

EXECUTIVE SUMMARY - CIVIL/STRUCTURAL ISSUES

INTRODUCTION

Scope of Allegations: The allegations in the civil/structural discipline basically arose from information derived from reviews being conducted by contract personnel working for Ebasco, the project manager and architect-engineer for LP&L, ~~the owners of Waterford-3~~. These reviewers were conducting quality assurance reviews of documentation relative to the safety-related items to determine whether such items had been manufactured, purchased, stored, maintained, installed, tested and inspected as required by the project documents and procedures. In addition, allegations arose from the reviewers efforts concerning the functioning of the quality program, the control of design changes and field changes, the disposition of nonconformances and discrepancies, the reportability of items to the NRC and information existing outside the quality program related to deficiencies. Finally, as a result of information from the reviewers' effort there were allegations of falsified records consisting of "created," data, forged signatures/initials, and unauthorized changes to records. The information upon which most all of the allegations were based generally reflected the results of QA record reviews completed during the period of late 1982 up through mid-1983.

The allegations touched almost all aspects of construction activity in the civil/structural discipline, including materials, procedures, work execution, testing, inspection and maintenance.

Concerns were expressed with regard to the adequacy of the resolution of a nonconformance report addressing the construction of the clam shell material used directly beneath the nuclear plant island structure (the common base mat and all the safety class structures which rest upon it) as well as the adequacy of records related to the soil backfill material surrounding the nuclear plant island structure.

Allegations have been made ^{which relate} ~~related~~ to ~~Gas~~welding activities. These allegations ~~related~~ to certification of inspectors, missing records, falsified records, failure to follow specification requirements on testing frequencies and splicer requalifications, use of unauthorized materials and ~~that~~ deficiencies identified in nonconformance reports ~~have not been~~ properly resolved.

There have been allegations regarding the qualification of craft, inspection (Quality control), quality assurance and engineering personnel, the installation, ^{and} inspection records, and acceptance of activities related to waterstop material in the reinforced concrete structures.

The largest number of allegations have been directed against the concrete related activities. The allegations have included violations of specifications and procedures, unqualified and uncertified personnel in construction and inspection functions, improper testing frequencies of in-process tests, improper reviews of records, missing records, falsified

records, improper classification of or failure to identify problems for entry in the quality system and improper resolution of discrepancy notices and nonconformance reports. 7

The composite of the above noted area of allegations; soil materials, Cadwelding, waterstops and concrete related activities has resulted in allegations that construction practices and construction problems may have led to, or contributed to, the cracks and water seepage which have been observed on the common base mat of the nuclear plant island structure.

Other items or activities subjected to allegations have been in the area of traceability of steel materials, weld rod, and coatings; the qualifications/ certification of personnel; inadequate inspections and documentation of as-builts and improper disposition of deficiencies in these related areas as well as improper storage or in-place maintenance.

Finally, there have been allegations that ~~records of~~ problems or deficiencies during construction have been recorded on documents which have not been reviewed or considered because they are outside the formal quality program and that there was pressure to not report the issues as nonconformances.

Characterization and Consolidation of Allegations

The approach utilized in addressing the allegations was to characterize the allegations in to specific areas where possible, yet recognizing the possible greater scope implied for generic implications while gathering facts related to that allegation. The allegations and related facts found by the staff were consolidated after each of the allegations had been fully researched with regard to the technical issues. This consolidation was performed to group similar allegations and to allow an evaluation of possible generic implications.

TASK FORCE TEAM

The NRC staff team in the civil/structural discipline was selected on the basis of technical expertise and capabilities, providing a balance of individuals with engineering design experience, quality assurance and document control experience, inspection experience, construction experience, project management experience, enforcement experience, and the ability to search for and focus on discrepancies, and irregularities as well as technical issues and their resolution. In this particular team, the expertise of seven NRC staff personnel included representation from the Office of Nuclear Reactor Regulation, the Office of Research, the Office of Inspection and Enforcement, and a Regional Office. One team member was employed by an NRC contractor. In total, the aggregate of the team represented 150 years of engineering experience of which 90 years were in the nuclear industry.

In addition, there was an independent consultant who was responsible for independently evaluating construction controls and problems and their possible effect on structural behavior and integrity. This consultant has 38 years of management, engineering and construction experience in the area of construction.

APPROACH TO ALLEGATIONS

In order to accumulate the necessary facts with which to evaluate the allegations, the team utilized the various project documents such as specifications, drawings, procedures and instructions as well as the actual construction records which exist for the various structural materials, construction work packages, personnel records, inspection, surveillance and audit reports and other relevant documents. Additionally, the team discussed various issues with and gathered information from personnel of LP&L, Ebasco and other subcontractors when they were available. The team also conducted inspections in the plant where walkdowns and direct observation could provide factual information. Discussions were also held with some of the allegers to clarify allegations if that was necessary and to discuss status and preliminary findings in some cases. Finally an evaluation of the facts was made to establish if the allegation was valid or invalid. The safety significance was determined and any generic implications were defined, where licensee action was needed, the necessary action was requested.

