Report No. 50-412/84-06

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

DUQUESNE LIGHT COMPANY

BEAVER VALLEY POWER STATION UNIT 2

(Construction Phase)

MAY 14, 1984

TABLE OF CONTENTS

TABLES

ATTACHMENT

I. INTRODUCTION

1.1 Purpose and Overview

The Systematic Assessment of Licensee Performance (SALP) is an integrated NRC staff effort to collect the available observations on a periodic basis and evaluate licensee performance based on those observations with the objectives of improving the NRC Regulatory Program and licensee performance.

The assessment period is December 1, 1982 through March 31, 1984. The prior assessment period was December 1, 1981 through November 30, 1982. Significant findings from prior assessments are discussed in the applicable Performance Analysis (Section IV) functional areas.

Evaluation criteria used during this assessment are discussed in Section III below. Each criterion was applied using the "Attributes for Assessment of Licensee Performance," contained in the NRC Manual Chapter 0516.

1.2 SALP Board and Attendees:

Review Board Members

R. Starostecki, Director, Division of Project and Resident Programs (DPRP)
T. Martin (part time), Director, Division of Engineering and Technical Programs (DETP)
S. Ebneter (part time), Chief, Engineering Programs Branch, DETP
S. Varga, Chief, Operating Reactors Branch No. 1, NRR
L. Tripp, Chief, Reactor Projects Section 3A, DPRP
G. Walton, Senior Resident Inspector, Beaver Valley, Unit 2
M. Ley, Licensing Project Manager, NRR

Other Attendees

K. Murphy, Technical Assistant, DPRP
W. Troskoski, Senior Resident Inspector, Beaver Valley, Unit 1
G. Meyer, Project Engineer, Reactor Projects Section 3A, DPRP
D. Johnson, Resident Inspector, Beaver Valley, Unit 1

1.3 Background

Duquesne Light Company was issued a Construction Permit (CPPR-105) to build Beaver Valley, Unit 2 (Docket No. 50-412) on May 3, 1974. The NSS is a 2660 MWt Westinghouse PWR with three loops. At the end of this assessment period, the fuel load date was scheduled for December, 1985 and the commercial operation date was May, 1986. On April 2, 1984, the licensee revised the estimated commercial operation date until approximately the end of 1986. Stone and Webster Engineering estimated

the construction at 77.5 percent complete as of March 27, 1984, as compared to 63.3 percent complete as of the end of the last assessment period (November 30, 1982).

a. Licensee Activities

Activity increased throughout the assessment period with the craft work force increasing from approximately 1800 on November 30, 1982, to 2412 on March 31, 1984. Second shift activity was increased from 193 on November 30, 1982, to 423 on March 31, 1984. Third shift has a minimal amount of work activities with 24 assigned people. Weekend activity has increased with an average of 1746 manual and non-manual people working on Saturdays. Sundays have minimal activity. The licensee increased manpower in the site Quality Control Department by 85 percent. Since the last assessment period, Stone and Webster supervisory, engineering and administrative personnel onsite have increased 41 percent to 485 people. There has also been an increase in other contractors' management and drafting personnel.

Some safety related equipment has been turned over to Duquesne Light Company Construction Start-Up Group. This includes the storage batteries in two battery rooms, six electrical panels, isolation cabinets and 480 volt Bus 2 G with associated equipment which have been completed.

The service water system was the first piping system scheduled for turnover to the DLC Construction Start-Up Group. The planned turnover of this system during the period of January - February, 1984, did not occur by the end of the assessment period. The contractor was still performing some of the activities necessary for a turnover. Hydrostatic testing was completed, and witnessed by the NRC on portions of this system. Other hydrostatic tests are scheduled in the near future on this system and others, and must be completed before turnover occurs.

During this assessment period, the major construction activities included installation, welding and testing of the primary coolant piping, main steam, feedwater piping, large and small bore piping and associated supports; HVAC systems were installed; pumps, motors, control panels and storage batteries were set. Electrical cable trays were installed, cable was pulled and terminated. Painting occurred throughout the site on piping, walls, floors, ceiling and other items.

