Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

August 19, 2008
ABR-AE-08000066

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 3 and 4
Docket No. 52-012 and 52-013
Qualifications Assessment of Toshiba Corporation

On July 23, 2008, STP Nuclear Operating Company (STPNOC) participated in a public meeting with the Nuclear Regulatory Commission to discuss the results of a Due Diligence Assessment to determine whether Toshiba Corporation (Toshiba) is qualified to supply the design of the Advanced Boiling Water Reactor (ABWR) for the South Texas Project, Units 3 and 4 in accordance with 10 CFR Part 52, Appendix A – Design Certification Rule for the US Advanced Boiling Water Reactor. At the meeting, STPNOC committed to provide the NRC with a summary of our Due Diligence Assessment. This summary is provided as Attachment 2.

Also included as Attachment 1 to this letter is an affidavit in support of the request for withholding proprietary information on behalf of STPNOC. This affidavit requests that proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390.

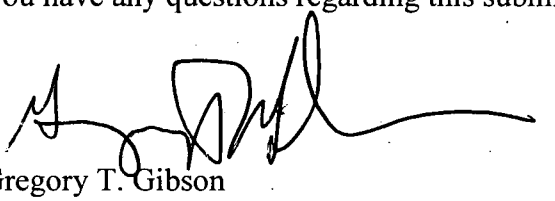
The complete reports of the Due Diligence and the Toshiba Capabilities Assessment Project are considerably more extensive than this summary. The detailed reports are available for NRC review at the offices of Nuclear Innovation North America, in Arlington, Virginia.

The attached summary proposes many follow-up actions identified in the course of the internal TCAP and Due Diligence assessments. These are not intended to be external project commitments. Consequently, there are no NRC commitments contained in this letter.

A non-proprietary version of this letter is provided in parallel with this submittal.

D091
NRO

Please contact me at 361-972-4626 if you have any questions regarding this submittal.



Gregory T. Gibson
Manager, Regulatory Affairs
South Texas Project, Units 3 & 4

Attachments

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
STP Nuclear Operating Company	)	Docket Nos.52-012
	)	52-013
South Texas Project	)	
Units 3 and 4	)	

AFFIDAVIT

I, M. A. McBurnett, being duly sworn, hereby depose and state that I am Vice President, Oversight and Regulatory Affairs, of STP Nuclear Operating Company (STPNOC); that I am duly authorized to sign and file with the Nuclear Regulatory Commission the attached application for withholding proprietary information from public disclosure, that I am familiar with the content thereof; and that the matters set forth therein are true and correct to the best of my knowledge and belief.

In accordance with 10 CFR 2.390(b)(ii):

(A) The specific documents for which withholding from public disclosure is sought are:
STPNOC Due Diligence Evaluation for Toshiba to Supply the Certified ABWR Design
- Task 1 Report (ABWR Design Documentation)
- Task 3 Report (Design Basis Information)
- Task 7.5 Report (Fuel)

(A) The official position of the person making this affidavit is Vice President, Oversight/Regulatory Affairs, of the STP Nuclear Operating Company, who has been specifically delegated the function of reviewing the information sought to be withheld and authorized to apply for its withholding on behalf of STPNOC.

(B) The information sought to be withheld is contained in the Attachments A, B and C of STP letter, ABR-AE-08000066, submitting a summary report of the Due Diligence Evaluation of Toshiba Corporation for Supplying a Certified ABWR Design. Pages containing proprietary information display the word "PROPRIETARY" at the top of each page. The proprietary information is marked with a number between 1 and 7 corresponding to the NRC guidance on categories of proprietary information from the Electronic Submittal Task Force sponsored by the NRC.

(C) The basis for proposing the information be withheld is that the information constitutes business sensitive information, trade secrets and commercial or financial information and is privileged or confidential [10 CFR 2.390(a)(4)].

(D) Public disclosure of the information sought to be withheld is likely to cause substantial harm to STPNOC's competitive position and its business relations with Toshiba Corporation. The information documents results of a confidential qualifications assessment of Toshiba to provide the certified ABWR design in the US.

Further, STPNOC affirms that:

(i) The information has been held in confidence by STPNOC.

(ii) The information is of a type customarily held in confidence by STPNOC and there is a rational basis for doing so.

(iii) The information has been transmitted to the NRC in confidence.

(iv) The information is not available in public sources.

(v) Public disclosure of the information sought to be withheld is likely to cause substantial harm to the competitive position of STPNOC, taking into account the value of the information to STPNOC; the amount of money and effort expended by STPNOC in developing the information; and the ease or difficulty with which the information could be properly acquired or duplicated by others.

M. A. McBurnett
Vice President,
Oversight/Regulatory Affairs

STATE OF TEXAS)
)
COUNTY OF MATAGORDA)

Subscribed and sworn to before me, a Notary Public in and for the State of Texas, this 19th day of August, 2008.

PENNY HOLZAPFEL
MY COMMISSION EXPIRES
June 18, 2011

Notary Public in and for the
State of Texas

Due Diligence Evaluation for Toshiba to Supply the Certified ABWR Design

Executive Summary

Background/Purpose

The STP Nuclear Operating Company (STPNOC) submitted an application on September 20, 2007, to construct and operate two Advanced Boiling Water Reactors (ABWR) on behalf of their owners NRG Energy and City Public Service (CPS). The Combined Operating License Application (COLA) is to construct and operate the two units at the South Texas Project (STP) site near Bay City, TX. STPNOC is the license holder and will manage the project for the owners.

When the COLA was submitted, STPNOC expected that the original ABWR certified design sponsor would participate on the EPC Team, providing access to the underlying design basis information for the certified ABWR design described in 10 CFR 52, Appendix A. Subsequent to the COLA being submitted, commercial issues prevented the certified ABWR design sponsor from participating in the remainder of the project. The option NRG and CPS have chosen for completing the project is to continue without the certified ABWR design sponsor's participation. In this option, Toshiba would assume the role of supplying the certified ABWR design, including the underlying design bases.

The ABWR design received design certification by the US Nuclear Regulatory Commission (USNRC) in 1997. At that time, Toshiba was a partner and key participant in the original development of the ABWR common engineering and the development of ABWRs in Japan. As a result, Toshiba has actual ABWR design and construction experience and knowledge.

The purpose of this report is to present the results of a Due Diligence Evaluation to confirm that Toshiba has the necessary capabilities to complete the STP 3&4 ABWR project to USNRC standards and STP 3&4 Owners' requirements without participation of the certified ABWR design sponsor. The Due Diligence Evaluation is largely based on the results of the Toshiba Capabilities Assessment (TCA) performed by the Toshiba EPC Team, supplemented by additional independent investigation and evaluation by STPNOC. The focus areas are identified and plans are presented to address these areas. A particular focus is to confirm Toshiba is qualified to supply the certified ABWR design in accordance with the requirements of 10CFR52.73.

Scope/Approach

The scope for the TCA was selected to assess the areas where Toshiba may not have the direct experience required to support the certified ABWR design. Toshiba has provided the remaining scope for other ABWR projects and is expected to provide the same scope for STP 3&4. The assessment areas of Toshiba's capability to supply the certified ABWR design can be grouped into four categories. Each of the following areas was evaluated in detail and the results are provided in this report:

- **Design Documentation** – The processes for Toshiba to support the licensing process, complete the certified ABWR design, and provide the ABWR design documentation necessary for long term plant operation.
- **Technical Items** – The plans for developing technology and design features needed to support the certified ABWR design.
- **Licensing** – The process for STPNOC to receive a COL in accordance with 10CFR52, as well as how Toshiba will support the licensing process.
- **Supply Chain** – The plans for developing and implementing a supply chain structure to construct a certified ABWR design with a significant fraction of the equipment and commodities procured from US suppliers.

The scope of the TCA evaluation was separated into a series of tasks covering the various assessment areas. The results of the individual tasks are presented in this report as well as the overall conclusions based on the collective results of the individual tasks.

Toshiba plans to complete the STP 3&4 project with an EPC Team comprised of Toshiba, Fluor, and Sargent & Lundy. In addition, Westinghouse and MPR are expected to support Toshiba. The evaluations described in this report were performed by leaders and contributors from each of these five companies, with oversight and participation from STPNOC personnel, and industry experts on the STPNOC Due Diligence Team. The various task teams were comprised of personnel from some or all of these companies, focusing in particular on senior engineers with applicable experience in the topical areas.

Conclusions

The overall conclusion of this evaluation is that Toshiba can supply the certified ABWR design without participation of the original certified ABWR design sponsor. The STP 3&4 EPC Team led by Toshiba has the capabilities to execute the project. There are no issues identified that could prevent the project from being completed successfully. Most importantly, Toshiba has available almost all required design basis information for the certified ABWR design. This supports the demonstration that Toshiba, in accordance with 10CFR52.73, can supply the certified ABWR design. Some design information will require reconstitution, but the amount is small and manageable within the overall project schedule. Further, Toshiba has the design documentation available for virtually the entire scope of the Tier 1 design, as well as direct experience applying those design bases to the design, construction, and operation of existing

ABWRs. The COLA will require revision, but the scope of the revision is defined and is manageable.

The focus areas and uncertainties include:

- **Design Documentation** – The project plan and schedule must properly reflect the necessary design reconstitution activities, and processes must exist for proper handling of ABWR design documents.

- **Instrumentation and Control (I&C)** – There are first-of-a-kind I&C design issues that result in uncertainties with platform development and qualification, software development and testing, commercial grade dedication, system design, integrating I&C systems from multiple vendors into a single control room and human factors engineering (HFE) program, simulator design and development, etc.

- **Americanization** – The STP 3&4 project involves converting to American codes and standards (or Americanizing) appropriate design documents for application in the US. This will include converting the design from metric to English, switching from Japanese equipment/suppliers to US and international suppliers, ensuring the design meets US codes and standards and USNRC regulations, etc.

- **Communication** – Communication among the EPC Team organizations may be affected by different languages and organizations separated by several time zones.

- **USNRC Licensing Related Uncertainties** – There are uncertainties associated with licensing, considering Toshiba's limited experience working within the USNRC regulatory framework.

The EPC Team has identified mitigation management actions for these focus areas, as well as less significant uncertainties identified in this report. These actions are expected to mitigate the uncertainties and increase the likelihood of the project completing successfully. The actions include, but are not limited to:

- Additional investigation and planning (to address Americanization issues)

- Management oversight and reviews of EPC Team activities (to address I&C and Americanization issues)

- Confirmation of the scope and approach for reconstituting the certified ABWR design bases information (to address design documentation issues)

- Improved communication processes

- Involvement of additional US personnel working for Toshiba (to address licensing and communication issues)

Details of these and other mitigation management actions are provided in this report.

Summary

In summary, the results of this Due Diligence Evaluation show:

- There are no outstanding issues to completing the STP 3&4 project without participation of the certified design sponsor. Toshiba and the EPC Team have the necessary capabilities, and the required certified ABWR design basis information to supply the certified ABWR design accordance with 10CFR52.73 and Owners' requirements.
- The EPC Team understands the full scope of the project, as well as the uncertainties and is implementing mitigation management plans and actions to address those uncertainties.

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Contents (cont'd.)

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1 Introduction

1.1 PURPOSE

This report documents the evaluations to confirm that Toshiba and the Toshiba EPC Team are capable of providing the certified ABWR design for South Texas Project (STP) Units 3&4 without support and participation from the certified design sponsor. The objectives of the evaluations include:

- Confirm there are no technical, licensing, documentation or schedule uncertainties that would prevent Toshiba from providing a certified ABWR design without participation of the certified design sponsor (i.e., no insurmountable issues)
- Identify the additional activities needed from Toshiba to support the detailed design, procurement and 60-year operation of STP 3&4
- Identify the uncertainties along with plans to manage/mitigate those project and schedule uncertainties

A specific objective is to confirm Toshiba satisfies the requirements of 10CFR52.73 and is qualified to supply the certified ABWR design

1.2 BACKGROUND

NRG and CPS are planning to license and construct two ABWR units at the South Texas Project (STP) site and to have the ABWR project engineering, procurement, and construction (EPC) activities be led by Toshiba. (STPNOC is managing the project for NRG and CPS.) The ABWR technology was chosen by the owners based on the excellent design and construction experience in Japan, as well as the existing ABWR design certification by the USNRC and the actual ABWR operating experience in Japan.

The ABWR design that received design certification by the USNRC in 1997 was sponsored by a third party and is partially based on the sponsor's proprietary information and design documents. Toshiba was one of the three partners in the original development of the ABWR common engineering and the development of ABWRs in Japan, so Toshiba has a similar experience and knowledge level as the certified design sponsor.

The Combined Operating License Application (COLA) prepared for STP 3&4 and submitted to the USNRC assumed that the certified design sponsor would be part of the project team, allowing convenient access to the necessary design basis information for the certified ABWR design as well as addressing the scope items where Toshiba may not have direct experience.

However, commercial issues precluded that arrangement. The project owners and STPNOC have conducted a due diligence process to assess the option of completing the project without participation of the certified ABWR design sponsor. STPNOC is evaluating whether Toshiba can perform the full scope EPC for a certified ABWR design.

The Toshiba EPC Team prepared the Toshiba Capabilities Assessment (TCA) to confirm that Toshiba has the necessary capabilities to complete the STP 3&4 project without participation of the certified ABWR design sponsor. This report is largely based on the TCA, supplemented by additional investigation and evaluation by STPNOC. The uncertainties are identified and action plans are presented to address those uncertainties.

1.3 ABWR History

The ability of Toshiba to provide the certified ABWR design without participation of the certified ABWR design sponsor derives from the history of the development of the ABWR design. Figure 1-1 provides an overview of the development history of the ABWR. In summary:

- The conceptual design, fundamental design, and common engineering for the ABWR were developed by a team composed of three companies, including Toshiba.

- This ABWR team completed the detailed implementation engineering for the Kashiwazaki-Kariwa Units 6&7 (K-6&7), the first ABWRs. The majority of the detailed engineering was performed by Toshiba and Hitachi based on the common engineering developed jointly by the three companies.

- Subsequent to the K-6&7 projects, Toshiba also participated in the design, procurement, and construction of Hamaoka Unit 5 (H-5). The H-5 plant and system designs included continued evolutionary improvements for increased reliability and safety. Similar improvements have been studied and planned by Toshiba since H-5.

- In parallel with the continued ABWR development in Japan in the 1990s, the certified ABWR design was developed, with assistance from Toshiba, for licensing with the USNRC pursuant to 10 CFR 52. The certified ABWR design was based in part on first-of-a-kind-engineering (FOAKE) sponsored by the US government.

- The Lungmen ABWR project (Taiwan Power Company), also includes participation by Toshiba, with Toshiba contributing to the design and equipment delivery. The Lungmen design is mostly based on the certified ABWR design, but with selected differences. In general, these differences are improvements in safety and/or reliability identified after the USNRC design certification in 1997.

- In 2005, Toshiba collaborated with other companies on a study (sponsored by the US Department of Energy) to investigate the implementation of an ABWR at the Bellefonte site. This study considered engineering, licensing, procurement, and construction of the certified ABWR design based on the Japanese ABWR design and construction experience. The study determined that the Japanese ABWRs and the certified ABWR design are very

similar, with only selected design differences resulting from differences in regulations, codes, and standards between Japan and the US.

- Finally, Toshiba has been studying implementing the design, licensing, and construction of ABWRs in the US for about ten years. These studies include a detailed evaluation of US codes and standards, as well as USNRC regulations and criteria.

In summary, the ABWR design was developed jointly by three companies, including Toshiba. Toshiba has continued to advance and apply the design since the first ABWRs were constructed, so Toshiba has state-of-the-art knowledge of the ABWR and its design bases. The certified ABWR design is based on the same common engineering basis documents as the Japanese ABWRs, and Toshiba has successfully used those design documents. Thus, Toshiba has a first-hand working knowledge of the ABWR design, Toshiba has access to and has applied the underlying design bases for the certified ABWR design, and Toshiba has successfully designed and constructed multiple ABWRs that are very similar to the certified ABWR design.

1.4 SCOPE

The scope for the Due Diligence and TCA were selected to assess areas and determine if gaps exist where Toshiba may not have direct experience required to engineer, design, and construct a certified ABWR design project.

The scope for this evaluation was determined using the following approach:

1. The scope of the certified ABWR design, Design Control Document (DCD) was reviewed in detail and the list of systems and topics applicable to the certified ABWR design was developed.

2. This list was reviewed by senior engineers with BWR expertise from Toshiba and MPR. Those engineers identified the systems and topics that are not routinely provided or addressed by Toshiba in Japanese ABWRs.

3. The processes and information required to develop and implement the certified ABWR design based on the design bases for the certified ABWR design were defined by MPR and Toshiba.

4. The results of these reviews were presented to STPNOC personnel to receive and include comments on the scope and understand STPNOC questions regarding Toshiba capabilities.

5. The Due Diligence Evaluation scope included activities in addition to the activities completed by the Toshiba EPC Team. These were performed to independently verify the TCA results and to investigate additional topical areas.