FINDINGS

It was found that most of the allegations related to missing records, ^{and} discrepancies in records ^{and} during mid-1983 were probably true. Since that time period, it is apparent that a great deal of effort by LP&L has been put into the task of assembling records and analyzing and resolving discrepancies. Complete record reviews have been conducted by Ebasco in the area of soils, concrete placement packages and structural steel furnished by American Bridge. The team did find areas where there are still issues to be resolved either by facts which can be obtained from records, if they can be located, or developed by another means.

The team has concluded that the significant discrepancies related to the clam shell placement and construction have been identified and satisfactorily resolved. The team concluded that the records in this area reflect the actual construction ^{activities} ~~facts~~.

With regard to the soil backfill activities, the team's sample review of records after the licensee had completed a 100% review revealed missing records of in-place density tests and errors in the physical location of test samples. Action is being requested of the licensee to resolve this issue.

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Reference allegation is so
vague that it is what action
is being requested.

In the area of Cadwelding, the team found many of the individual items raised in the allegations had subsequently been satisfactorily addressed, by LP&L, yet others remained unresolved, ~~based on the assessment of the team.~~ The team found that as a result of findings by an NRC construction assessment team (CAT) inspection conducted in February and March 1984, that one nonconformance report on the subject of Cadwelds which addressed multiple issues had been reopened on the basis that all issues had not been adequately resolved. In our review this team found discrepancies in numbers of Cadwelds installed, numbers rejected, numbers tested and other related data. As a result the licensee has been requested to assemble all Cadweld data into a format which will allow the evaluation and judgment to be made on the quality of the in-place material. Additionally, the deviations, if any, from the project specifications and procedures can then be identified by building or structural component and assessed against necessary margins for acceptability. This activity will have to be completed before the issuance of a license.

Concrete activities, which were reviewed and evaluated through the use of existing documents and discussions with personnel having first hand knowledge of various concrete placement activities, resulted in ^{significant} no major negative findings relative to structural adequacy. While instances of deviations from project specifications and industry standards were identified, a review of the specific details and impact of these deviations resulted in no reduced confidence in the ability of the concrete to perform as a material, ^{to intended function} as a material.

consistent with the design assumptions. The team did identify some minor discrepancies in the concrete placement records, but these were not of the type that would identify any item of safety significance.

With regard to the impact of the various deviations and deficiencies which arose during construction of the basemat, the team and the independent consultant have concluded that there have been no significant detrimental effects. Further, it has been concluded that the observed cracking and seepage through the base mat are not likely to have been caused by, or aggravated by the construction deviations and deficiencies.

The team found from a random sample of miscellaneous, yet safety-related structural steel which was outside of the scope of a 100% review of the major structural steel subcontractor, that the records were incomplete. These records related to the bolting and inspection of the completed work for the framing supporting the mainsteam line restraints above the steam generators. In this area it was determined that the licensee would be required to complete the work prior to initial criticality.

Two problem areas were identified related to welding activities which will have to be addressed. The first involved welds for the support of several instrumentation cabinets inside containment for which the team could not identify ^{whether} if the welds in a specific position had been made by a welder qualified in that position. The second issue is that the team was unable to verify the weld rod and welder identification for welds supporting the

containment spray system rings in the top of the containment. The licensee will be required to take action on these items. Action on the first shall be completed before fuel loading and the second shall be completed before power levels exceed 5%.

In reviewing information related to inspector qualifications and certification the team found that numerous waivers had been granted for length of experience for inspectors to qualify at levels I, II, and III as defined by ANSI N45.2.6, even though the procedures in some cases stated that the time requirements were not meant to be absolutes. The licensee will be required to take action in this area to provide additional confidence in the work completed by such inspection personnel.

Finally, the team found that there were documents such as speed letters and requests for information in existence which may yield safety related information on the construction activities, although based on the teams sample review it is not expected that items of any major safety significance will be found. The licensee will have to take action to complete an adequate review of these documents prior to full power licensing.

In general, the team found that the procedures which had been put in place to control the work activities and inspection activities as early as 1975 and 1976 to be detailed and to more than adequately provide for necessary quality control. The team also found that these had generally been followed except in certain instances which have now been evaluated. The

team found that most all deficiencies found during the construction process were generally evaluated, but there were instances of items which may not have been properly classified. The team believes these situations occurred due to the overlap in the definitions of nonconformances and deficiencies etc.

Assessing the project from the view point of civil/structural activities nearly nine years after the start of the major work in this discipline, the team concluded that the quality review of records was initiated rather late in the project. If the reviews had been more closely following the work activities, it is probable that the magnitude of the current effort would have been greatly reduced.

With the exception of the items noted, the team concluded that the civil/structural construction activities were conducted in a controlled manner and that significant safety issues have in all probability been identified and issues requiring action prior to operation have been identified. The only source of new relevant information based on allegations currently involved would be new information arising from investigations currently underway by the NRC Office of Investigations (OI). Technical evaluation of that information cannot be completed until the OI report is issued.