In summary, the construction of Beaver Valley, Unit 2, is entering the phase of system checks and turnovers, with construction approximately 78 percent complete. The construction work of some of the contractors discussed in this SALP and in the last SALP report is virtually completed. The containment contractor, Pittsburgh Des

Moines, the structural contractor, Dick Corporation and the tank contractor, Richmond Engineering Company, although still on site, have completed the majority of their work on safety related items. Most of the concrete work is also completed. A significant amount of work is still to be performed on pipe supports, electrical cable pulling and terminations. Installation of instrumentation and associated supports is presently in progress. As construction on each system is completed and turned over to DLC, the licensee will be taking a more active role in the site activities. The NRC has observed the licensee's organizational structure and personnel buildup in this area and recently performed a preliminary inspection of turnover and startup activities.

b. Inspection Activities

Resident inspector activities involved accomplishment of assigned inspection requirements including observation of work in progress, followup of licensee events, reactive inspection and evaluation of licensee responses to NRC identified concerns. In addition, the resident inspector participated in a Construction Team Inspection (CTI) conducted by NRC Region I.

Twenty inspections were performed during the assessment period; nine independently by the senior resident inspector, two jointly by the senior resident inspector and region-based specialist inspectors, and nine by region-based specialist inspectors. Sixty-five percent of the inspection coverage was performed by the resident inspector. The other thirty-five percent was performed by region-based specialist inspectors. The specialist inspection activities were in the following areas: electrical, instrumentation, welding, cable trays and conduit, quality assurance, design control, equipment storage, environmental protection program, drawing control, and record reviews of construction activities.

c. Licensing Activities

Licensing activity increased during the assessment period. The licensee issued the Final Safety Analysis Report (FSAR) on January 26, 1983. Five amendments were also issued to the FSAR during the assessment period. There was a heavy work load involving the DLC Licensing Division responding to NRR staff questions. There is also continuous activities associated with generating the draft "Safety Evaluation Report." Numerous meetings were held between DLC Licensing and NRR on these matters.

NRC conducted a combined site visit and held a public meeting on September 28-29, 1983. This involved an environmental site visit in preparation for issuance of the Operating Licensing Stage Draft

Environmental Statement. The public meeting allowed the public to participate in the proceedings and make the NRC aware of any environmental concerns.

On January 27, 1984, the Atomic Safety and Licensing Board in the operating license proceeding issued a Report and Order on the Special Prehearing Conference denying all intervention petitions and dismissing the proceeding.

II. SUMMARY OF RESULTS

		BEAVER VALLEY POWER STATION, UNIT 2		
	FUNCTIONAL AREA	CATEGORY 1	CATEGORY 2	CATEGORY 3
1.	Soils and Foundations	Insufficient Bases for Assessment		
2.	Containment and Other Safety-Related Structures	X		
3.	Piping Systems and Supports (Includes Welding, NDE and Preservice Inspection)			X
4.	Safety-Related Components (Includes Vessel, Internals, and Pumps)	X		
5.	Support Systems (Includes HVAC, Radwaste, Fire Protection)	X		
6.	Electrical Power Supply and Distribution			X
7.	Instrumentation and Control Systems		X	
8.	Licensing Activities		X	
9.	On-Site Storage	X		
10.	Engineering/Construction Interface			X

Overall Summary

Design and engineering effort for Beaver Valley Unit 2 continues to be the area of most concern. It does not appear that design documents are receiving adequate constructability reviews before they are sent to the field for implementation. This has led to numerous problems because of unclear or missing design details or incorrect application of design criteria. In particular, a large number of design changes and reinspections of piping supports have been necessary because of such deficiencies. Cable separation problems and the slow progress in achieving acceptable resolution are also attributed primarily to engineering deficiencies. The on-going engineering confirmation program and organizational changes made after the assessment period are intended to address such engineering problems; management must continue to aggressively address this area since it represents the root cause of many of the most significant project problems.