Based on these results, this evaluation addresses the following focus areas for Toshiba to provide the certified ABWR design without participation of the certified ABWR design sponsor.

- **Design Documentation** – The processes for Toshiba to support the licensing process, complete the certified ABWR design, and provide the ABWR design documentation necessary for long term plant operation.

- **Technical Items** – The plans for developing technology and design features needed for the certified ABWR design that are either outside Toshiba's ABWR experience base in Japan or need to be re-performed without participation of the certified ABWR design sponsor.

- **Licensing** – The process for STPNOC to receive a COL in accordance with 10CFR52, as well as how Toshiba will support the licensing process.

- **Supply Chain** – The plans for developing and implementing a supply chain structure to construct the certified ABWR design with a significant fraction of the equipment and commodities procured from US suppliers.

- **Schedule** – The plan to address the uncertainties in the above four categories on an overall licensing and construction schedule consistent with STPNOC needs.

These areas were evaluated in detail by completing separate tasks. Each task addressed a specific topical area, with the objectives to confirm there are no issues that would prevent the project from succeeding, identify additional activities required from Toshiba, and identify uncertainties and develop mitigation management plans. The results of each task are documented in individual task reports. The tasks are listed in Table 1-1. Note that the results of some tasks are proprietary and are not discussed in this report (e.g., the schedule evaluation).

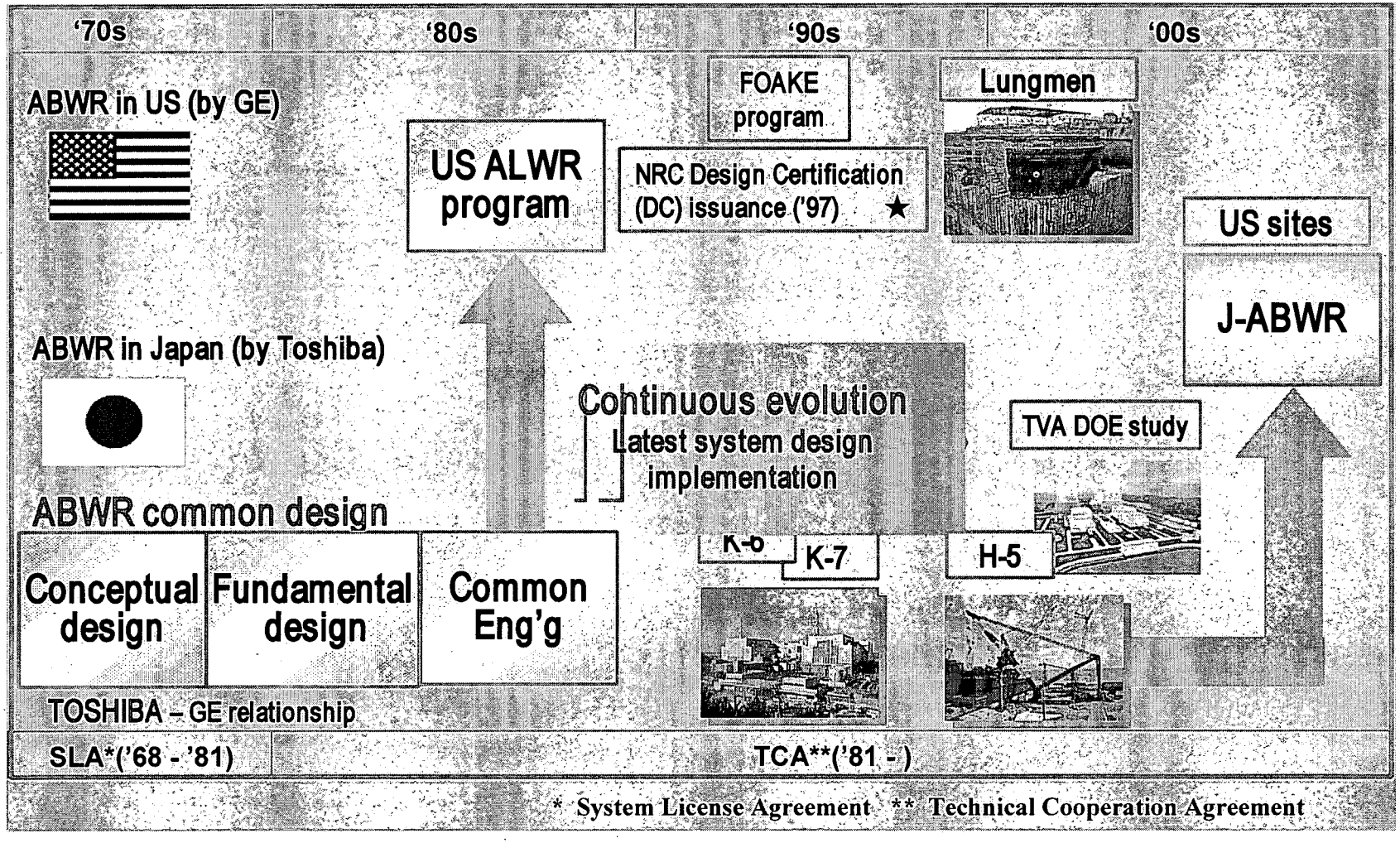

Figure 1-1. ABWR Technology Development

1.5 EPC TEAM AND KEY PERSONNEL

The STP 3&4 project will be completed by an EPC Team led by Toshiba, and includes US companies. This evaluation addressed the overall capabilities of the EPC Team, since the EPC Team would be implementing the project, not just Toshiba.

The STP 3&4 EPC Team includes the following companies:

- Toshiba as the EPC Team Leader and overall Project Manager, also performing engineering, procurement, and equipment fabrication activities, as well as construction management.
- Fluor as the primary constructor and procurement organization, as well as engineering for the balance of plant systems and structures.
- Sargent & Lundy for the detailed design and implementation engineering for the safety-related systems and structures (except for the reactor vessel and internals which are engineered by Toshiba).

In addition to these EPC companies, Westinghouse will provide engineering and components for selected systems, primarily fuel and safety analyses and I&C systems, and MPR Associates is supporting Toshiba in the areas of project management assistance, licensing, and technical support in selected areas.

Personnel from each of these organizations participated in this evaluation along with STPNOC personnel. The evaluations and assessments were performed by diverse task teams with significant licensing, design, and construction experience in the US nuclear power industry. This diversity was an important element of the evaluation strategy to ensure a rigorous evaluation was performed. Table 1-1 lists each TCA task, the lead organization for the task, and the Task Leader. Senior leaders from each participating company were the primary leaders and contributors to this evaluation. In addition to the personnel listed in Table 1-1 each task was supported by other engineers as necessary to complete the task activities. Each task typically had supporting personnel from at least three of the participating companies.

Figure 1-2 illustrates the EPC Team organization for the STP 3&4 project. Additional description of the experience of the EPC companies is provided below.

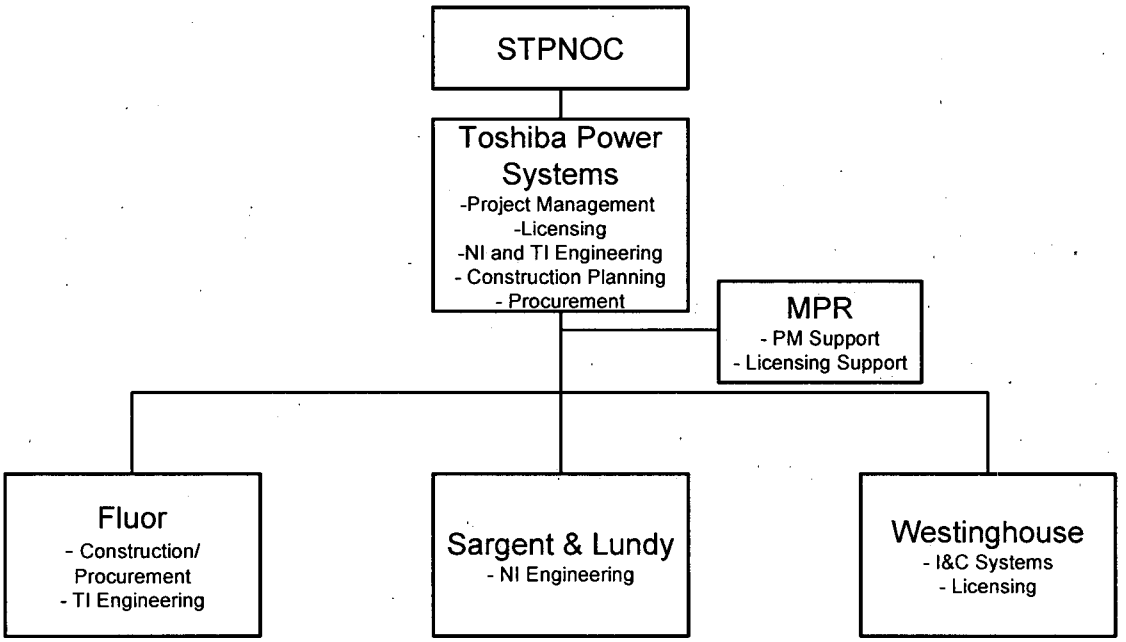

Figure 1-2. STP 3&4 EPC Team Organization

1.5.1 Toshiba America Nuclear Energy (TANE)

In early 2008, Toshiba created Toshiba America Nuclear Energy (TANE), with headquarters in Northern Virginia. TANE was created to lead Toshiba's ABWR and BWR servicing business in the US. The TANE leadership includes Toshiba executives from Japan along with Americans with significant US nuclear industry experience. Figure 1-3 illustrates the Toshiba corporate structure.

TANE will be responsible for project management and leadership of Toshiba's US nuclear business. The project management and licensing functions will be based in the headquarters office. Engineering functions will be based in a planned US Engineering Office. TANE will also be the key contact and communication with Toshiba in Japan.

The key leaders of TANE were directly involved in the design and construction of ABWRs in Japan, including:

- Mr. Fuyuki Saito, President – Mr. Saito has been in charge of nuclear power plant construction planning and construction control work for 31 years. He planned the construction method of the first ABWRs (K-6&7) and was deputy site manager of the K-6&7 construction site. He was also the General Manager of Isogo Engineering Center for two years.

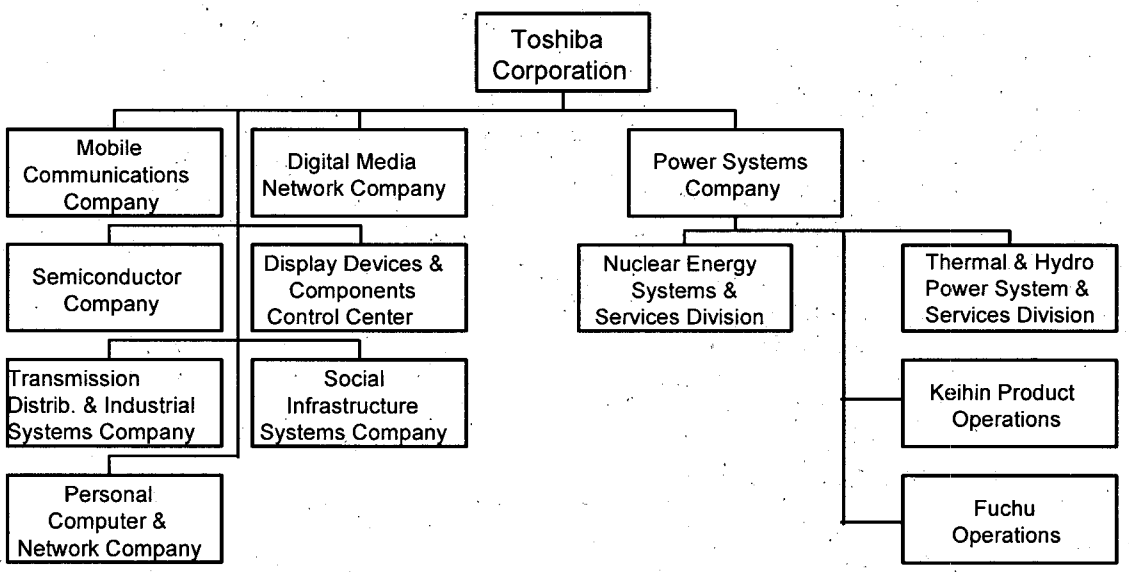

Figure 1-3. Toshiba Corporate Structure

- Mr. Tohru Maruyama, Senior Vice President – Mr. Maruyama has been in charge of structural design, layout design and development of new construction methods to shorten the construction period and minimize the construction cost of nuclear power plants for 26 years. He was a Lead Engineer and Manager for plant planning and construction management of many nuclear plants including ABWR Hamaoka Unit 5. He also was the Project Manager for the TVA DOE study to evaluate the feasibility of constructing an ABWR at the Bellefonte site.

- Mr. Hiroshi Sakamoto, Senior Vice President – Mr. Sakamoto is currently responsible for business development in the USA for Toshiba's nuclear power plant technology and products for both operating and future new plants. He has been in charge of nuclear power plant diagnosis technology and systems development in the Toshiba Nuclear Energy Laboratory for 14 years. During this period, he was stationed at EPRI to develop Artificial Intelligent application systems for nuclear power plants. He also has been in charge of the Engineering Information Systems Department for five years and the Overseas Project Promotion Department responsible for new ABWR plant construction project in Taiwan.

- Mr. Yuji Yamamoto, Vice President – Mr. Yamamoto has been in charge of nuclear system/equipment engineering for 14 years, and domestic nuclear power plant project engineering for one year. He was also in charge of Overseas Project Management for five years. During the TVA DOE study, he was assigned to serve as the Deputy Project Manager.

1.5.2 Toshiba Power Systems Company

Toshiba Power Systems is a subsidiary of Toshiba Corporation. Toshiba provides nuclear and non-nuclear power and energy solutions world-wide. The overall Toshiba Corporation has

approximately 190,000 employees (consolidated), and in the fiscal year ending in 2007 had approximately $70 Billion in sales. Toshiba is a major international company with the required resources to lead and complete the STP 3&4 project.

Toshiba is a leading supplier of nuclear power plants and nuclear technology in Japan. Toshiba constructed its first nuclear power plant in the late 1960s and has continuous experience with design and construction of nuclear power plants over the past 40 years. Toshiba has been the prime contractor on 18 BWRs in Japan and a major subcontractor on four additional BWRs in Japan (the initial BWRs in Japan). Figure 1-4 provides an overview of Toshiba's nuclear power plant experience. Toshiba has also supported nuclear power plant projects outside Japan.

During the last century Toshiba has delivered approximately 1,700 steam turbine units, 240 hydraulic turbine units, 300 hydraulic generator units and 32 nuclear reactor units to customers throughout the world.

Toshiba has extensive experience in the design, construction, and commissioning of the ABWR worldwide. The first ABWR, Kashiwazaki-Kariwa Unit 6, commenced commercial operation in 1996, followed by Unit 7 the following year. Both of these ABWRs were delivered to Tokyo Electric Power Company by Toshiba. Following the K-6&7 projects, Toshiba provided the third ABWR, Hamaoka Unit 5, to Chubu Electric Power Co. The Hamaoka 5 design was based on K-6&7, but also included selected updates to advance the ABWR technology and incorporate Toshiba's latest design developments. Hamaoka 5 commenced commercial operation in 2005.

Key senior personnel from Toshiba will be the leaders for the STP 3&4 project, including:

- Mr. Akio Shioiri, Technology Executive – Mr. Shioiri has been in charge of the nuclear system engineering for 27 years. He specialized in the Nuclear Steam Supply System (NSSS) design for the ABWR. He has been the Senior Manager of the Project Engineering Department and since 2007 he has been Technology Executive, including responsibility for the STP 3&4 project.

- Mr. Kiyoshi Okamura, Vice President – Mr. Okamura has been in charge of Project Engineering or sales and marketing of nuclear power plant construction in Japan for 20 years. From 2003 to 2007 he was the Senior Manager of LWR Operating Plant Project Engineering Department and was a key contributor to expanding Toshiba's nuclear O&M business in Japan. Recently, as Senior Manager of Plant Project Engineering Department he had been in chare of promoting ABWR construction in Japan (Higashidori & Ohma) and in the US (STP 3&4).

