

**JOINT PROGRAMME OFFICE**

**REPORT ON THE JOINT REGULATORS' TEAM INSPECTION OF WESTINGHOUSE'S  
ARRANGEMENTS AS PART OF THE GENERIC DESIGN ASSESSMENT PROCESS  
(QUALITY MANAGEMENT ARRANGEMENTS)**

**NOVEMBER 2007**

<b>REQUESTING PARTY:</b>	Westinghouse Electric Com-	<b>FILE REF.:</b>	
	pany (WEC)		
<b>SITE:</b>	Pittsburgh	<b>CC:</b>	
<b>DATE:</b>	November 16 – 21 2007		
<b>INSPECTION No.:</b>	03/07		
<b>SUBJECT</b>	Inspection of WEC quality management arrangements in support of GDA process.		
<b>INSPECTION OBJECTIVES:</b>	<p>To check that WEC has Quality Management Systems that provides organisational and procedural arrangements that adequately support production of the submission.</p> <p>Through inspection, to establish that WEC has implemented and continue to review arrangements that adequately control their GDA related activities.</p> <p>To inform the UK Nuclear Regulators' assessment of WEC's submission.</p>		
<b>INSPECTION BACKGROUND:</b>	<p>As part of the GDA process the UK Nuclear Regulators carried out an inspection of WEC's QMS and in particular those arrangements relating to the development of the submission (environmental, safety, security report). An inspector from the United States Nuclear Regulatory Commission (USNRC), attended throughout the inspection as an observer. USNRC asked questions and sought clarification on a number of issues and provided the UK regulators with useful insight into the US regulatory process.</p>		
<b>FACILITY/AREA:</b>	NPP WEC Monroeville Pittsburgh PA		

## **SUMMARY OF INSPECTION FINDINGS**

### **SUMMARY**

QA arrangements are well established. The QMS has been maintained for the AP1000 programme and the Quality Plan for that programme and subsequent revisions have been submitted to and accepted by the USNRC as meeting the requirements of IOCFR50 Appendix B. There is however, as yet, no quality plan specific to the UK GDA process and the level of resource employed directly on the UK project is small. There are sub-tier processes and procedures, including document and design change control that appear to be well established. There is an ongoing review of these sub-tier procedures.

WEC operates a matrix management structure. The AP1000 project organisation is established under the banner Nuclear Power Plants (NPP). Other units within the Company such as Nuclear Services and the Fuel Division provide resource and technical expertise to the AP1000 programme. There is a high degree of formalised internal contracting between the units and divisions within WEC. WEC does use a select number of contractors in the design process; these being specialist civil, steam generators or turbine designers and manufacturers. It was made very clear that WEC has and retains technical specialists and as such maintains an intelligent customer (IC) base including in those areas that it contracts out. There is evidence for intelligent customer for key aspects of the environment submission within the WEC organisation, and it is understood this area is being strengthened with an internal recruitment of another radioactive waste co-ordinator.

There is a strong focus on learning and development in the organisation; there is a technical mentoring programme in place, a NPP Training Council responsible for identifying training needs, and formal training is provided for new graduates and experienced new employees. The regulators identified an opportunity for training, for example within the licensing and design functions to develop an understanding of UK regulatory requirements re the GDA process.

Whilst the inspection team did not assess the detail, it would appear, from discussions, that environmental considerations are integrated into the design process. For example, internal WEC Design Reviews require consideration of the ALARA principle regarding minimising waste and dose.

There is a plan to develop a waste and decommissioning strategy which addresses specific Environment Agency P&I requirements including radioactive waste and spent fuel management, decommissioning and other environmental issues such as non-radioactive discharges etc. Environment Agency would expect to have the detailed strategy available in full for the commencement of the Step 3 submission in April 2008. There is clearly some work to be done to develop the environmental submission to achieve this and meet a challenging programme date.