Construction activities by craft personnel have continued to be generally successful. The QC program continues to be strong with aggressive QC efforts as previously noted in the 1982 and 1983 SALP assessments. QC inspections are generally accomplished by well qualified and knowledgeable personnel in accordance with a program that is well conceived, thorough, and well executed. However, some problems have occurred with QC inspections of piping supports which have contributed to the large number of reinspections in this area.

A marked improvement in onsite storage and housekeeping was noted as a result of actions taken in response to earlier NRC concerns in this area. The pace of licensing activities increased significantly with the docketing of the FSAR; they continued to be generally acceptable although some problems with timeliness and missing information were encountered.

III. CRITERIA

The following criteria were used as applicable in evaluation of each functional area:

1. Management involvement in assuring quality.

2. Approach to resolution of technical issues from a safety standpoint.

3. Responsiveness to NRC initiatives.

4. Enforcement history.

5. Reporting and analysis of 50.55(e) and Part 21 items.

6. Staffing (including management).

7. Training effectiveness and qualification.

To provide consistent evaluation of licensee performance, attributes associated with each criterion and describing the characteristics applicable to Category 1, 2, and 3 performance were applied as discussed in NRC Manual Chapter 0516, Part II and Table 1.

Category 1: Reduced NRC attention may be appropriate. Licensee management attention and involvement are aggressive and oriented toward nuclear safety; licensee resources are ample and effectively used such that a high level of performance with respect to operationals safety or construction is being achieved.

Category 2: NRC attention should be maintained at normal levels. Licensee management attention and involvement are evident and are concerned with nuclear safety; licensee resources are adequate and are reasonably effective such that satisfactory performance with respect to operational safety or construction is being achieved.

Category 3: Both NRC and licensee attention should be increased. Licensee management attention or involvement is acceptable and considers nuclear safety, but weaknesses are evident; licensee resources appeared strained or not effectively used such that minimally satisfactory performance with respect to operational safety or construction is being achieved.

IV. PERFORMANCE ANALYSES

4.1 Soils and Foundations (1%)

Analysis

The major portion of all safety related work on soils and foundations was completed before this assessment period started. No safety related foundations were placed. Some work on soils occurred on site during this assessment period. A culvert was placed in Peggs Run and the ravine was filled with dirt. Also, the bank adjacent to the cooling tower was graded and seeded.

No major problems were experienced by the licensee in the activities discussed above; there were no 50.55(e) reports submitted. An NRC inspection of soils and soil runoff found no significant items of regulatory concern.

As discussed in prior SALP assessments, licensee and contractor performance has consistently been strong in this functional area.

Conclusion

Insufficient bases for assessment.

Board Recommendation

None.

4.2 Containment and Other Safety Related Structures (6%)

Analysis

Seven inspections were performed in this area; five by the resident inspector and two by the resident inspector and a region-based inspector. The inspections performed in this area were of completed work and follow-up inspections of previous 50.55(e) reports and identified noncompliances. During this assessment period, the batch plant was disassembled and removed from the site. The miscellaneous concrete poured was obtained from an offsite contractor. The construction opening in the containment building has not yet been closed.

One problem was identified by NRC during the assessment period which resulted in a violation. The problem involved a potential hardware deficiency. The licensee failed to identify the requirements for bolted connections of structural steel joints with long slotted holes (i.e., the use of 5/16 inch thick plate washers). As a result, these type connections exist throughout all safety related buildings onsite with structural steel connections. It has been determined by the licensee that the connections will perform their intended function in the as-installed condition. This omission resulted because the licensee and contractors failed to perform adequate specification and code reviews before issuing and approving the field procedures.