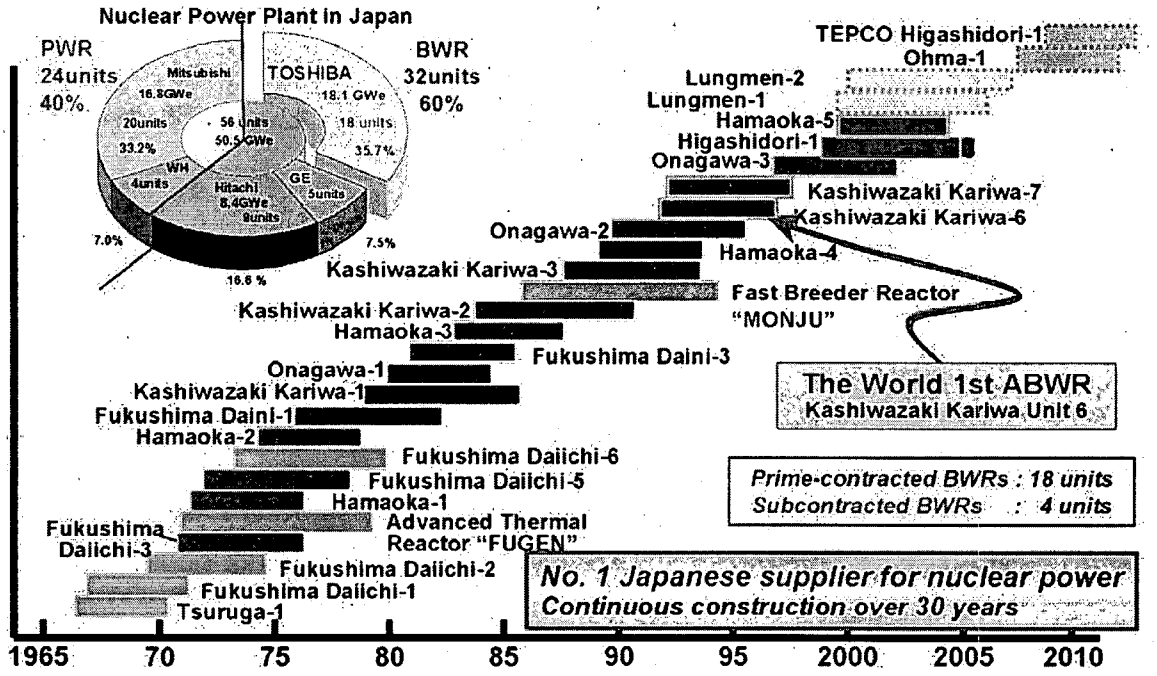

Figure 1-4. Toshiba Nuclear Power Plant Experience in Japan

- Mr. Koichiro Oshima, Senior Manager – Mr. Oshima has been in charge of nuclear safety engineering for 15 years and promoting nuclear plant sales in Japan. From 2006 to 2008 he was Senior Manager of System Design and Engineering Department and was responsible for design and licensing for STP 3&4. He is now Senior Manager of Plant Project Engineering Department and is responsible for ABWR construction in Japan (Higashidori & Ohma) and in the US (STP 3&4).

The certified ABWR design is based primarily on the ABWR Common Engineering Documents and design information developed jointly by three companies, including Toshiba, in the development of the K-6&7 design.

The STP 3&4 project will allow Toshiba to apply their engineering, construction, inspection, testing, and maintenance experience in Japan to ensure safe and reliable ABWR operation in the US. The STP 3&4 project will be led by Toshiba Leaders with first-hand experience on the K-6&7 and Hamaoka 5 projects (to maximize the application of the Japanese ABWR experience).

1.5.3 Fluor Corporation

Fluor Corporation is one of the world's largest, publicly owned engineering, procurement, construction, and maintenance services companies. Fluor serves clients in a wide variety of traditional and evolving industries worldwide, including chemicals and petrochemicals; commercial and institutional; government services; healthcare; life sciences; manufacturing;

microelectronics; mining; oil and gas; power; telecommunications; and transportation infrastructure.

Fluor has provided engineering, environmental, procurement, construction and start-up services for multiple power development projects. Among these was the Fluor conversion of the unfinished Midland Nuclear Power Plant to a combined-cycle, natural-gas-fired cogeneration facility. This project was the first of its kind and represented the largest cogeneration project ever executed in the United States with 1,035MW produced by gas turbines with an additional 335MW provided by steam turbines.

1.5.4 Sargent & Lundy

For more than 115 years, Sargent & Lundy has provided comprehensive consulting, engineering, design, and analysis for electric power generation and power delivery projects worldwide. Sargent & Lundy has a large, highly experienced and diversified staff solely dedicated to the energy business. Nuclear power has been a primary focus of their business since 1954. Through the years, Sargent & Lundy has been continuously involved in nuclear power, designing successive generations of new stations and supporting operating plants on an on-going basis. Sargent & Lundy has been authorized to design more than 30 new nuclear units, approximately 25,000 MW. Their nuclear new generation experience includes completion of 12 boiling water reactors, 16 pressurized water reactors, one high-temperature gas-cooled reactor, and one liquid sodium reactor. Recent experience includes extensive engineering, design, analysis, and project services for PWR, BWR, and CANDU nuclear power station owners.

1.5.5 Westinghouse Electric Company

The Westinghouse Electric Company, offers a wide range of nuclear plant products and services to utilities throughout the world, including fuel, engineering services, maintenance support, Instrumentation & Control (I&C) systems, and advanced Nuclear Power Plant designs. With its headquarters in Pittsburgh, Pennsylvania, USA, Westinghouse has operations in 12 states and in 15 countries around the world with over 10,000 employees.

Fifty years ago, Westinghouse helped design and build the first commercial Nuclear Power Plant in the United States. Today, there are more than 435 operating commercial nuclear reactors world-wide. Westinghouse technology is the basis for approximately one-half of these reactors, giving Westinghouse technology the world's largest installed base of operating nuclear plants.

More than 10% of Westinghouse's employees are directly involved in Boiling Water Reactor (BWR) design, fuel supply, engineering services, and I&C equipment supply. Westinghouse has BWR-specific engineering centers in Chattanooga, Tennessee, San Jose, California, Vasteras, Sweden, and in Mannheim, Germany. Westinghouse annually supplies nuclear fuel reloads, and the associated analyses and licensing support, for 30 operating BWR plants world-wide. The company also supplies a complete portfolio of field and engineering services, plant modifications and upgrades, plant uprating services and I&C system components and upgrades for the world's operating BWR fleet.

Westinghouse has designed and installed the Ovation platform for control and information applications in 40 operating nuclear plants in 11 countries, and has provided its Common Q platform to 17 operating nuclear plants in four countries for safety control and protection applications. Fourteen new Nuclear Power Plants that have design activities in progress today (four in China, six in Korea, and four in the USA) are planning to utilize these same Ovation and Common Q platforms. By adapting these I&C platforms for the STP 3&4 ABWR, there is increased confidence that the necessary industry infrastructure to support these platforms will be in-place to support the plants through their operating lifetimes and enhances confidence in the plant safety, reliability and dependability.

Table 1-1. Project Scope and Key Personnel

Task	Objective	Lead Organization	Key Supporting Companies
ABWR Certified Design Sponsor Design Documentation			
1. Design Documentation	Identify the references in licensing documents that must be re-established to support the licensing process for STP 3&4.	TSB	TSB MPR WEC S&L
2. Unique Issues	Understand any unique issues and how they affect the plant design.	TSB	TSB WEC MPR
3. Design Basis Information	Define the design basis documentation to be provided by Toshiba as well as estimated level of effort and plan for preparing that documentation.	MPR	MPR TSB WEC STPNOC
Engineering Plan			
4. Americanization	Determine the impact of Americanization on engineering and procurement.	S&L	S&L MPR TSB
5. Engineering Schedule/ Resources	Integrate updated schedule and resource requirements from results of all tasks. *Note that the results of this task are proprietary and are not discussed in this report.*	Fluor	Fluor S&L TSB WEC MPR
Licensing			
6. USNRC Interface	Define the process, roles, and responsibilities for implementing the 10CFR52 methodology for the current STP COLA with a third party NSSS vendor, and develop the COLA revision plan without participation of the certified ABWR design sponsor.	TSB/MPR	MPR TSB WEC STPNOC

Task	Objective	Lead Organization	Key Supporting Companies
Technical Items			
7.1 Seismic and Civil/ Structural Design	Develop an Action Plan for addressing the issue of seismic and civil/structural design (conclusions, actions, uncertainties, schedule impact, recommendations).	S&L	S&L TSB WEC
7.2 Safety-related I&C Platform	Develop an Action Plan for addressing the issue of a safety-related I&C platform (conclusions, actions, uncertainties, schedule impact, recommendations).	TSB	TSB WEC MPR STPNOC S&L Fluor
7.3 OPRM System	Develop an Action Plan for addressing the issue of an OPRM system (conclusions, actions, uncertainties, schedule impact, recommendations).	TSB	TSB WEC MPR
7.4 Human Factors Engineering	Develop an Action Plan for addressing the issue of human factors engineering (conclusions, actions, uncertainties, schedule impact, recommendations).	WEC	WEC TSB MPR S&L Fluor STPNOC
7.5 Fuel and Associated Analyses	Develop an Action Plan for addressing the issue of fuel and the associated analyses (conclusions, actions, uncertainties, schedule impact, recommendations).	WEC	WEC TSB
7.6 PRA	Develop an Action Plan for addressing the issue of the PRA (conclusions, actions, uncertainties, schedule impact, recommendations).	TSB	TSB WEC STPNOC
7.7 Severe Accident Mitigation	Develop an Action Plan for addressing the issue of severe accident mitigation (conclusions, actions, uncertainties, schedule impact, recommendations).	TSB	TSB WEC MPR
7.8 Hydrodynamic Loads	Develop an Action Plan for addressing the issue of hydrodynamic loads (conclusions, actions, uncertainties, schedule impact, recommendations).	TSB	TSB WEC MPR S&L

Task	Objective	Lead Organization	Key Supporting Companies
	Supply Chain		
8. Supply Chain	Demonstrate that the Engineering, Procurement, and Construction team has the capability to deliver the required material and equipment.	TSB	TSB Fluor S&L WEC
	Uncertainty Evaluation		
9. Mitigation Management Assessment	Summarize and describe uncertainties along with primary mitigation management methods. *Note that some of the results of this task are proprietary and are not discussed in this report.*	MPR	MPR WEC TSB Fluor S&L STPNOC

Key:
Fluor	Fluor
MPR	MPR Associates
S&L	Sargent & Lundy
STPNOC	South Texas Project
TSB	Toshiba
WEC	Westinghouse Corporation

1.6 ASSESSMENT CRITERIA

The following specific assessment criteria were used:

1. There must be a high confidence the USNRC will determine Toshiba is qualified to supply the certified ABWR design in accordance with 10CFR52.73. The expected USNRC processes for review and approval of the construction and operating license application (COLA) are defined and understood to the extent possible, especially as those processes impact STPNOC and Toshiba.

2. The Toshiba licensing and engineering plans clearly show that participation of the certified design sponsor is not required for design, construction, licensing, and long-term plant operation.

3. Major uncertainties are defined and each of those uncertainties is acceptable with a well-defined and clear mitigation management plan and contingency plans where applicable.

4. The engineering activities required to reconstitute the certified ABWR design are clearly defined and a realistic schedule is developed for completing those activities.

5. There are no unreasonable departures from the certified ABWR design required.

1.7 KEY ASSUMPTIONS

The evaluations documented in this report were performed based on key assumptions:

- All project activities will be performed in strict accordance with all existing commercial agreements regarding ABWR design documentation.

- The certified ABWR design sponsor is not a participant in the STP Units 3 and 4 project.

2 Conclusions

2.1 Conclusions

The overall conclusion of this evaluation is that Toshiba can provide the certified ABWR design without participation of the original certified design sponsor. The STP 3&4 EPC Team led by Toshiba has the necessary capabilities to execute the project. There are no issues that could prevent the project from being completed successfully. Most importantly, Toshiba has available almost all required design basis information for the certified ABWR design. This will support the qualification of Toshiba in accordance with 10CFR52.73 as a supplier of the certified ABWR design. Some information will require reconstitution, but the amount is small and manageable within the overall project schedule. Further, Toshiba has the design documentation available for virtually the entire scope of the Tier 1 design, as well as direct experience applying those design bases to the design, construction, and operation of existing ABWRs. The COLA will require revision, but the scope of the revision is defined and is manageable.

There will be several focus areas and uncertainties, particularly during the engineering and licensing phase for the first several years, but with proper planning and mitigation management those can be addressed. The focus areas are summarized below in Section 2.2 as part of the Recommendations discussion and described in more detail in the body of this report (primarily Section 10).

2.2 Follow-Up Actions

Although there are no issues that prevent Toshiba from completing STP 3&4 without participation of the certified ABWR design sponsor, there are several uncertainties that warrant special mitigation management plans to ensure the impact of those uncertainties does not delay the project implementation. The uncertainties are summarized in Table 2-1 along with recommended/planned actions and plans to manage those uncertainties. Additional details, including additional less significant uncertainties and corresponding recommendations are provided in Section 8.

Some of the uncertainties are unrelated to lack of participation by the certified ABWR design sponsor. They are included for completeness to define the overall uncertainties. Also, as shown in Table 2-1, some of the uncertainties and the recommended mitigation management approaches overlap and are related.

This evaluation also identified follow-up actions that must be completed to complete the STP 3&4 project without participation of the certified ABWR design sponsor. These actions were identified in the individual tasks and are summarized in Attachment D to this report.

Table 2-1. Primary Uncertainties and Mitigation Management Plans

Area	Planned Actions
1. **Design Documentation** – There are several uncertainties and potential issues with access to and the use of ABWR design documentation: • The reconstitution efforts could identify additional work load not included in the engineering plan.	• Assign an Engineering Manager responsible for implementing the design document reconstitution process, including both document development and ensuring compliance with all applicable commercial agreements. • Include in the engineering plan vertical slice/FOAKE inspection tasks for each system with design content by the certified design sponsor. Complete those assessments in 2008 and develop a specific reconstitution plan for each system (resulting in a confident schedule/resource estimate by end of 2008).
2. **Instrumentation and Control (I&C)** – There are first-of-a-kind I&C design issues that result in uncertainties with platform development and qualification, software development and testing, commercial grade dedication, system design, integrating I&C systems from multiple vendors into a single control room and human factors engineering (HFE) approach, simulator design and development, etc.	• Install a dedicated project manager to manage the various activities by Toshiba, Westinghouse, S&L, Fluor, and other vendors. • Install an oversight and verification function to review and provide oversight of all I&C and HFE activities (regular special design reviews, performance monitoring, etc.). • Continued (increased if possible) interaction with industry in discussions with USNRC on resolution of I&C issues. Consideration should be given to an increased leadership role in this area. • Consider a study to define the advantages, disadvantages, costs and benefits of available contingency plans and potential parallel activities.
3. **Americanization** – The STP 3&4 project involves Americanizing the Toshiba ABWR design for application in the US. This will include converting the design from metric to English, switching from Japanese equipment/suppliers to US, ensuring the design meets US codes and standards and USNRC regulations, etc.	• Assign a separate Americanization Engineering Manager responsible to lead a focused effort to identify and evaluate all Americanization related issues, and provide recommendations for changes and/or additions to the engineering schedule and plans. • Perform a pilot system audit which will validate the processes and plans for completing detailed engineering to identify any potential Americanization issues. • Update Project Plans and similar project documents to clearly define common processes and procedures to be used by all EPC Team organizations to address Americanization issues.

Area	Planned Actions
4. **Communication** – Communication among the EPC Team organizations is hindered by different languages and organizations separated by several time zones.	• Enhance communication plan (and include in Project Manual) to ensure that language differences and miscommunication do not cause configuration management issues. • Increase EPC Team personnel in each other's office to foster communication and sharing of information. • Add US personnel to the Toshiba team in key roles. • Implement a cultural awareness/training program.
5. **USNRC Licensing Related Uncertainties** – Toshiba has limited experience working within the USNRC regulatory framework.	• Use MPR and Westinghouse to augment the Toshiba licensing organization and provide the expertise and experience with working within USNRC processes. • Continue the plan for TANE to hire US personnel, including licensing professionals, to work in the US. • Maintain clear communication with USNRC Staff regarding the review processes for the STP 3&4 COLA and be responsive to all information requests.

2.3 ASSESSMENT CRITERIA EVALUATION

Section 1.6 defined the assessment criteria to be used for this evaluation. Table 2-2 compares the results of the evaluation with those assessment criteria.

Table 2-2. Assessment Criteria Evaluation

Assessment Criteria	Discussion
There must be a high confidence the USNRC will determine Toshiba is qualified to supply the certified ABWR design in accordance with 10CFR52.73. The expected USNRC processes for review and approval of the construction and operating license application (COLA) are defined and understood to the extent possible, especially as those processes impact STPNOC and Toshiba.	Toshiba has the experience, capabilities, and necessary design information to satisfy the requirements of 10CFR52.73. The anticipated licensing processes, including the required support from and involvement of Toshiba have been defined.
The Toshiba licensing and engineering plans clearly show that access to the certified design sponsor's design information is not required for design, construction, licensing, and long-term plant operation.	The evaluation confirmed Toshiba has available almost all required design information and that the unavailable information can be reconstituted. The project plan will not require any dependence on the certified design sponsor during the life of the plant.
Major uncertainties are defined and each of those uncertainties is acceptable with a well-defined and clear project management/mitigation plan and contingency plans where applicable.	A detailed project evaluation, including development of project management plans, was performed.
The engineering activities required to reconstitute a Toshiba ABWR design basis for the certified ABWR design are clearly defined and a realistic schedule is developed for completing those activities.	The required reconstitution activities are estimated based on extrapolating from a detailed pilot program evaluation of four systems. The activities to determine the specific scope for the remaining systems is included in the updated schedule as well as the estimated level of effort of reconstitution (based on the extrapolation).
There are no unreasonable departures from the certified ABWR design required.	Additional departures are required for the STP Units 3&4. However, they are not unreasonable. Further, the total number of departures will remain essentially the same since some departures included in the current STP 3&4 COLA can be deleted.