A significant driver for WEC in licensing and design is compliance with regulatory requirements. WEC has sought to improve in a number of areas including lowering operator exposures, and reducing waste in decommissioning through selection of alternative materials. However, formal application of ALARP and BAT principles is not evident.

In line with USNRC agreements, WEC have a number of Design Acceptance Criteria (DAC) and related Inspection, Testing, Analysis and Acceptance Criteria (ITAAC). The areas where these apply are I&C, which is the most significant, piping, and human factors (HF). This raises questions about the maturity of design and the ability of WEC to provide sufficiently detailed information to the UK Regulators as part of the GDA process. USNRC has carried out significant assessment on the AP1000 design and the issues raised are being addressed by WEC.

There are a number of points raised on management systems during the inspection for WEC's consideration, however, none of these would prevent WEC from going forward to Step 3 of the GDA process.

**The UK Regulators' conclusion is that:**

WEC operates a well developed set of quality arrangements which include sub-tier procedures which are periodically reviewed and audited. The Inspection Team consider that arrangements for the development of the Step 2 submission are adequate and that WEC has experienced and knowledgeable staff and a commitment to retain adequate technical resources. On that basis the UK regulators have confidence that the production and update of the submission is adequately controlled for this stage of the GDA process and that arrangements are in place to deal with comments and queries in a satisfactory manner. However, more needs to be done to ensure that WEC design and safety analysis staff are aware of the UK Regulatory process. Similarly, there is some work to be done to prepare the environmental submission to meet GDA requirements, and in particular the GDA programme for Step 3.

The UK regulators wish to understand and capitalise on as much of the detailed technical assessment work carried out by the USNRC as is appropriate. The issues for the UK Joint Regulators arising from this inspection are the development of a strategy for dealing with DACs and related ITAACs and the level of use to be made from the significant amount of design assessment already carried out by USNRC.

**AP1000 Design Organisation**

1. WEC operates a matrix organisation structure across its range of activities.

The AP1000 design organisation, which is housed in Nuclear Power Plants, employs over 600 full time equivalents in a variety of technical disciplines. These are supported by other technically qualified and experienced staff from other parts of the WEC Company, eg Nuclear Services provide additional safety analysis services. There is clear evidence that WEC is committed to recruit further significant resource to meet the growing and anticipated demand for nuclear reactors world-wide (particularly in the US and China). Training and placement of new recruits (both graduate and experienced) is professionally managed.

2. From the inspection it was clear that WEC has significant appropriate technical resource within NPP or with other parts of the company. Recruitment is active with selection, training and placement being undertaken in a professional manner. Succession planning is considered and core skill reviews are carried out periodically. There is an obvious pride in the AP Series design and significant experience and knowledge of this design has been retained within NPP.
3. WEC has significant internal resource to call upon with formal internal agreements operated across the business. Where external contractors are used these are subjected to screening and selection processes that are appropriate to the nature of the work being undertaken.
4. There is no separate organisation that has been charged with managing the UK GDA project, and currently there is no quality plan or programme for this work. WEC has set up arrangements for liaison with the JPO via its licensing function within NPP, but is currently very limited and for the growing workload appears to be under-resourced. At the time of the inspection, WEC had not contracted an organisation that has experience of the UK regulatory process, but is considering employing additional resource to support the UK Licensing Manager.
5. WEC has developed the AP1000 design within the US regulatory framework with USNRC having carried out significant assessment. WEC recognise that the UK Regulatory approach is different, particularly in the aspect of ALARP/BAT concepts, but has yet to fully consider how it can demonstrate that the AP Series design evolution has used these approaches. Significant use is made of INPO and EPRI information particularly for reliability analysis.
6. WEC is committed to a standard design for AP1000 and pressure to change has to be very strong from a number of customers before this will be considered.

#### **QA Arrangements Overview**

7. WEC has a quality programme for work performed for the AP1000 project in the form of a Quality Management System (QMS), Rev 5, dated October 1,

2002. This programme meets the requirements of 10CFR 50, Appendix B. The QMS includes a number of AP and WEC procedures, including configuration and change control, training, DCD preparation, design reviews, auditing and corrective action management.