An area identified as a violation in the last SALP assessment and followed up during this period was the omission of the required volumetric examinations of electrical penetrations. Inspection by the licensee of the electrical penetrations revealed that sixty-nine of seventy-eight welds contain indications which exceed the acceptance standards of the ASME Code. Repairs of the unacceptable indications recently commenced on three of the penetrations. Failure to identify the test requirements prior to releasing the requirements to the field was identified in the last SALP report as a program weakness. The major repairs which are required could have an impact on the structural integrity test and terminations of electrical connections in the penetration area. This item must receive increased management attention so that quality repairs are performed in a timely manner.

No 50.55(e) reports were issued in this functional area. Other than the problems noted above, licensee performance in this area was acceptable with no significant problems reported. Overall performance in this functional area has generally been satisfactory, but the high performance levels noted in the previous SALP assessments have not been maintained.

Conclusion

Category 2

Board Recommendation

4.3 Piping Systems and Supports (36%)

Analysis

Fourteen inspections were performed in this area, eight by the resident inspector, four by specialist inspectors and two by the resident inspector and region-based specialist inspectors.

The work activities in piping and supports has increased during this assessment period. Installation and welding occurred on the primary loop piping, main steam and feedwater lines, large and small bore piping and supports. Five violations and one deviation were issued during this assessment period. These and other findings by NRC as discussed below, indicate problems in the Engineering, Construction and Quality Control areas, and have a direct impact on the quality of the hardware. Major reinspections are continuing by the licensee to determine if unacceptable conditions exist.

The items found by the NRC which have a direct impact on the installed hardware are:

-- Large bore piping was being installed without either permanent or temporary supports installed to support the pipe weights. Subsequently, procedures were written to establish acceptable spacing of supports and for the installation of temporary supports, where required. It was necessary to perform reinspection on all piping systems; nonconforming conditions were identified for disposition. This omission of requirements indicates a weakness in the licensee/contractor's program in failing to impose needed requirements. It also indicated a weakness in the construction discipline in failing to recognize the lack of good construction practices and to take proper action to remedy the deficiency.

-- The NRC found there were inadequate procedures for the control of repairs to base materials. The licensee corrected this omission by issuing a repair procedure. The NRC also found inadequate procedure controls for planned onsite post weld heat treatment (PWHT) of piping welds. The procedure required a major revision to comply with the code requirements. The deficiencies found indicate a program weakness in the review and issuance of field welding procedures.

-- The NRC identified that correct piping wall thicknesses and weights were not considered when designing the supports for the emergency diesel generator exhaust piping and significantly overweight conditions would have existed on the designed spring hangers. Follow-up indicated that a potential generic problem exists with oversize fitting in piping systems which could have an impact on equipment nozzle loads and piping restraints due to thermal expansion loadings. This omission could have impact on piping construction. As directed

by NRR, it will require some reinspections to determine actual wall thicknesses and reanalysis to determine its impact on thermal expansion.

-- The NRC found that vendor supplied piping had not received the required post weld heat treatment (PWHT). The rise and fall temperatures were not controlled in accordance with the code rules. Re-PWHT is required on at least six welds to assure code compliance. This indicated a weakness in the vendor program and the licensee's/contractor's monitoring thereof. In addition, a discrepancy was found in the specification requirements versus the FSAR commitments. The specification allows less restrictive post weld heat treatment requirements than the code specified in the FSAR allows. This item is not resolved.

-- In the last assessment period, the NRC found that support baseplates for HVAC supports were not being installed in accordance with the design requirements. As a result of that findings and questions raised by NRC regarding it applicability to pipe supports, it has now been determined that baseplate attached by anchor bolts for pipe supports are also deficient. The Stone and Webster Engineering Department failed to provide installation tolerances and/or shimming provisions to assure they were installed in accordance with assumptions used in design calculations. Failure to supply sufficient and/or clear design detail for use by the Construction and QC Departments has been a recurring problem; it indicates that adequate attention is not being devoted to constructability review of design documents during their preparation. The licensee must now reinspect all supports and install shims where necessary. The licensee committed to commence a reinspection of these items by a certain date, but failed to start the program until a "Deviation" was issued by the NRC. This appeared to be an isolated occurrence in that the licensee has generally been responsive in meeting other commitments.