3

Licensing Approach for Toshiba

3.1 BACKGROUND

The USNRC regulations for licensing nuclear power plants are documented in 10CFR52. The 10CFR52 process involves several steps for the granting of a combined operating license (COL) for a nuclear plant. These steps are summarized below.

- **Design Certification** – Design Certification is the review and approval, by the USNRC, of a standard nuclear power plant design. A sponsor (typically an NSSS company) submits an application for design certification. The core of the application is a generic Design Control Document (DCD) that includes a design description with detail comparable to a Safety Analysis Report (SAR). The USNRC reviews and approves the design on a generic basis for potential use by any future COL applicant. A main benefit of the Design Certification is that the design is already approved and a future COL application (COLA) may reference the certified design, and does not need to include the detailed design description. Further, during the COLA review the USNRC will only review site-specific design features described in the COLA, not the entire plant design. Once the design is approved, a Design Certification Rule is created for the design and an appendix for that design certification is added to 10CFR52. For information, the ABWR design certification is Appendix A of 10CFR52.

- **Combined Operating License** – The COL is the single license approved by the USNRC. The COL is the specific license to construct and operate a specific plant design at a specific location and by a specific owner-operator. The COLA typically will reference a certified design DCD.

- **Inspection, Tests, Analysis, and Acceptance Criteria (ITAAC)** – ITAAC are specified in the COLA. The ITAAC are the specific evaluations and confirmation performed to ensure the plant, as constructed, is consistent with the critical design features described in the COLA.

Safety-related construction may begin once the COL is issued by the USNRC. Once all ITAAC have been confirmed and approved by the USNRC, permission is granted to begin power operation.

The approach for Toshiba providing the certified ABWR design at STP without participation of the certified ABWR design sponsor must be accomplished within the 10CFR52 framework.

3.2 STP UNITS 3 AND 4

Within 10CFR52, there are several options for Toshiba. These options include the following:

- Prepare and obtain USNRC approval for a separate certified Toshiba ABWR design. In this case, the STP COLA would reference this new DCD. This involves preparing an entire DCD and requires formal USNRC review of that DCD followed by rulemaking for the certified design. However, the required schedule is unacceptable for the STP 3&4 project.

- Prepare, and obtain USNRC approval for an amendment to the certified ABWR design in 10CFR52, Appendix A. Although the revised 10CFR52 allows for amendments to design certifications, the allowable criteria for the amendment do not include business considerations such as this situation. Further, there could be complications if other vendors were supplying the certified ABWR design at the same time. Finally, this approach likely does not satisfy the schedule requirements for the STP 3&4 project.

- Submit a COLA that does not reference any certified design, and instead provide all design and safety analysis information in the COLA. This approach is allowable by USNRC rules, but the USNRC review schedule would be significant. Further, this would lose the benefits gained by use of a certified design. This approach also would not satisfy the schedule requirements for the STP 3&4 project.

- Revise the existing STP 3&4 COLA to add the required information for Toshiba to supply the certified ABWR design, and continue to reference the existing certified ABWR design. The STP 3&4 COLA would still reference the existing certified ABWR design, so the COLA would need to specifically address how Toshiba planned to provide a plant in accordance with the certified design without the certified design sponsor participating.

Given these options, the best alternative to satisfy USNRC rules and STP 3&4 project schedule requirements is the last option – to reference the existing certified ABWR design in the COLA and provide the additional information where appropriate. 10CFR52 specifically allows a third party to reference and use a certified design, so this approach should be acceptable to the USNRC as long as the alternate vendor (Toshiba) can demonstrate adequate knowledge of the certified ABWR design bases and complete the necessary development activities.

This approach is feasible and USNRC rules allow Toshiba to provide the certified ABWR design without participation from the certified design sponsor. STPNOC will need to make a determination that Toshiba has the appropriate experience and capabilities to satisfy the requirements of 10CFR52.73. The NRC will need to also independently confirm such a determination (pursuant to 10CFR52.73) as part of the routine review of the STP COLA under COLA Part 1, "Qualifications" in accordance with their Standard Review Plan.

3.3 SUMMARY

In summary, the best approach for STP 3&4 is for Toshiba to design and construct the existing certified ABWR design. Some minimal variations will likely be required to reflect the Toshiba

design bases and the lack of participation by the certified design sponsor. For USNRC review and approval of the COLA, STPNOC and Toshiba must demonstrate that Toshiba:

- Has an adequate understanding of the certified ABWR design bases and can apply them
- Has the key design basis information for the certified ABWR design
- Has the overall experience and capabilities to design and provide an NSSS
- Can adequately defend the design and licensing bases for the design in the STP 3&4 COLA

This approach will be pursued by STPNOC by submitting a revised COLA including appropriate new information. The information will be included in Revision 2 of the STP 3&4 COLA.

4

ABWR Design Documentation (Tasks 1, 2, and 3)

4.1 ABWR Design Documentation

Design basis document, licensing basis document, and DCD/COLA/SER reference are all terms which refer to the various documents that are part of the project configuration management system. Licensing basis documents and DCD references are typically Licensing Topical Reports (LTRs) and other reports, whereas design basis documentation more often consists of calculations, analyses, specifications, and so forth.

Three companies, including Toshiba, worked collaboratively on the original common engineering for the ABWR, as well as the detailed design and development at Kashiwazaki-Kariwa Units 6&7 in Japan (the first ABWRs). Subsequently, Toshiba also participated in the design and construction of Hamaoka-5 in Japan. Prior to these ABWR projects, Toshiba collaborated on other BWR technology initiatives and projects. These efforts have provided Toshiba with a strong knowledge of ABWR design documentation.

Toshiba has access to and shares ownership rights to the ABWR common engineering documents (under permission granted by the Japanese utilities). These common engineering documents form the core of the underlying design bases for the ABWR, both the ABWRs in Japan as well as the certified ABWR design. There are some additional technical documents and information that are not included in the common engineering documents. Toshiba either already has the required design documentation for the STP 3&4 project from work performed on other ABWR projects or has the capability to develop or reconstitute the necessary documentation. Toshiba has demonstrated sufficient BWR and ABWR knowledge and experience to be able to reconstitute the required documentation.

TCA Tasks 1 and 3 investigated the ABWR design and licensing basis documentation in order to develop a high level of confidence in Toshiba's capability to provide complete and comprehensive technical support to the project. In most cases, the basis documentation is available to Toshiba. This documentation is organized in a comprehensive electronic records management system which provides ready retrievability. Toshiba's engineering staff repeatedly demonstrated an intimate technical knowledge of design documents, having developed or participated in the development of many of them.

Task 1 primarily addressed licensing basis documentation and DCD/COLA/SER references. Task 2 addressed unique technology considerations. Task 3 examined design basis documentation for selected systems and components.

4.2 DESIGN DOCUMENTATION FOR CERTIFIED DESIGN (TASK 1)

4.2.1 Issue

The certified ABWR Design Control Document (DCD), the USNRC Safety Evaluation Report (SER) on the DCD (NUREG-1503), and the STP 3&4 COLA include references to numerous specific documents and topical reports. Many of these documents are readily available in the public domain, however, a number of the documents contain proprietary information. Since these documents are not readily available, substitute documentation must be independently developed or reconstituted for the STP 3&4 project. The purpose of Task 1 was to identify the design documents that must be reconstituted to support the STP 3&4 COLA and licensing process.

The Task 1 report provides the detailed results of this effort. Attachment A to this report provides the key results and supporting information from the task report.

4.2.2 Approach

References in the DCD, SER, and COLA were grouped into three categories:

1. Direct References (documents directly identified in the licensing document)
2. Embedded References (documents referenced within direct references)
3. Indirect References (technical statements in the licensing document that are not provided with a direct reference)

Each reference identified was then grouped into one of five categories.

- Type 1 references can be used as-is. These are references which are either in the public domain or have no restrictions for use.
- Type 2 references are no longer applicable to the STP 3&4 design. These are references for which the technical bases they are supporting are not applicable to the plant design, not references which are being replaced by new engineering work.
- Type 3 references (including technical bases) are not required, because they will be superseded with new engineering work during the detailed design and procurement activities for STP 3&4.
- Type 4 references contain applicable design basis information unavailable to Toshiba. Type 4 references are to be replaced with alternate documentation.
- Type 5 references are available to Toshiba but contain information which cannot be released. Project specific Toshiba documents must be developed as appropriate.

Information in COLA Revision 2 requiring USNRC review and approval must be supported by appropriate references. References for information incorporated by reference and not within the scope of COLA Revision 2 can be developed on an as-needed schedule basis. Each direct reference was screened using the evaluation questions required by 10CFR52, Appendix A, Section VIII.B.5 (similar to 10CFR50.59) to determine if prior USNRC approval will be required for the direct reference reconstitution.

4.2.3 Conclusions

A comprehensive review of all documents used as direct references in the ABWR DCD, the associated USNRC Safety Evaluation Report (NUREG-1503), and the existing STP 3&4 COLA revision 1 has been completed. The results of the Task 1 reviews are included in the task report (key result included in Attachment A of this report). The review identified 158 references in the DCD/SER/COLA as potentially containing certified design sponsor design documentation. Of these, 18 have been identified as potentially requiring resolution to support COLA revision 2.

In addition to these references, the Task 1 reviews identified 42 references that must be reconstituted after COLA revision 2 (the affected sections are Incorporate by Reference in the COLA). These totals exclude fuel related design and analysis since those activities will be addressed separately.

The sampling review of embedded references determined that additional reviews were not required. Determination of the necessary design basis documents is within the scope of Task 3.

Indirect references typically identify/discuss either design inputs or acceptance criteria for a particular topic. They essentially represent the design basis of the plant and are typically supported by a referenced document, although the reference may not be explicit. Indirect references will be addressed during the detail design phase of the project to ensure that the design bases used in future engineering work are consistent with those specified in the existing licensing documentation.

4.3 ABWR Unique Issues (Task 2)

4.3.1 Issue

Since the ABWR was designed jointly by three companies including Toshiba, some technologies necessary for the certified ABWR design may be unavailable immediately. Toshiba would have to develop alternatives to those unique issues. The purpose of Task 2 was to identify these potential issues for STP 3&4. The assessment addressed areas such as nuclear technology, turbine technology, and other relevant technologies such as water treatment and steam generation.

4.3.2 Approach

The review was completed using an approach with the following key elements:

- Searches and preparation of lists covered nuclear technology, turbine technology and other relevant technologies such as water treatment and steam generation.
- Reviews which pertain to technologies necessary for the certified ABWR design.
- Independent review to confirm the identification of unique technologies necessary for the certified design ABWR.
- Identification of alternative technologies that could be used.

4.3.3 Conclusions

The review determined that Toshiba can supply the certified ABWR design without participation of the certified design sponsor

4.4 Design Basis Information (Task 3)

4.4.1 Design Basis Information Issue

The certified ABWR design bases are based partially on engineering and design documentation developed by the certified ABWR design sponsor. If the certified ABWR design sponsor is not participating in the STP 3&4 project, some of this documentation may not be available to the EPC Team. Task 1 addressed the need to reconstitute selected references to support the licensing process. Task 3 addresses the need to reconstitute references for EPC purposes and development of design basis information for long term plant operation support.

The purpose of Task 3 was to estimate the design basis information (DBI) source documents (i.e., design inputs and requirements for the ABWR SSCs) that need to be generated by the EPC Team to support detailed design, construction, and Inspection, Test, Analysis and Acceptance Criteria (ITAAC) activities.

The detailed Task 3 report is included as Attachment B to this report.

4.4.2 Approach

The scope of the Task 3 assessment included a vertical slice review of four selected Systems, Structures, and Components (SSCs) and reviews of additional documents for selected systems for the purpose of extrapolating the assessment data to the overall plant design.

Four SSCs were specifically selected from ABWR design areas where the certified ABWR design sponsor was a primary design agent during the ABWR development. The four SSCs selected were:

- Reactor Pressure Vessel (RPV)
- Safety/Relief Valves (SRVs)

- Reactor Internal Pumps (RIPs)
- High Pressure Core Flooder (HPCF) system

For each of the selected SSCs, detailed "vertical-slice" investigations were performed using a desktop guide/process to focus on identifying the sources for various design statements in the ABWR DCD with COLA Revision 1. The vertical slice investigations identified the types of design basis source documents required to support the STP 3&4 design. Instances where Toshiba did not have the design basis source information needed to support the design item (and in a form available to STPNOC) were identified as potential "gaps".

For each gap not already being addressed by other tasks, the estimated effort and potential schedule impacts to resolve the gap were estimated. Since the vertical slice process did not cover all DBI for each SSC, the total percentage of DBI documentation reconstitution/re-creation (R/R) expected for each SSC is also estimated.

The results of the four SSC investigations are used to obtain an initial estimate of the reconstitution/re-creation (R/R) effort and to identify other areas for further assessment. In particular, other areas are selected for further assessment based on the types of design basis source documents and design topics that are associated with the gaps. This includes consideration of the type and extent of source documents held by Toshiba for all the ABWR systems, their historical origin, and the experience of cognizant Toshiba engineers, including consideration of known differences between the certified ABWR design and the Japanese ABWRs. For the additional selected systems or areas, investigations of available source documentation are performed as a means of providing a better estimate of the potential gaps for all plant SSCs.

Overall, based on the detailed investigations of these four SSCs, there were three main reasons for the gaps.

- Some analyses and design features that are required for the certified ABWR design are not required for plants in Japan.
- Some DCD analyses were performed using the certified design sponsor's computer codes or methods.
- The design basis source information for some parameters come from proprietary documents in the certified design sponsor's design record files, and although Toshiba has access to, and ability to use, the information in these files, specific Toshiba will be developed to replace such sources.

4.4.3 Conclusions

The primary source for the ABWR DBI that Toshiba has available and would use for STP 3&4 is the Common Engineering Documents (CEDs). These documents were developed jointly by the three companies developing the ABWR design and were either applied directly to K-6&7 and

H-5, or were used as the basis for creating equivalent plant-specific documents for those units. There are roughly 800 CEDs associated with 85 ABWR systems or topical areas.

For many of the SSC design items investigated that were not covered by the CEDs, Toshiba has equivalent DBI source documentation for review that either Toshiba or its affiliate companies had developed for specific plants (e.g., K-6, H-5, or Lungmen). These alternate examples demonstrate Toshiba's ability to develop technical bases documents.

In several instances Toshiba has identified improved or advanced designs, methods, or codes compared to the detailed design items stated in the. These were typically based on Toshiba's direct design, construction, and operating experience with the Japanese ABWR.

During the assessment, Toshiba provided evidence which demonstrated the capability to develop the system design specifications, design criteria documents, design drawings, calculations, technical reports, and analyses that form the basis for the plant design and which are typically referenced within the plant Design Basis Documents (DBDs).

The approximately 800 CEDs that were prepared jointly during ABWR design development in the 1980s/90s are a key source for the STP 3&4 design inputs. An extrapolation of the results from the limited scope assessment of Task 3 results in an overall impact which is manageable within the project plan.

The identified gaps between the certified ABWR design features versus the Japanese ABWR design features are not significant enough to require an unreasonable additional effort.

5
Technical Areas (Tasks 4 and 7)

Although Toshiba has designed and constructed ABWRs in Japan, there may be selected technical and design areas that are either outside the Toshiba experience base or need to be re-performed without participation of the certified ABWR design sponsor. These areas result from differences in regulations and design practices between Japan and the US. Each of these areas was evaluated in detail to confirm Toshiba can provide the necessary design and equipment and to define the action plan for those development activities. This section provides a summary of the results of each technology evaluation.

5.1 AMERICANIZATION (TASK 4)

5.1.1 Issue

"Americanization" is the process of transferring an established capability for the design, construction, and successful operation of a fleet of ABWRs from the foreign country in which that technical capability was developed to the US. Although the design of the Japanese ABWRs is the basis for the very similar US certified ABWR design, the units of measure, applicable codes and standards, regulatory requirements, licensing processes, vendor and utility interface, and operating and maintenance philosophies are different. The Americanization task investigates the processes which can be employed on the project to manage these issues and identifies actions which the project can take to ensure that the expectations for a US ABWR are satisfied.