8. It was apparent that WEC has looked beyond compliance with 10CFR 50 and NQA-1 as mandated by US Regulatory Requirements. It has also considered other national and international codes having achieved certification to ISO 9001 and is aware of the requirements of IAEA QA Codes and Guides. This is apparent in the aim for WEC to be a learning organisation with its self reporting culture and causal thinking programme.
9. The design for AP1000 is based upon employing the design of AP600 to the maximum extent possible. As a consequence, continuous quality programme development has taken place over a number of years with the current QMS being well established. There has been a recent review of a number of procedures in the design control area in an attempt to make these more user-friendly with new recruits specifically in mind. There is an attempt to move from a knowledge-based approach, through rules based to a skill-based approach. The inspection team found some of the procedures difficult to understand. This had already been recognised by WEC and hence the initiation of the review process. The UK Regulators considered that such a review was timely and encouraged its continuance. This part of the inspection was of particular interest to USNRC as an audit of the design process by USNRC is programmed for early 2008. An invitation was given by USNRC to the UK Regulators to participate in that audit.
10. Auditing processes are well-established and a Corrective Action Programme (CAP) process has been established across the company. These aspects appeared to be well-understood and implemented.
11. The UK GDA project does not have a specific quality plan or programme but the development of such will be considered at a later stage. The UK Regulators pointed out the benefits of having such a document including an indication of WEC's commitment to the project.
12. The QA resource within NPP is increasing which is consistent with the increasing workload from the US and China particularly.
13. Detailed design work is ongoing with 3-5 safety design changes per week. Many of these changes are thought to be minor, but where these change the DCD they are categorised as Class 1. The established process for design change control has recently been reviewed as part of the wider exercise of making procedures more user-friendly. Although there appeared to be no lack of control implementing this procedure, the classification criteria, the timing of comments from affected parties and the timing of incorporation of accepted design changes into the design documentation are aspects the UK regulators will consider further.

## **Observations**

14. WEC has not as yet developed a quality plan/programme specifically for the UK GDA project. This would identify and clarify the organisational and procedural arrangements for the project.
15. WEC does not have a documented history of the development of the AP Series design, showing the design options considered and the reasons for those adopted. Such a document would aid demonstration of the application of BAT and ALARP principles.
16. Understanding of the UK Regulatory approach is limited to a few staff within WEC. This could be extended through awareness training for chapter leads, with emphasis on ALARP and BAT.
17. WEC collect reactor related information (eg operational experience feedback) from a number of sources including INPO and EPRI that could be useful to designers and operators. This process is not formally documented and relies heavily on very experienced staff and established networks.
18. The waste and decommissioning strategy submission is not yet available and needs to be developed for submission to the JPO prior to the start of Step 3.
19. The established design change process has recently been reviewed to ensure that it is more user friendly. The inspection team found no lack of control, however, this process will be further inspected by the UK regulators during Step 3.
20. WEC has a sound internal audit process and a developing Corrective Action Programme (CAP) system. These are seen by the UK regulators as a barometer of the health of the QMS and as such the UK regulators will continue to monitor these aspects throughout the GDA process.

## **Recommendations**

21. Recommendation 1: WEC should consider the development of a quality plan and programme for the UK GDA process with clearly defined responsibilities.
22. Recommendation 2: WEC should consider producing a history of the development of the AP Series design, showing the design options considered and the reasons for those adopted. This will support justification of BAT and ALARP principles.
23. Recommendation 3: WEC should develop awareness and understanding for chapter leads of the UK regulatory process with emphasis on the application of ALARP and BAT principles.

24. Recommendation 4: WEC should formalise its current arrangements for the capture of operational experience feedback and other sources of feedback.

25. Recommendation 5: WEC should produce its waste and decommissioning strategy submission for submission to JPO prior to the start of Step 3.