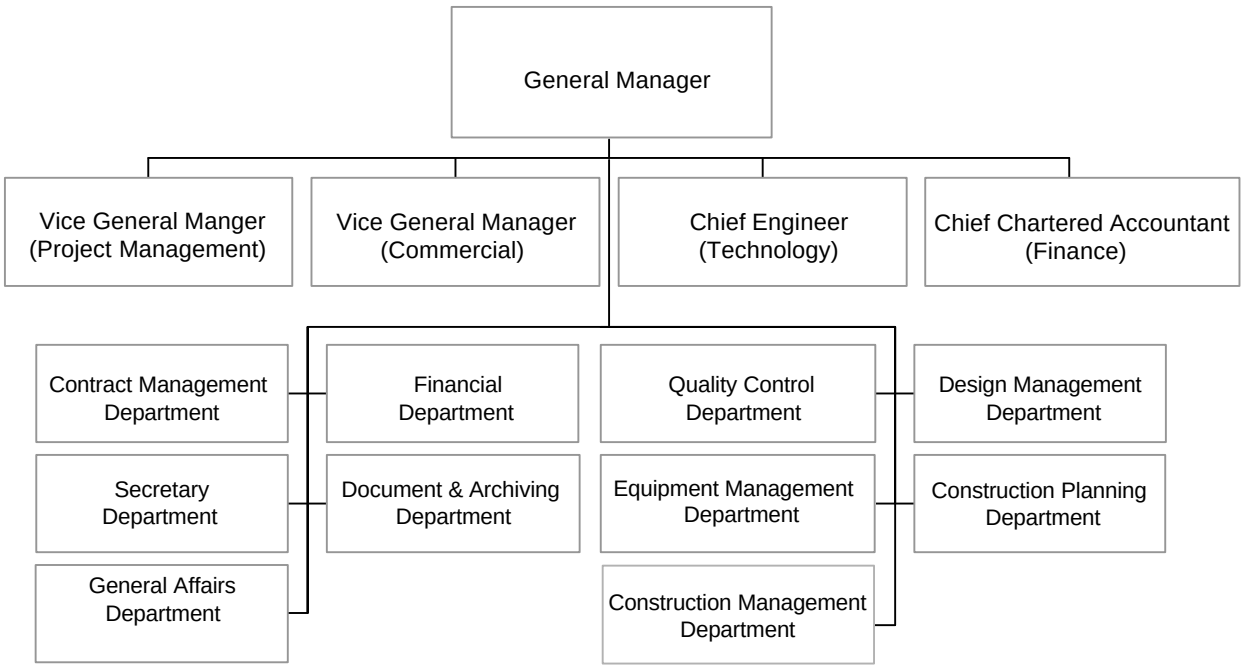

Figure 7 Qinshan CANDU Project - TQNPC Organization