Each of the US new nuclear power plant projects must address with Americanization issues to some extent. Each of the NSSS vendors has some degree of non-US ownership and involvement. The technology for the next generation of plants to be built in the US has been exported overseas in the past few decades, evolved and matured overseas, and is now being imported back to the US. Equipment supplied for the next generation of nuclear generating plants will be on a global scale, whereas previous US plants were constructed almost entirely from domestically supplied equipment. All of the new plants will be licensed under the new 10CFR52 rules. The US industry has collected lessons learned from operating experience which must be incorporated into the new plant designs. Enhanced expectations and design features for plant performance, on-line maintenance, equipment reliability, and human performance have evolved in the US industry and differ in some respects from practices in other countries. All of these issues fall under the very broad heading of "Americanization."

These issues will not be resolved by the TCA effort. Instead, the objective of TCA is to perform a limited examination of these areas in order to identify the future actions required to develop an Americanization plan and to establish clear lines of responsibility in the project organization for ownership of the processes to be developed to address Americanization issues.

5.1.2 Discussion

Generally, Toshiba will be relying on US companies to implement Americanization of the Japanese ABWR design. Toshiba will typically provide conceptual design information at the system and major component level based upon the design information of the Japanese plants, such as K-6&7. In this manner, the experience gained by Toshiba based on the design evolution and construction advances demonstrated in Japan can be transferred to the US plants. The detailed design, program development, and design and constructability reviews will be performed by US companies. Except for the major NSSS components, the majority of equipment will be specified and procured by the US companies. For those components which will be procured by Toshiba, specific plans for oversight will be developed to ensure compliance with US requirements.

The STP 3&4 engineering plan includes activities and features to address Americanization, including:

- A defined process for converting units (metric to English)
- Procurement activities, including expectations for procuring all equipment to US codes and standards from qualified 10CFR50, Appendix B suppliers and minimizing commercial grade dedication
- An assigned Americanization program manager to continue to develop specific plans to identify issues as they are identified
- Additional benchmarking to continue to collect lessons learned from other similar projects
- Specific procedures and checklists for Americanization audits and reviews which address NRC regulatory requirements, US codes and standards, EPC Specification requirements, and DCD/COLA/SER requirements
- Training plans for all EPC participants
- Program plans for topics unique to US plants or notably different from Japanese plants, such as Environmental Qualification (10CFR50.49), Fire Protection, Electrical Separation, Security, etc.

The TCA and STPNOC Due Diligence teams participated in two benchmarking activities of similar projects, i.e., projects associated with the transfer of nuclear technology from foreign suppliers to the US market. Meetings with Louisiana Energy Services (LES) and AREVA were held to glean lessons learned from their projects. LES has obtained a license for and is presently constructing the National Enrichment Facility in Lea County, New Mexico. AREVA has submitted an application for design certification for the Evolutionary Pressurized Reactor (EPR). Both of these projects are importing technology from Europe to US projects. As a result of the many lessons learned collected, action plans have been developed for future implementation.

The Americanization task has developed a confirmatory sample review process. One system (Fuel Pool Cooling and Cleanup System) and two components (Hydraulic Control Unit and the RIP Motor Generator Sets) in the Toshiba scope of supply have been selected to be audited at a future date.

5.1.3 Conclusions

Uncertainties and issues related to Americanization will continue to be identified as the project progresses and the action plans are implemented. The EPC team is cognizant of the Americanization issues and has developed adequate plans for the project to proceed.

5.1.4 Recommendations

The following summarizes the key recommendations/actions resulting from this task.

- Sargent & Lundy will assign an "Americanization" Manager, working closely with Toshiba, to investigate this task further to understand if the current plans address all issues and include sufficient resources/effort. This will include additional benchmarking activities.
- Toshiba will revise their procedures (applicable procedures referenced in Plant Design Guidance document and other procedures, as applicable), incorporating the "Americanization" comments provided by S&L and STPNOC. The revised procedure will clearly delineate the process Toshiba will use to "Americanize" their reference design for STP 3&4.
- The confirmatory sampling process for reviews of Toshiba products by American EPC Team members will be implemented.

5.2 Seismic and Civil/Structural Design (Task 7.1)

5.2.1 Issue

Seismic and structural design and analyses of the safety-related structures was performed by the certified ABWR design sponsor in development of the certified design. Without participation of the certified ABWR design sponsor, this engineering is unavailable and must be reconstituted by the Toshiba EPC Team. Site-specific seismic analyses already performed by other contractors will also not be available. The purpose of Task 7.1 was to develop the plan for performing the required engineering for the seismic design of the plant structures, particularly the reactor building.

The Task 7.1 report provides a comprehensive description of the task results, including conclusions, engineering plans, etc. This section includes a summary of the task results.

5.2.2 Conclusions

The results of this task show that the EPC Team has the capability to perform the required design and analysis activities, including the necessary reconstitution efforts. A detailed engineering plan has been developed for these activities.

The duration of the engineering activities, including the reconstitution efforts, is considerable. This plan is included in the updated EPC schedule.

5.2.3 Action Plan

The task report includes a detailed implementation plan for completing the structural and seismic design and analysis by the team of Toshiba, Sargent & Lundy, and Fluor.

5.2.4 Uncertainties

The development of the engineering plan identified several uncertainties that will be managed during the design and analysis activities:

- Exterior surfaces of the existing Japanese ABWR designs have openings, penetrations, doors, and louvers that may be vulnerable to tornado generated missiles and thus require protective barriers. Those protective features will be included in the design.
- The certified ABWR design is based on ACI 349-80. The STP 3&4 COLA revision 1 includes a departure to change the design code to ACI 349-97. This change will be reconciled in the reconstituted analyses.
- The STP 3&4 analyses will result in calculation of new seismic response spectra. The spectra for the certified design are included in the DCD. The reconstituted analyses will be consistent with the DCD results. Any differences will be reconciled and evaluated for acceptability.

5.2.5 Recommendations

Several follow-up actions should be performed in this area. These include:

- Start structural seismic analysis and design activities as soon as possible but no later than July 1, 2008.
- Expedite determination of final STP 3&4 site parameters as well as site design response spectra.
- It is possible that the updated EPC schedule will require procurement of equipment and/or analysis and design of systems prior to generation of new response spectra. In these situations, it is recommended that the equipment procurement and/or analysis and design of systems be based on using 120% of the existing DCD ABWR response spectra in order

to minimize any possible impact due to differences between the spectra for DCD and Toshiba ABWRs.

- Based on commitments in the DCD and STP 3&4 COLA, several of the design codes and requirements for the structural design are consistent with current codes. Consideration should be given to new departures for STP 3&4 to also change tornado parameters to those specified in Revision 1 of Reg. Guide 1.76 to change applicable edition of ANSI/AISC N690 code from 1984 to 1994 with Supplement No. 2.

5.3 SAFETY-RELATED AND NON-SAFETY I&C (TASK 7.2)

5.3.1 Issues

Toshiba and Westinghouse will supply the I&C systems for STP 3&4. Although Toshiba has supplied I&C systems for Japanese ABWRs, and Westinghouse will provide I&C systems for US AP1000s (as well as many operating PWRs), both companies will be providing I&C systems for the certified ABWR design for the first time. As a result, the I&C designs, including hardware, software, documentation, and testing, are not complete and the COLA will include a commitment to the USNRC and appropriate ITAAC/DAC for work to be done. Further, since all platform designs are not complete and qualified, development and first-of-a-kind (FOAK) activities will be involved in the project scope.

The objectives of this task were to demonstrate that the Toshiba EPC team could deliver appropriate solutions over the lifecycle of the planned units.

5.3.2 Conclusions

A detailed plan for implementing the I&C platform and system design, manufacturing, testing, qualification, and installation was developed. The final recommended platforms to be implemented for the major systems are summarized in Table 5-1. These selections were based on the goal of synergies between ABWR and AP1000 and previous Toshiba and Westinghouse experience.

While a large amount of work will need to be done by multiple vendors, the I&C can be completed successfully. It is important to note that the I&C, HFE, and Simulator scope will likely be on the critical path to plant completion.

5.3.3 Approach

The evaluation was performed by completing a series of individual tasks/studies. These activities included:

- The proposed architecture of the safety and non-safety systems was documented. The approach used to determine the recommended architecture was outlined, and the result of this evaluation was documented. An overall summary for each system was provided along with a brief justification of the selected platform.

Table 5-1. Recommended I&C Platforms

System	Selected Platform
Reactor Trip and Isolation System (RTIS) and Neutron Monitoring System (NMS)	TOSDIA-FPGA
ESF Logic and Control System (ELCS)	Common Q
Plant Computer and Information Systems (including Plant Data Network)	Ovation
Feedwater Control (FWC) and Reactor Recirculation Flow Control Systems (RRFC)	TOSMAP (C2000)
Automatic Power Regulation System (APR)	TOSMAP (C2000)
Rod Control and Information System (RCIS)	TOSMAP (C2000)
Steam Bypass and Pressure Control System (SBPC)	TOSMAP (HCNT)
Electro-Hydraulic Control System (Main Turbine Control) (EHC)	TOSMAP (HCNT)
Automatic Voltage Regulator (AVR)	TOSMAP (HCNT)
Other Reactor, Turbine, and Plant Controls	Ovation
Area, Process, and Effluent Radiation Monitoring (RMS) – Safety and Nonsafety	Third Party Systems

- The non-technical aspects of the safety system and non-safety system platforms were also evaluated. There are several important non-technical aspects to platform evaluation which are summarized for the safety candidate platforms. Issues examined include standardization, schedule, and commercial uncertainty.

- An evaluation of technical aspects of candidate safety platforms (RTIS, NMS, and ELCS) was provided. Platforms included are TOSDIA-FPGA, Common Q, DRS Plμs32 and TRICON V10.

- A numerical evaluation of technical aspects of candidate non-safety platforms (PICS, FWC, RRFC, APRS, RCIS, SBCS, EHC, AVR, RMS and Reactor and Turbine Auxiliary Controls) was performed. Platforms included are TOSMAP (C2000 and HCNT configurations), Ovation, Foxboro I/A, and TRICON V10. Not all platforms were candidates for all non-safety systems.

- An evaluation of technical aspects of candidate RMS platforms was performed. Two Toshiba supplied RMS platform scenarios are included (one using Toshiba skids and one using Non-Toshiba skids). RMS platform scenarios are also provided.

- Several specific evaluations were performed at the request of STPNOC. These include: an assessment of Smart Instrumentation requirements in the EPC Specification, a response to STPNOC's inquiry into a Software Management Plan, the current status of the Setpoint Methodology for the STP 3&4 project, and a discussion and recommendations for an Electromagnetic Compatibility (EMC) plan.

The alternatives analysis was completed iteratively between Toshiba/Westinghouse and S&L/Fluor/MPR/STPNOC. The results of the analysis were utilized to develop recommended solutions. The analysis placed high priority on COLA impact, similarity to Toshiba's standard ABWR design, and similarity to Toshiba's planned fleet ABWR design.

Most of the effort of this task was directed at planning the path forward. The task team worked to ensure that the schedule would reflect the activities that have to be performed, that the schedule has the correct ties between tasks to set the appropriate priorities, and that the direction planned by this task can result in a licensable, operable, maintainable, safe, reliable, available, testable plant. The I&C and Human Factors task teams met together, since the I&C and HFE processes are interdependent. The schedule produced also incorporated the OPRM (Task 7.3), to ensure that the I&C (including the OPRM), Human Factors, and Simulator could be achieved and that the schedule would represent the best vision of the path forward. Project uncertainties are defined below, which have mitigation plans in progress or require development of mitigation plans.

5.3.4 Uncertainties

The development of the engineering plan identified several project uncertainties that will be managed during the design and analysis activities:

- The field programmable gate array (FPGA) technology to be used for RTIS and NMS has been submitted to the NRC for evaluation and licensing.

- While the power range and startup range neutron monitoring systems have been designed and built, the FPGA implementation for RTIS is first-of-a-kind-engineering.

- The Toshiba Fuchu design and manufacturing organizations does not currently operate under a 10CFR50, Appendix B program. The development and implementation of this program must be completed (to address potential licensing and quality assurance issues for both STPNOC and the USNRC). Implementation of this Appendix B program is presently scheduled for September 2008.

- Other than the existing control systems, such as feedwater, reactor recirculation, and rod control, design work will need to be performed. After the design is completed, software design, development, implementation, review, and test will be required for both safety and non-safety systems (although previous Toshiba work on TOSMAP C2000 and TOSMAP HCNT can be used in some areas).

- The ELCS provides the credited safety grade data display in the control room for all safety systems. The PICS provides nonsafety grade data display and annunciation in the control room for all systems. Implementation issues are possible for the gateways from the safety-related FPGA-based systems to the non-safety Plant Information and Control System (PICS) and the safety grade communication paths from the FPGA-based systems to the safety-related Common Q ELCS (since the FPGA systems do not yet exist). Additionally, depending on the selected radiation monitoring system (RMS) vendor, there could be implementation uncertainties with the communication links from the radiation monitoring

system (RMS) to the safety grade Common Q ELCS and the gateways from the RMS to the nonsafety grade PICS (although it is important to note that implementation issues associated with the gateways from the safety-related Common Q to PICS has been dealt with in other Westinghouse projects so the uncertainties should be low).

- There could be communications interfacing issues associated with the various vendors' systems and required communications between these systems.

- Safety-related systems (e.g., radiation monitoring) will be purchased from third-party suppliers. These may represent significant licensing uncertainty, as the selected vendors may not have pre-approvals in the form of USNRC Safety Evaluation Reports. However, many of these vendors have been supplying RMS to the nuclear power industry for many years.

- The testing methodology for the integration of the I&C must be defined. The scope, magnitude, and requirements for such testing, including evaluation of the required overlap conditions and the required test coverage, need to be defined early in the project and factored into the schedule, costs, and resources for all systems and vendors.

- The entire I&C system needs a close-to-final database of inputs, outputs, setpoint values, composed points, and other communications interface data, as well as clear plans, procedures, and processes to control change.

5.3.5 Recommendations

A comprehensive I&C and HFE engineering, testing, and procurement plan is being developed, including oversight of the I&C efforts by a dedicated I&C Manager. The plan will include all appropriate contingencies. The TCA task efforts developed a preliminary plan. Additional details will be added during initial EPC activities.

5.4 OPRM System (Task 7.3)

5.4.1 Issue

The certified ABWR design includes an Oscillation Power Range Monitor (OPRM) to detect or suppress power oscillations before Specified Acceptable Fuel Design Limits (SAFDL) are uncertainties and to ensure compliance with nuclear design licensing criteria in 10CFR50, Appendix A, GDC-12. However, the ABWRs operating in Japan utilize a Selected Control Rod Insertion (SRI) to suppress power oscillations and do not utilize an OPRM system. Thus, Toshiba will need to develop, test, and implement an OPRM system. The purpose of Task 7.3 was to recommend an approach for developing an OPRM system without participation of the certified ABWR design sponsor.

5.4.2 Conclusions

The Task 7.3 report documents two approaches for implementing an OPRM system for STP 3&4. One approach utilizes available design documentation from operating plants to develop an ABWR system. The alternate approach is based on developing a system design without the use of existing design documentation. The investigations determined both options can be accomplished and are manageable within the overall project plan. Toshiba and Westinghouse have the necessary experience and expertise to specify, manufacture, test, and implement an OPRM system.

Details of the Task 7.3 assessment of OPRM system development are provided in the Task 7.3 Task Report.

5.5 HUMAN FACTORS ENGINEERING AND SIMULATOR (TASK 7.4)

5.5.1 Issues

The Human Factors Engineering (HFE) Program for the ABWR in the DCD was developed by the certified design sponsor. Toshiba will need to implement the HFE Program without the certified design sponsor's participation, but may not have access to all the supporting documentation for the program. In addition, the human factors engineering methods approved by the USNRC in the certified design do not meet the current USNRC requirements and expectations, as expressed in NUREG-0711, Revision 2, "Human Factors Engineering Program Review Model." The purpose of Task 7.4 was to determine the impact on schedule, resources, and uncertainty for Toshiba to implement the HFE program.

The Control Room automation includes alarm suppression and electronic procedures, which may present licensing issues to the USNRC. In addition, the use of alarm suppression and electronic procedures creates human factors evaluation requirements and I&C testing requirements with impacts that may not be understood by the schedule and budget development staff. This issue is common to Task 7.2, I&C.

5.5.2 Conclusions

Westinghouse, in collaboration with STPNOC, has the experience and expertise to execute the complete NUREG-0711, Revision 2, HFE program expected by the USNRC. The COLA will be left unchanged, and a Human Factors Engineering Plan put in place that exceeds the HFE program approved in the ABWR DCD, while meeting current regulatory requirements.

Westinghouse will need to perform and document many of the analyses expected in a NUREG-0711, Revision 2, program, including the Emergency Operating Procedures.

Terminology related to the standard design, including the term Power Generation Control System (PGCS), was found to be non-proprietary.

Toshiba's Advanced Plant Operation by Displayed Information and Automation (A-PODIA) Control Room design will serve as a baseline for the STP 3&4 Control Rooms, but some updates will be required based upon I&C platform considerations and the planned HFE program.

5.5.3 Approach

Most of the effort associated with this task was directed towards planning the path forward. The task team needed to ensure that the schedule/plan would reflect the activities that need to be performed, that the schedule has the correct ties between tasks to set the appropriate priorities, and that the direction planned by this task can result in a licensable, operable, maintainable, safe, reliable, available, testable plant. The I&C and Human Factors task teams met together, since the I&C and HFE processes are interdependent. The schedule produced also incorporates the OPRM (Task 7.3), to ensure that the I&C (including the OPRM), Human Factors, and Simulator could be achieved and that the schedule would represent the best vision of the path forward. Project uncertainties are defined below. These have already been mitigated, have mitigation plans in progress, or require development of mitigation plans.

5.5.4 Uncertainties

The only project uncertainty in developing the HFE program is schedule. Completing all required activities may challenge the plant simulator completion date desired for operator training, design activities, and HFE verification activities to support training and licensing operators. This is mitigated with a comprehensive work plan and schedule that includes all dependencies between the I&C, HFE, and simulator activities. Also, information from the Japanese ABWR projects will be obtained and used as guidance or reference when possible, to preclude duplicating work.

5.5.5 Recommendations

The HFE Program Plan must be completed, reviewed, and approved in an expedited manner.

5.6 Fuel and Associated Analyses (Task 7.5)

5.6.1 Issue

The fuel supplier for the Japanese ABWRs is Global Nuclear Fuel (GNF). The purpose of this task was to define an alternative fuel supply option in addition to GNF.

The Task 7.5 report is included as Attachment C to this report.

5.6.2 Conclusions

This evaluation determined that Westinghouse is a viable supplier of ABWR fuel for STP 3&4. Westinghouse has successfully provided fuel to operating US BWRs and can develop and manufacture ABWR fuel.

5.6.3 Action Plan

The COLA for STP 3&4 incorporates by reference all of the fuel and safety analyses sections from the certified ABWR design DCD. The STPNOC plan for fuel design is to process a license amendment after the COL is issued. This will allow STP 3&4 to use the latest available design ABWR fuel and safety analyses, and competitively select a fuel supplier.

The current Westinghouse core and safety analysis package of LTRs approved by the USNRC for US BWR reload fuel licensing provides an excellent foundation to develop the required LTRs and technical material for ABWR fuel. The WEC LTRs will require revision to reflect the ABWR reactor type and the ABWR FSAR and initial core analyses.

5.6.4 Uncertainties

The key uncertainty associated with fuel supply is considered to be availability of resources at the USNRC to perform the required reviews and approval of the LTRs on a schedule required for STP 3&4. This uncertainty exists regardless of the fuel supplier. This will be mitigated by early and effective communication with the USNRC.

5.7 PRA (TASK 7.6)

5.7.1 Issue

The PRA model for the certified ABWR design documented in the ABWR DCD was developed by the certified ABWR design sponsor and is the property of the sponsor. As a result, it is unavailable to STPNOC for the licensing of STP 3&4 or for development of the detailed design. Further, although Toshiba has performed PRA work in Japan, Toshiba has not developed and implemented a PRA model in accordance with US standards. Finally, although the Toshiba EPC Team is performing the design of STP 3&4 and supporting the licensing process, STPNOC has elected that the PRA model will be developed and maintained by STPNOC, with the Toshiba EPC Team in a support role.

The purpose of this task is to confirm that the Toshiba EPC Team has the necessary capabilities to support STPNOC in the development and implementation of the STP 3&4 PRA model. A particular issue is support in the near term for licensing purposes, since the PRA model results will be needed to support the licensing process, but there is no model currently available.

5.7.2 Conclusions

STPNOC performed an audit of the Toshiba and Westinghouse PRA capabilities and concluded that the EPC Team capabilities are adequate to supply the necessary design information that will be needed by STPNOC in the completion of the PRA plan for STP 3&4. The Toshiba EPC Team can adequately support the STPNOC plans for providing PRA technology and information to the USNRC in the completion of the COLA review, and in the start-up and commercial operation of STP 3&4.

5.7.3 Action Plan

Near Term Plan

STPNOC has elected to reconstitute a full-scope PRA for the ABWR design as documented in the DCD. This decision resulted from several factors, most importantly the need for the PRA model to support the evaluation of departures and design features that will be included in the revised COLA. STPNOC has provided the EPC Team with the list of information required to support PRA model development.

Long Term Plan

10CFR52 requires STPNOC (the licensee) to have an updated, full-scope PRA for STP 3&4 prior to fuel load, and for the PRA to meet all required standards that existed one year prior to fuel loading. STPNOC plans to develop the plant specific updated PRA model, with the Toshiba EPC Team providing needed information and providing additional support. The EPC Team scope is expected to include:

- Support for implementation of a Design Reliability Assurance Program (DRAP)
- Support for plant-specific calculations
- Provision of internal and peer reviews of the completed model
- Provision of plant construction walk-downs

STPNOC is developing a detailed project plan for the plant-specific PRA and its use in supporting Risk-Informed Applications (RIAs). The final plan will define the required technical support from the EPC Team.

5.7.4 Uncertainties

There is essentially no uncertainty associated with the PRA reconstitution or the full-scope PRA for STP 3&4. Further, the Toshiba EPC Team has the necessary design basis information, technical capabilities, experienced personnel, and requisite tools to perform tasks needed to support STPNOC.

5.8 Severe Accident Mitigation (Task 7.7)

5.8.1 Issue

The certified ABWR design includes several design features to mitigate severe accidents, including some that have not been incorporated in the Japanese ABWRs. As a result, Toshiba does not have first-hand application of those features/designs, as well as delivery of the associated components. The purpose of this task was to determine the feasibility of using these features and, if necessary, evaluate alternatives.

5.8.2 Conclusions

Commercial technical agreements provide for the technology to be available for use by the EPC Team for STP 3&4. Further, Toshiba and Westinghouse have sufficient understanding of the certified design approach for severe accident mitigation and the design bases for the required components to develop equivalent designs.

5.8.3 Action Plan

Design, verification and manufacturing of necessary components will proceed as required on the overall EPC schedule. In addition, potential vendors will be evaluated.

5.8.4 Uncertainties

Development of the required designs and components for severe accident mitigation is considered to have minimal to no uncertainties.

5.9 HYDRODYNAMIC LOADS (TASK 7.8)

5.9.1 Issue

Hydrodynamic loads on the containment and reactor structures can result from a Loss of Coolant Accident and Safety Relief Valve lift. These loads were analyzed for the certified ABWR design by the certified design sponsor, using proprietary computer codes, and using proprietary experimental data for validation. Without participation of the certified design sponsor, some of the analyses, codes, and data will not be available. Therefore, Toshiba and the EPC Team will have to reconstitute required hydrodynamic load analyses.

Analysis is required of loads associated with the suppression pool swell and fall back (referred to as pool swell loads), loads associated with condensation oscillation and chugging at the vent exits (referred to as CO/CH loads), and loads associated with safety relief valve (SRV) lift and clearing (referred to as SRV loads).

The purpose of this task was to develop the hydrodynamic load calculation methodology by: 1) determining what models need to be developed, 2) establishing how these models will be validated using available test data or benchmark data from a previously qualified computer model, and 3) identifying the needs for additional testing, if any.

5.9.2 Conclusions

The EPC Team has the capabilities to perform the required analyses. The approach for each load is summarized below.

- **Pool Swell Loads** – These loads will be calculated using GOTHIC with similar assumptions from the DCD analyses. Preliminary analyses have been performed and the results successfully benchmarked against Marviken test data.

This is a change from the DCD analyses, so there will be licensing impact. Although GOTHIC has been previously accepted for Mark III applications on a limited basis and has been benchmarked against vertical vents (Mark II), there is a lack of explicit benchmark data for the horizontal vent design. Further benchmarking is planned. Toshiba has access and permission to use the data collected from a Mark III test. A separate technical report will be prepared for STPNOC to submit to for USNRC review and approval in parallel with the COLA review.

An alternate/contingency approach is to use the Westinghouse-Sweden code (COPTA), which has been used for the Nordic plants. The COPTA code has only been benchmarked against the Marviken test data (representing the Mark II configuration). Therefore, COPTA would also need to be benchmarked against the horizontal vent test data.

- **CO/CH Loads** – The Source Load Approach will be used for this approach. This is the same approach used in the DCD analyses. The methodology has been applied successfully for other containment types. Further, Toshiba has rights to use the required analysis methodologies and tools.

- **SRV Loads** – These loads will be determined using a methodology based on empirical correlations derived from mini-scale, small-scale, and large-scale tests. This is the same approach used in the DCD analyses. The methodology has been applied successfully for other containment types. Further, Toshiba has rights to use the required analysis methodologies, tools, and necessary test data. Further, this is the same as that used for Mark II/III containments in the US.

5.9.3 Action Plan

Pool Swell Load

A technical report will be prepared for STPNOC submittal for USNRC review and approval. The necessary departure will be incorporated into the COLA after the USNRC review.

CO/CH and SRV Loads

Toshiba will reconstitute the CO/CH and SRV load analysis utilizing the DCD methods. Since the plan is to reconstitute the analysis utilizing the same methods, any required departures in the COLA will be incorporated through the departures processes described in 10CFR52, Appendix A. USNRC approval is not expected to be required.

Contingency Plans

Detailed plans and schedules for the backup/contingency methods have not been fully developed. If the use of a backup method should become necessary, the schedule impact will be addressed at the time.

5.9.4 Uncertainties

For pool swell loads, although the GOTHIC model has been previously accepted for the Mark III applications on a limited basis and has been benchmarked against vertical vents (Mark II), there

is no explicit benchmark against the horizontal vent design of the certified ABWR design. Specific USNRC approval will be required. To mitigate this uncertainty, further benchmarking analysis is planned to support preparation of a technical report for STPNOC and USNRC review. As a back-up, the Westinghouse-Sweden analysis code (COPTA) may be used.

For CO/CH loads, there is little uncertainty since the proposed analysis methodology remains the same as that in the DCD.

For SRV loads, there is little uncertainty since the proposed analysis methodology remains the same as that in the DCD.

6
Supply Chain (Task 8)

6.1 Supply Chain Issue

Toshiba has provided ABWRs in Japan and has supported the Lungmen ABWR project. The Japanese ABWRs were constructed with equipment and commodities procured almost entirely from Japanese suppliers. STP 3&4 and other ABWRs will be constructed using an approach where a significant fraction of the plant equipment and commodities are procured from US and international suppliers, but without the participation of the certified design sponsor. The purpose of TCA Task 8 was to assess the availability of manufactured equipment for the ABWR normally supplied by the certified design sponsor. This task also considered whether there are a sufficient number of suppliers to supply the equipment and commodities to meet the STP 3&4 project needs, as well as the overall procurement process.

6.2 Conclusions

The Task 8 evaluation determined that all major equipment normally supplied by the certified design sponsor can be procured from other suppliers. This is the most important conclusion of the evaluation. There should not be any supply chain issues that prevent STP 3&4 from being completed without participation of the certified design sponsor. Further, the evaluation determined that the Task 8 team is developing the supply chain infrastructure needed for STP 3&4.

The Task 8 evaluation also included an assessment of the existing supplier base for nuclear power plant projects, including ABWRs. The results of this assessment are not specifically related to whether the certified ABWR design sponsor participates on the STP 3&4 project or not. However, these observations and conclusions are important considerations for the project. The overall supply chain assessment identified three primary conclusions:

- There is a strong supplier base for nuclear grade mechanical equipment. Procurement of this equipment is not expected to be an issue for STP 3&4.

- There are presently few nuclear grade electrical (IEEE) suppliers. This will likely impact the availability of electrical equipment from 10CFR50, Appendix B suppliers. A potential option for this issue is increased amounts of procurement of electrical equipment from commercial suppliers coupled with commercial grade dedication. This approach is not attractive to STPNOC. STPNOC desires to maximize the amount of equipment procured from 10CFR50, Appendix B suppliers.

- Although the overall supply chain for US nuclear power plant projects is presently thin (resulting from no new plant orders in a generation), the industry can likely support the

first few new plant projects. If the industry attempts to initially construct many plant projects at the same time, the industry wide supply chain may not be able to provide all required equipment and commodities in a timely manner.

6.3 UNCERTAINTIES

The major supply chain uncertainties were discussed in the conclusions. The uncertainties that warrant specific management/mitigation plans include (note that none of these are related to lack of participation by the certified design sponsor in the project):

- Availability of 10CFR50, Appendix B suppliers of electrical (IEEE) equipment.
- Overall impact on supply chain of numerous simultaneous new nuclear power plant projects.

6.4 ACTION PLAN

Based on the evaluations performed for Task 8, the task team identified a series of actions that should be taken to manage/mitigate uncertainties related to procurement and supply chain and ensure a successful project. These are described in the task report and summarized below.

1. Ensure that sufficient engineering information is available early to commit the long lead material and equipment purchase orders that are necessary for maintaining the existing procurement schedule.
2. Determine the most critical components (castings, forgings, steel, piping, switchgear, power cable, etc.) that may impact supply of components or equipment.
3. Identify potential suppliers for critical components, as well as perform engineering necessary to support procurement of critical components.
4. Reach agreements with suppliers as quickly as possible to supply equipment. This should consider the potential to make early commitments to "reserve" equipment, especially IEEE equipment.
5. Maintain current procurement schedule for the critical equipment and material.
6. Initiate discussions with the commercial grade dedication organizations for certain safety-related components and equipment which OEMs cannot supply to STP 3&4.
7. Encourage suppliers to develop or reactivate 10CFR50, Appendix B QA programs in order to provide safety-related equipment and services (especially electrical equipment).

Several of these actions are already being completed as part of the STP 3&4 project plan.

7

NRC Interaction/Licensing (Task 6)

7.1 SCOPE

The approach for Toshiba to provide the certified ABWR design at STP 3&4 without participation of the certified ABWR design sponsor is to continue to reference the certified ABWR design in the revised COLA, and to include the necessary departures and supplemental information in the COLA revision. There were two main objectives of Task 6:

- Determine the scope of the COLA revision
- Demonstrate that Toshiba and the EPC Team have the required licensing experience and expertise to support the STP 3&4 project

The Task 6 personnel worked closely with the Task 1 task team since there was considerable overlap in scope and objectives related to the handling/replacement of DCD design information.

7.2 COLA REVISION SCOPE

STPNOC submitted revision 0 of the STP 3&4 COLA on September 20, 2007. The application was docketed by the USNRC on November 29, 2007. STPNOC also submitted COLA revision 1 on January 10, 2008.

With Toshiba providing the certified ABWR design without participation of the certified design sponsor, the revised COLA is planned to be submitted to the USNRC in October 2008. The purpose of COLA revision 2 is to incorporate all essential changes reflecting Toshiba as the EPC.

The scope of the changes to the COLA (to prepare revision 2) can be divided into several categories:

1. To replace the information included in COLA revision 0 and revision 1 by reference to Licensing Topical Reports (LTRs) prepared since the design certification was approved by the USNRC. The references to the LTRs will be replaced with specific discussion included in the COLA, potentially with reference to a separate technical document that can be made available for USNRC review if necessary.

2. To include departures from the certified ABWR design required to support Toshiba recommended changes. In some cases, departures are necessary to provide a separate bases for a design feature. Further, there were instances where Toshiba (because Toshiba has designed and constructed actual ABWRs) was aware of issues or problems with the

certified ABWR design information. Updated Toshiba design information will be provided. Finally, there were instances where lack of participation by the certified ABWR design sponsor necessitated a different design approach. The best example is the departure for a Toshiba turbine-generator.

3. To delete or revise some departures included in revision 0 of the COLA.

4. To correct errors in the DCD or COLA revision 0 or revision 1. Toshiba performed a detailed review of the certified ABWR design DCD and STP 3&4 COLA revision 0 and 1. This review identified several errors and inconsistencies that will be corrected in the COLA revision 2.

Additional details on the scope of COLA revision 2 are provided below.

7.2.1 Certified Design Sponsor References

As discussed in Section 4, there are numerous references in the ABWR DCD and STP 3&4 COLA. The references in the DCD have already been reviewed and approved during design certification. As long as Toshiba plans to implement the same approach and follow those documents, no action is required for the STP 3&4 COLA. The references in the STP 3&4 COLA must be replaced with equivalent Toshiba information. The main reason for this change is to be able to respond to USNRC questions on the content of the material.

As discussed in Section 4, a number of LTRs require replacement in COLA revision 2. The equivalent information will be prepared and included in the COLA. The potential need to eventually replace references to documents in the DCD will be determined on a case-by-case basis as the detailed STP 3&4 design is completed.

7.2.2 Design Changes/Departures

The docketed STP 3&4 COLA contains 11 Tier 1 and one Tier 2* departures from the DCD. These were included for a variety reasons including improved safety and reliability, standardization with Lungmen, and improved technology (the certified design is about 15 years old).

Toshiba performed a detailed review of the DCD and STP 3&4 COLA to determine proposed departures (Tier 1, Tier 2*, and Tier 2) to improve safety and reliability, standardization with the operating ABWR fleet, improved technology, and lack of participation by the certified ABWR design sponsor. These proposed departures were reviewed in detail with STPNOC Licensing and Engineering to determine the final scope of COLA revision 2. This process included formal presentations to the STPNOC Project Design Review Board (PDRB) for numerous proposed changes.

The departures were categorized into four groups:

- **"Delete"** – The COLA departures in revision 1 that STPNOC and Toshiba agreed to delete (and return to the 10 CFR 52, Appendix A, certified ABWR design).

- **"Keep"** – The COLA departures that will be kept in revision 2 because they are advantageous. For these departures Toshiba will prepare a COLA validation package and 50.59-like evaluation to confirm that Toshiba has the supporting design bases. Toshiba will also review the Part 7 description and determine if improvements are warranted.

- **"Revise"** – The COLA included departures related to changes desired for revision 2, but not the exact same departures. These departures will be revised as desired for revision 2. For these departures, Toshiba will prepare any necessary engineering, the COLA mark-up, the 50.59-like evaluation, and the validation package.

- **"New"** – STPNOC and Toshiba agreed to several new departures that were not included in the original COLA. For these departures, Toshiba will prepare any necessary engineering, the COLA mark-up, the 50.59-like evaluation, and the validation package.

Departures to correct errors in the DCD or current COLA were included as "revise" or "new" depending on whether there was an existing departure.

The COLA revision 2 is expected to have slightly less departures compared to revision 1. In general, both revisions are similar with regard to changes from the DCD.

7.2.3 Proprietary Sections

There are seven proprietary sections in the DCD and COLA revision 1:

- 3B Containment Hydrodynamic Loads
- 4.3 Nuclear Design
- 4D Reference Fuel Design Compliance with Acceptance Criteria
- 4A Typical Control Rod Patterns and Associated Power Distribution for ABWR
- 4B Fuel Licensing Acceptance Criteria
- 6.3 Emergency Core Cooling Systems
- 18H Supporting Analysis for Emergency Operation Information and Controls

Since Toshiba plans to implement the same approaches as used in the DCD, these sections are Incorporated By Reference from the certified ABWR design, and will be reconstituted at a later date and replaced with Toshiba proprietary information. The goal is to develop these replacements such that NRC approval is not required.

7.3 TOSHIBA EPC TEAM LICENSING CAPABILITIES

The design, licensing, construction and operation of a nuclear power plant requires the reactor/NSSS vendor to support the plant owner/operator in a variety of licensing areas. This

includes STP 3&4. In order to execute the STP 3&4 project, Toshiba will need to provide a variety of licensing support services. This is a potential issue since Toshiba has limited experience working within USNRC regulations and processes.

In general, an NSSS vendor must provide licensing support in the following areas:

- Preparation of a Design Certification Application (or SAR)
- Preparation of Licensing Topical Reports
- Preparation of Combined Operating License Application (COLA)
- Effective Interface/Meetings with USNRC
- Preparation of responses to USNRC Requests for Additional Information (RAIs) on license submittals (applications and topical reports)
- Technical support for USNRC Hearings
- Atomic Safety Licensing Board Hearings and Interaction Support
- ACRS Hearings and Meetings Support
- Technical support for plant operations

Toshiba has not provided the NSSS for an operating nuclear power plant in the US. As a result, realistically Toshiba does not have the full range of experience and capabilities to provide licensing support to STPNOC for the STP 3&4 COLA, detailed design, construction, and operation. However, the Toshiba EPC Team assembled for the STP 3&4 project collectively does have the necessary experience and capabilities.

The vision for the STP 3&4 project is for Westinghouse and MPR to provide licensing support and expertise to Toshiba during the period while Toshiba develops an internal capability, either through training/experience or through hiring of experienced US professionals. Both MPR and Westinghouse have considerable USNRC licensing experience, especially experience with 10CFR52 and new nuclear power plants. The other members of the EPC Team (Sargent & Lundy and Fluor) also have licensing experience and will also provide support as appropriate.

Table 7-1 shows a summary of the required services that an NSSS vendor must provide along with the breakdown of how the Toshiba EPC Team can provide those services. As shown in Table 7-1, the EPC Team adequately covers the required capabilities.

In summary, the Toshiba EPC Team has the necessary experience and capabilities to support the licensing of STP 3&4 and the required interfaces with the USNRC. Toshiba alone does not presently have experience in each of the necessary areas. However, the EPC Team collectively has the required experience. Westinghouse, as an NSSS vendor, has capabilities in each area. MPR, as a support contractor for Toshiba also has the requisite experience and capabilities in many of the required areas. In addition, Fluor and S&L also have experience in these areas.

Table 7-1. Licensing Support Capabilities

Task/Activity	Applicable Experience[1]			
	Toshiba	WEC	MPR	Fluor/ S&L
Preparation of a Design Certification application (or SAR)	-	X	-	X
Preparation of Licensing Topical Reports in accordance with USNRC regulations and processes	-	X	X	-
Preparation of responses to USNRC Requests for Additional Information (RAIs) on license submittals (applications and topical reports) in accordance with USNRC regulations and processes	-	X	X	X
Technical support for USNRC Hearings		X		X
Atomic Safety Licensing Board Support		X	-	-
ACRS Hearings/Meetings		X	X	X
Technical support for plant operations	X	X	X	-

Notes:

1. X indicates significant experience
   - indicates applicable experience, but not with USNRC

7.4 TOSHIBA QUALIFICATION TO 10CFR52.73

The ability of Toshiba to supply the certified ABWR design referencing the certified design is based on the information in 10CFR52.73. This section states:

> *(a) ... In the absence of a demonstration that an entity other than the one originally sponsoring and obtaining a design certification is qualified to supply a design, the Commission will entertain an application for a combined license that references a standard design certification issued under subpart B of this part only if the entity that sponsored and obtained the certification supplies the design for the applicant's use.*

When 10CFR52 was originally developed, the USNRC assumed this approach would be followed (that a third party designer would have a license agreement with the design certification sponsor). However, the USNRC elected to include the option for the approach where the certified design sponsor is not involved.

Toshiba and STPNOC do not have a specific agreement in place with the certified ABWR design sponsor. The design documentation that the USNRC will desire to review and confirm is available at Toshiba, or the equivalent information can be reconstituted. The results of Task 3

(described in Section 4) document that Toshiba has the ability to demonstrate the STP 3&4 design will be consistent with the design bases of the certified ABWR design.

It is important to note that the certified ABWR design material is the Tier 1 design information in the DCD. The Tier 2 information is approved by the NRC, but not certified. Task 3 showed that Toshiba has the design basis information for almost all of the Tier 1 certified material; most of the gaps in available design bases information are Tier 2 information.

The USNRC is expected to conduct an inspection of Toshiba. The purpose will be to confirm, and document in the Safety Evaluation Report of the STP Units 3 & 4, that Toshiba:

- Has an adequate understanding of and can supply the certified ABWR design bases
- Either has, or has access to, the key design basis information for the certified ABWR design
- Has the overall experience and capabilities to design and provide an NSSS

Based on these considerations as well as the results of Task 3 described in Section 4, Toshiba will be able to address these considerations.

8

Uncertainties & Mitigation Management (Task 9)

8.1 PROJECT UNCERTAINTIES

The project for Toshiba to support the certified ABWR design without participation of the certified design sponsor includes a number of uncertainties. As described in the previous sections of this report, there are no aspects of the project scope that prevent Toshiba from completing the project – all necessary activities, including development activities, can be accomplished. The evaluation identified the uncertainties to completing the project on the schedule desired by STPNOC, along with key mitigation/management actions to reduce those uncertainties.

A review was performed to identify and collect the uncertainties for Toshiba to supply the certified ABWR design at STP, based on the results of the TCA task evaluations.

8.1.1 ABWR Design Documentation

The certified ABWR design documentation includes technical documents, calculations, testing, operational data, etc. Much of this documentation is available to Toshiba and Toshiba has rights to use it with certain restrictions. The project plan includes the development of design documents as necessary to support the STP 3&4 licensing and design processes.

8.1.2 Communication

Communication among the EPC Team organizations is hindered by different languages and organizations separated by several time zones.

8.1.3 Instrumentation and Control (I&C)

There are first-of-a-kind I&C design issues that result in project uncertainties with platform development and qualification, software development and testing, commercial grade dedication, system design, integrating I&C systems from multiple vendors into a single control room and human factors engineering (HFE) approach, simulator design and development, etc.

8.1.4 Americanization

The STP 3&4 project involves Americanizing the Toshiba ABWR design for application in the US. This will include converting the design from metric to English, switching from Japanese equipment/suppliers to US, ensuring the design meets all US codes and standards and USNRC regulations, etc.

8.1.5 Licensing

Section 8.3 (below) identifies several project uncertainties associated with USNRC licensing for STP 3&4 without participation of the certified design sponsor.

8.2 UNCERTAINTY MITIGATION MANAGEMENT

The mitigation plans are described below for the identified uncertainties. These are the main actions. Additional actions will also be considered.

8.2.1 ABWR Design Documentation

Assign a Design Documentation Engineering Manager to lead the effort to manage the process for handling and using design documents in accordance with the requirements of the existing commercial agreements, and develop and implement a plan for reconstitution of necessary design documentation.

8.2.2 Communication

The Project Manual will include a communication plan that will specify language usage, increased use of bi-lingual personnel, and interchange of personnel in each other's offices, including STP, requirements for reports, and use of a secure web site. There will be a shift of Toshiba management personnel to TANE so that the time zone impediment to communications within the team will be eliminated. Communications within the Toshiba organization will be transparent to the project.

Toshiba will assign a dedicated person to develop a comprehensive plan to help identify current communications, language and cultural issues that have led to miscommunications and misunderstandings among the EPC Team, as well as with STPNOC. The person will develop a strategy and list of recommendations for improving communications and minimizing language and cultural differences. The EPC Team will implement the changes and recommendations to enhance communications.

8.2.3 Instrumentation and Control (I&C)

Toshiba will assign a dedicated I&C/HFE Project Manager who will be responsible for overseeing I&C and HFE design activities performed by Toshiba, Westinghouse, S&L, and Fluor. The I&C/HFE Project Manager selected for this critical position will have the leadership and project management skills, along with technical experience to effectively manage the work and resolve issues. The I&C/HFE Project Manager will be responsible for leading routine design review meetings and monitoring I&C engineering progress to ensure the work is completed in accordance with the project requirements and is completed on time in accordance with the project schedule.

There will be continued (increased if possible) interaction with industry who are in discussions with USNRC on resolution of I&C issues. An attempt toward increased leadership within the industry in this technical area shall be made.

8.2.4 Americanization

Assign a separate Americanization Engineering Manager responsible to lead a focused effort to identify and evaluate Americanization related issues, and provide recommendations for changes and/or additions to the engineering schedule and plans.

Develop and implement an Americanization Plan owned and maintained by the Americanization Engineering Manager.

Select a pilot system and validate the processes and plans for completing detailed engineering to identify any potential Americanization issues.

Update Project Manual and similar project documents to clearly define common processes and procedures to be used by all EPC Team organizations to address Americanization issues.

A documented process for assuring that the EPC Technical Specification requirements are incorporated into the Toshiba basic design is being pursued.

8.3 OTHER UNCERTAINTIES

Section 8.1 describes the uncertainties with the greatest potential to impact project schedule. Additional, lower probability and consequence uncertainties were also identified. These are summarized briefly below. Each of these uncertainties is considered to be manageable without a specific mitigation plan.

8.3.1 Seismic/Structural Design

Comparing the existing DCD seismic analysis with that planned by Toshiba makes it impractical to predict or quantify any differences. The differences can be either in accelerations or a shift in frequency of peak response. The integrated project schedule should include the activities required for reconciliation of the differences between the spectra.

8.3.2 Other Design Documentation Issues

Availability of design documentation affects the processes that Toshiba must abide by to support the licensing process, complete the certified ABWR design, and provide the documentation necessary for long term plant operation without violating the terms of existing commercial agreements regarding design documentation.

8.3.3 Reconstitution Issues

There are some analyses referenced and described in the ABWR DCD for which Toshiba does not have access to the underlying design bases or analyses. These analyses will be reconstituted for STP 3&4. STPNOC will follow NRC regulations on evaluating, reporting, and revising the STP 3&4 COLA.

8.3.4 Other Technical Areas

Application of technical areas for the first time will require that plans be prepared that address development of technology and design features needed for the certified ABWR design. These items would be technical areas outside the scope of Toshiba's ABWR experience base in Japan.

9

Additional Due Diligence Reviews

9.1 APPROACH

The previous sections of this report describe the results of the EPC Toshiba Capabilities Assessment (TCA). This section describes the additional due diligence activities completed by STPNOC.

The STPNOC Due Diligence Evaluation scope was to review and participate in the TCA activities as well as to perform three additional independent reviews. The STPNOC Due Diligence team participated in the TCA tasks in the following roles:

- Monitoring on some tasks (e.g., meeting participation, contractor facility visits, etc.)
- Hands-on contribution on some tasks
- Shared leadership on selected tasks

The STPNOC Due Diligence team also reviewed key TCA deliverables, including the final TCA summary report. The STPNOC team also monitored routine project management activities for the full duration of the TCA.

The three additional review tasks performed by the STPNOC Due Diligence team were:

- Project management capability review of the Toshiba EPC team
- Vertical slice technical inspection of the reactor pressure vessel design
- Vertical slice technical inspection of the environmental qualification program implementation

The vertical slice reviews were performing using the methodology of the NRC inspection module 37802, "First of a Kind Engineering." The project management review was performed by STPNOC using the Toshiba project performance on the TCA activities and the parallel COLA revision preparation activities.

The purpose of the Due Diligence Evaluation was to provide additional assurance of the capabilities of the Toshiba EPC Team to provide the certified ABWR design. The results of key due diligence activities are summarized below.

The STPNOC Due Diligence Team included STPNOC senior engineers and managers, as well as industry leaders with significant nuclear power plant design, maintenance, and operations experience. The members of the STPNOC team are listed below.

- Management Sponsor: Steve Thomas, Engineering Manager STP 3&4
- Team Leader: Rick Lane, retired Site Engineering Director Arkansas Nuclear One and Entergy South Engineering Projects Director.
- Gene Poletto – President, Performance Power Services
- Wayne Massie – Licensing Engineer, STP 3&4
- Greg Gibson – Manager, Regulatory Affairs, STP 3&4
- Mike Lazar – I&C Engineer, STP 3&4
- Walter Djordjevic – President, Stevenson & Associates
- Ken Walker – retired Entergy Reactor Engineering Superintendent
- Tom Daley – Supervisor, Mechanical Engineer STP 3&4
- Joe Burack – Configuration Management Principal, STP 3&4
- Alan Schildkraut – Senior Electrical Engineer, STP 3&4
- John Crenshaw – VP, Engineering & Construction, STP 3&4
- Mark McBurnett – VP, Oversight and Regulatory Affairs, STP 3&4
- Larry Blaylock – City Public Service (San Antonio Municipal Utility)
- Bill Stillwell – PRA Supervisor, STP 3&4
- Carl Sayko – General Manager, Support Services, STP 3&4
- Tim Walker – Quality Manager, STP 3&4
- Tim Hurst – President, Hurst Engineering

9.2 INTERIM EVALUATION

A focused assessment of Toshiba and the TCA was performed about six weeks after the start of the TCA. The STPNOC Due Diligence Team visited the Toshiba facilities in Isogo, Japan for a full week on-site assessment. The primary objective was to gain a preliminary conclusion

regarding Toshiba's ability to provide the certified ABWR design without participation by the certified ABWR design sponsor. More specific purposes of the interim evaluation were to:

- Ensure the Toshiba EPC team was on track to address the assigned tasks, including independently evaluating the schedule and resources to meet the COLA schedule milestones.
- Obtain information to assist the STPNOC team in preparation for the Final Verification Review at the end of the TCA.
- Identify any potential critical flaws.

The primary scope of the interim evaluation was the areas with the highest potential for critical flaws. These areas included: Task 1 - Design Documentation, Task 3 - Design Basis Information, Task 4 – Americanization, Task 6 - NRC Interface, and Task 7.2 - Safety Related I&C Platform. Other areas were assessed on a sampling basis to validate plans, scope and process. These areas included: Task 2 – Unique Issues, Task 7.3 - OPRM System, Task 7.6 – PRA, Task 7.7 - Severe Accident Analysis, Task 7.8 - Hydrodynamic Loads, and Task 8 - Supply Chain.

The desired outcomes of the interim review were developed prior to the visit to Toshiba. These desired outcomes included:

- Toshiba understands the full scope required
- Uncertainty areas are identified
- Potential impact (potential schedule impact to COLA submittal and overall project) areas understood and appropriately being addressed
- Adequate programs and processes exist or were being defined to support implementation of the certified ABWR design in accordance with applicable regulations (e.g., 10CFR50, Appendix B, 10CFR21, records retrievability, configuration management, 10CFR50.59, software control, etc.)
- Information on the plans and products produced to date for each task was obtained in English and process for future output is defined

The evaluation included a review of the design documentation for a list of systems as well as the program and process documentation for selected programs. The systems reviewed included 125VDC, HPCF, Containment, and RPS. The program/process documentation was reviewed for the following programs: software development and control, Differing Professional Opinions, Configuration Management, 10CFR21, Design Control, Operating Experience, Independent Verification, Personnel Training & Qualification, Corrective Action Plan, and QA for Engineering. Procurement, and Construction.

Generally, each task and subject was examined beginning with a combination of interviews and document review followed by data gathering, document review, clarifying questions/answers, and report development.

The interim evaluation showed that the Toshiba Team has an excellent understanding of the ABWR design bases. All desired outcomes were met.

9.3 EPC TEAM ASSESSMENTS

The STPNOC Due Diligence team also made on-site assessments and inspections at Westinghouse and Sargent & Lundy. Westinghouse and S&L are a key element of the Toshiba plan to provide a certified ABWR design in accordance with US codes and standards and within the US regulatory framework.

9.3.1 Westinghouse Assessment

The STPNOC Due Diligence Team visited the Westinghouse facility in Monroeville, PA for a two day on-site review meeting. The purpose of the Westinghouse assessment was to review the ongoing work and results of the TCA activities being performed by Westinghouse as well as to validate Westinghouse's capability to perform their assigned DOR scope for the STP 3&4 project.

The focus of the Westinghouse assessment were the following areas: Task 7.2 - Safety Related I&C Platform, Task 7.3 - OPRM System, Task 7.4 - Human Factors Engineering, Task 7.5 - Fuel & Safety Analysis, Task 7.7 - Severe Accident Mitigation, and Task 7.8 - Hydrodynamic Loads.

The desired outcomes of the assessment were to:

- Verify satisfactory progress toward completion of Westinghouse led TCA tasks
- Verify that adequate project management infrastructure is implemented for the STP 3&4 project
- Verify the understanding of Westinghouse's "Division of Responsibility" for the STP 3&4 project

All desired outcomes were satisfied. Westinghouse is fully capable of filling the expected role on the Toshiba EPC Team for STP 3&4.

9.3.2 Sargent & Lundy Assessment

The STPNOC Due Diligence Team visited the Sargent & Lundy facility in Chicago, IL for a two day on-site review meeting. The purpose of the S&L assessment was to review the ongoing work and results of the TCA activities being performed by S&L as well as to validate S&L's capability to perform their assigned DOR scope for the STP 3&4 project.

The focus of the S&L assessment were the following areas: Task 4 - Americanization, Task 7.1 - Seismic and Civil/Structural Design, Task 7.8 - Hydrodynamic Loads, S&L COLA revision 2 activities, environmental qualification program plans, and electrical system design.

The desired outcomes of the assessment were to:

- Verify satisfactory progress toward completion of S&L led TCA tasks
- Verify that adequate project management infrastructure is implemented for the STP 3&4 project
- Verify technical capability of S&L using reviews of the COLA revision activities, electrical calculation preparation, and equipment Environmental Qualification program implementation
- Verify the understanding of S&L's "Division of Responsibility" for the STP 3&4 project

All desired outcomes were satisfied. S&L is fully capable of filling the expected role on the Toshiba EPC Team for STP 3&4.

9.4 FINAL ASSESSMENT

A detailed final assessment of Toshiba was performed at the conclusion of the TCA. The STPNOC Due Diligence Team visited the Toshiba facilities in Isogo, Japan for a full week on-site assessment. The objectives of the final assessment were to review and confirm the results of the TCA and to verify Toshiba's capabilities as the NSSS provider to deliver the certified ABWR design for STP 3&4.

The scope of the assessment was the TCA and COLA revision tasks being completed by Toshiba. These tasks included: Task 1 – Design Documentation, Task 2 – Unique Issues, Task 3 - Design Basis Information, Task 4 - Americanization, Task 5 - Engineering Schedule, Task 6 - NRC Interface, COLA revision 2 activities, Task 7.2 - Safety Related I&C Platform, Task 7.3 - OPRM System, Task 7.7 - Severe Accident Mitigation, Task 7.8 - Hydrodynamic Loads, Task 8 - Supply Chain, and Task 9 - Mitigation Management.

The desired outcomes of the final assessment were to:

- Verify satisfactory progress toward completion of Toshiba led TCA tasks
- Verify that adequate project management infrastructure is implemented for STP 3&4 project
- Verify the technical capability of Toshiba using FOAKE reviews of reactor pressure vessel design and the equipment Environmental Qualification program implementation (described below)

- Verify the understanding of Toshiba's and all EPC companies' "Division of Responsibility" for the STP 3&4 project

All desired outcomes were satisfied. Toshiba is fully capable of leading the EPC Team for STP 3&4 and providing the certified ABWR design

9.5 FIRST OF A KIND ENGINEERING REVIEW

Two FOAKE detailed reviews were performed by the STPNOC Due Diligence Team. The purpose of these reviews is to assess the qualifications of the Toshiba organization to provide a NSSS system in the United States in accordance with the ABWR certified design.

The FOAKE reviews were performed utilizing USNRC Inspection Procedure 37802, "First-Of-A-Kind Engineering (FOAKE) Inspections." Reviews were performed for one component/ system design and one programmatic area. The two areas selected are Reactor Pressure Vessel and the Environmental Qualification Program.

9.5.1 Reactor Pressure Vessel FOAKE

The reactor pressure vessel was selected as a sample system to perform a FOAKE inspection. This system was selected since it is one of the first systems to be designed specifically for STP 3&4. The detailed design work for this system is sufficient to provide a meaningful verification of Toshiba's engineering capability to meet the certified design requirements for the certified ABWR design. The on-site FOAKE inspection was performed concurrent with the on-site Toshiba Assessment at the conclusion of the TCA.

There were no findings from the four day inspection of the RPV design process. The quality of the design engineering, and design processes that control it, exceeded STPNOC expectations. It was evident that Toshiba's past ABWR experience and the availability of the Common Engineering Documents provide a strong foundation to design and deliver the RPV for STP-3&4.

The inspection team was confident that Toshiba will deliver a high quality RPV in accordance with all ASME and USNRC Standards. The inspection team provided several observations, questions and recommendations for Toshiba to consider; however, none of these comments were considered significant.

9.5.2 Environmental Qualification FOAKE

The environmental qualification program was selected as a sample plant engineering program with uniquely US requirements to perform a FOAKE inspection. This program was selected since it has many uniquely US requirements and has a wide multi-discipline impact for design of STP 3&4. The detailed design work for this program is in the early stages for STP 3&4; however the STPNOC Team used the available information to make a meaningful verification of Toshiba's engineering capability to meet the certified ABWR design requirements. The on-site

FOAKE inspection was performed concurrent with the on-site Toshiba Assessment at the conclusion of the TCA.

The STPNOC Team determined that Toshiba demonstrates a very strong understanding of the scope, criteria and testing methodologies required for environmental qualification of components. However, implementation and application is discipline specific, resulting in outputs/products that vary in detail and format. These discrete outputs are also difficult to assemble into a programmatic form useful for operational tracking and replacement activities. The STPNOC Team recommended that Toshiba develop an overall Environmental Qualification Program Plan which would be implemented across all disciplines. The resultant output information should be clearly identified and provided in a manner to promote development of proper maintenance implementation practices.

In addition to the development of the program plan, the STPNOC Team provided several recommendations for Toshiba to consider to improve the implementation of the environmental qualification program. These included:

- Toshiba should assign one owner for the Equipment Qualification program
- Toshiba should utilize a dedicated multidiscipline staff for environmental qualification tasks to insure consistency of deliverables
- Toshiba should develop an environmental qualification master equipment list; this can be best achieved through identification of individual environmental qualification related components in the Equipment Database

9.6 DUE DILIGENCE EVALUATION CONCLUSIONS

Based on the detailed evaluations performed by the STPNOC Due Diligence Team, the team concluded that the Toshiba EPC Team is capable of providing the certified ABWR design to STP 3&4. The schedule impacts have been identified and evaluated to determine the impacts on the project. Several areas have been identified and appropriate mitigating actions developed.

From a nuclear safety perspective, no significant uncertainty was identified.

It was also confirmed that all TCAP follow-up actions, both those needed by COLA revision 2 submittal, and those which are to be reconstituted for reference purposes later, are being tracked and worked within the overall project schedule.

A

Task 1 Report (ABWR Design Documentation)

The Contents of this Attachment contain business sensitive information, confidential trade secrets, and commercial information, and as a result are withheld from the public record in accordance with 10CFR2.390(a)(4). This information may not be released without prior permission of STPNOC.

B

Task 3 Report (Design Basis Information)

The Contents of this Attachment contain business sensitive information, confidential trade secrets, and commercial information, and as a result are withheld from the public record in accordance with 10CFR2.390(a)(4). This information may not be released without prior permission of STPNOC.

C

Task 7.5 Report (Fuel)

The Contents of this Attachment contain business sensitive information, confidential trade secrets, and commercial information, and as a result are withheld from the public record in accordance with 10CFR2.390(a)(4). This information may not be released without prior permission of STPNOC.

D
Follow-Up Action Summary

Table D-1 is a summary of the major follow-up actions to manage project uncertainty. Table D-2 is a summary of the follow-up actions defined in the TCA Task Reports.

Table D-1. Project Mitigation Management Actions

Area	Actions
Design Documentation	• Toshiba will assign a Design Documentation Engineering Manager to lead the effort to finalize the process for handling and using design documents in accordance with the requirements of the existing commercial agreements. • The Design Documentation Engineering Manager will have ownership for ensuring the design document reconstitution process and document development efforts fully comply with all commercial agreements. • The Design Documentation Engineering Manager will be responsible for coordinating ongoing engineering activities to develop enough detailed engineering suitable for a pilot system to confirm and validate the processes and plans for reconstituting derivative documents in a manner that conforms to all requirements of the commercial agreements. • The Design Documentation Engineering Manager will be responsible for maintaining traceability and integrity of the design bases for the certified design through the development of derivative documents and design bases reconstitution.
Instrumentation and Controls (I&C)	• Toshiba will assign a dedicated I&C/HFE Project Manager who will be responsible for overseeing I&C and HFE design activities performed by Toshiba, Westinghouse, S&L, and Fluor. • The I&C/HFE Project Manager will be responsible for leading routine design review meetings and monitoring I&C engineering progress to ensure the work is completed in accordance with the project requirements and is completed on time.
Americanization	• Sargent and Lundy will assign a dedicated Americanization Engineering Manager. • The Americanization Engineering Manager will be responsible for developing an engineering audit plan for a pilot system audit by August to validate the project's Americanization processes and plans for completing detailed engineering. • The Americanization Engineering Manager will be responsible for gathering applicable lessons learned from the industry and communicating this information to the EPC Team to help ensure the same pitfalls and problems are avoided on STP 3&4.
Communication	• Toshiba will assign a dedicated person to develop a comprehensive plan to help identify current communications, language and cultural issues that could contribute to miscommunications and misunderstandings among the EPC Team, as well as with STPNOC. This person will develop a strategy and list of recommendations for improving communications and minimizing language and cultural differences.

Table D-2. Individual Task Follow-Up Actions

Task	Actions
Task 1 – Design Documentation	• Assign a Design Documentation Engineering Manager to lead the effort to finalize the process for handling and using design documents in accordance with the requirements of the existing commercial agreements. • Perform a pilot system audit which will validate the processes and plans for reconstituting documents and completing the required engineering within the constraints of the existing commercial agreements. • Verify the availability of Japanese utility-owned operating and technical data required for STP 3&4 design activities (obtain final approval).
Task 2 – Unique issues	• Complete the review for remaining scope (non-nuclear technology).
Task 3 – Design Basis Information	• Perform DBI Document Chart development for all systems, including the schedule inputs, with priorities toward completing the high sponsor design input systems by end of 2008, and the remaining systems in early 2009. The result will be a confident schedule and resource plan for reconstitution activities. • Add specific schedule entries for the systems/topics with known Gaps that require re-creation and reconstitution. • Add resources to final design development to account for potential new DBI re-creation and reconstitution. • Add a schedule activity to identify the full strategy, effort, and schedule to replace each computer code as planned in the Task 6 Codes & Analysis Matrix (CAM). This should also include a review to confirm completeness of the CAM list.
Task 4 - Americanization	• Sargent & Lundy will assign an Americanization Engineering Manager, working closely with Toshiba, to investigate this task further to understand if the current plans address all issues and include sufficient resources/effort. This will include additional benchmarking activities. • The draft Americanization Plan will be finalized and implemented. • Toshiba will revise their procedures (applicable procedures referenced in Plant Design Guidance document and other procedures, as applicable), incorporating the "Americanization" comments provided by S&L and STPNOC. The revised procedure will clearly delineate the process Toshiba will use to "Americanize" their reference design for STP 3&4. • The confirmatory sampling process for reviews of Toshiba products by American EPC Team members will be implemented. • Perform a pilot system audit which will validate the processes and plans for completing detailed engineering to identify any potential Americanization issues. • Update Project Plans and similar project documents to clearly define common processes and procedures to be used by all EPC Team organizations to address Americanization issues.

Task	Actions
Task 6 – Licensing	• Support STPNOC in COLA preparation • Use MPR and Westinghouse to augment the Toshiba licensing organization and provide the expertise and experience with working within USNRC processes. • Continue the plan for TANE to hire US personnel, including licensing professionals, to work in the US.
Task 7.1 – Structural	• Potential bidders/fabricators for the RCCV liner will be contacted to obtain possible delivery/completion dates and durations for the liner material procurement, liner fabrication, and shipment of various liner segments. This data will be examined and if necessary scheduled activities will be revised accordingly. • Further meetings and discussions will be held among Toshiba engineering & construction, Fluor construction, and S&L to re-examine scheduled activities for possible further refinement and optimization of the integrated schedule.
Task 7.2 – I&C	• Perform an evaluation to determine the contingency options for critical I&C platforms and systems. Determine appropriate follow-up actions. • Develop a plan for the I&C systems that contains strategies, plans and schedules to address the first time applications, Americanization issues, coordination with other utilities/suppliers (through NEI or other industry group), NRC submittals & approvals, etc. Include Americanization requirements and considerations into schedule for I&C Systems. • Upgrade Toshiba Fuchu processes to operate under a 10CFR50, Appendix B program. • Finalize the I&C system Division of Responsibilities (DOR) for the supporting organizations. • Continue (increase if possible) interaction with industry in discussions with USNRC on resolution of I&C issues. Consider an increased leadership role in this area.
Task 7.3 – OPRM	• If BWROG documents are not available, Westinghouse will develop the cycle specific DIVOM calculation and the BSP solution. Alternatively, STPNOC may choose to perform the portion of the analyses associated with the two proprietary documents and provide the results to Westinghouse to include in the overall set points for the OPRM without revealing the restricted contents of the BWROG documents. • Toshiba will develop a hardware specification, with Westinghouse providing guidance and support.
Task 7.4 – HFE	• Execute the HFE Program Strategy and plan developed in the TCA activities.
Task 7.5 – Fuel	• Complete the Licensing Strategy for submittal of the Licensing Topical Reports for NRC review. • Conduct Meeting with the NRC to review the Licensing Plan. • Develop and submit Licensing Topical Reports to NRC in accordance with plan developed in the TCAP activities.
Task 7.6 – PRA	• As requested, support STPNOC in development of STP 3&4 PRA model.

Task	Actions
Task 7.7 – Severe Accident	• Execute the Severe Accident strategy and plan developed in the TCA activities. • Determine the cost, schedule and licensability for the development of an alternative core debris retention approach
Task 7.8 – Hydrodynamic Loads	• Agreement with Japanese utilities on the use of ABWR test data • Complete GOTHIC 1-D pool swell analysis • Complete GOTHIC 3-D pool swell analysis and benchmark • CO/CH & SRV load reconstitution • Prepare Technical Report
Task 8 – Supply Chain	• Determine the most critical components (castings, forgings, steel, piping, switchgear, power cable, etc.) that may impact supply of components or equipment. • Identify potential suppliers for critical components, as well as perform engineering necessary to support procurement of critical components. • Initiate discussions with the commercial grade dedication organizations for certain safety-related components and equipment which OEMs cannot supply to STP 3&4. • Encourage suppliers to develop or reactivate 10CFR50, Appendix B QA programs in order to provide safety-related equipment and services (especially electrical equipment).
Task 9 – Mitigation Management	• Develop & implement a communication improvement plan that will ensure consistent and effective communication. Enhance communication plan (and include in Project Manual) to ensure that language differences and miscommunication do not cause configuration management issues. Increase EPC Team personnel in each other's office to foster communication and sharing of information. Continue increasing the number of TANE personnel in the US and the number of US personnel working for TANE. • Mobilize US personnel in leadership positions at Toshiba on their project management team. • Continue hiring of bi-lingual personnel at the EPC Team companies.