A high number of changes are being made to items after Quality Control has inspected and dispositioned them. On pipe supports alone, in excess of 6,600 pipe supports must be reinspected to some degree, many because design changes were made after Quality Control inspected the supports. These changes are implemented by issuance of EDCRs, drawing changes, field construction procedure changes, and QC inspection procedure changes. They address such things as baseplate shims, Hilti locking devices, Hilti exposed bolt length, Hilti retorquing, large and small bore attachment location, weld from edge of plate distance, bolt to edge of concrete distance, Hilti bolts to edge of embedment plate distance, spacing between Hilti bolts and fillet weld size and lengths. These changes generally indicate a lack of proper instructions for installation and inspection of the original item. These deficiencies generally were found through audits by INPO, Stone and Webster QA, and NRC. They indicate weaknesses on the part of Engineering and, in some cases, omissions on

the part of Duquesne Light Company Quality Control Department. The high number of such required reinspections are surprising in that most of these areas were treated extensively in IE Bulletin 79-02 and its Supplements. This is indicative of a failure to properly assimilate the "lessons learned" from earlier experiences.

Duquesne Light Quality Control Department has increased its inspection staff from 152 inspectors at the end of the last assessment period to the current level of 281 to provide needed inspection coverage. Recently, QC established a group of 10 inspectors to perform reinspections in the areas discussed above, which should help alleviate the large numbers of backlogged reinspections. However, even with the increased QC manpower, normal inspection coverage is strained. Increased management attention is necessary to assure adequate coverage is provided.

A problem was identified by NRC that involved a failure to properly control interim "Hold" Tags. This had the potential to cause confusion in that they were not always being removed when required. This item was corrected and no actual hardware deficiencies were created. Another problem identified by the NRC involved a failure of the licensee to perform calibration of a torque wrench. This was noted to be more of a procedural problem than an actual hardware deficiency because calibration was being performed in accordance with the standard calibration cycle, but it was not being performed in accordance with a modified calibration requirement.

Another problem involved the fabrication of pipe restraints intended to be in accordance with AWS D1.1, but engineering exceptions were taken to AWS D1.1 without documented justification. Engineering exceptions taken in this area include: (1) use of base metals not listed in AWS D1.1, (2) utilizing a general 1/32-inch undercut rule, and (3) utilizing a flare bevel effective throat rule not conforming to AWS D1.1. Acceptance of such exceptions without adequate documented justification is indicative of a weakness in engineering review which has an adverse effect on the quality of work.

Licensee and contractor management appears to be committed to improvement of controls in this functional area with improvements noted in some problem areas which were identified in the last SALP report. For example, improvement was noted in the welding area, particularly in the qualification of welding procedures since the last SALP assessment. However, the multitude of problems identified by NRC and others which directly involve hardware indicate that still more attention is necessary. When the above problems were individually identified, corrective actions generally involved additional QC staffing and reinspections to correct the effects of such deficiencies. However, the root cause of many of the problems has not received adequate attention. In particular, increased emphasis is needed by the licensee to assure that basic documents are correct and contain sufficient and clear details and require-

ments before they are issued to construction. This would reduce the high number of design changes and errors caused by inadequate design/ installation documents as well as reduce Quality Control reinspections.

In summary, with the increased work activities which occurred during this SALP period, a marked increase in deficiencies and errors were noted. These are occurring at the level of generation and approval of the basic documents. When basic documents are deficient, this jeopardizes the hardware acceptance and causes increased reinspections and rework of the hardware. Significantly increased licensee and contractor attention to this area is needed. Additional discussions on engineering weaknesses are included in Functional Area 10.

Conclusion

Category 3

Board Recommendation

Continued normal inspection coverage plus special emphasis on increased inspection(s) of the engineering effort as discussed in Functional Area 4.10.

4.4 Safety Related Components (9%)

Seven inspections were performed in this area, five by the resident inspector, one by a region-based specialist, and one by a region-based specialist and the resident inspector.

The major NSSS components were successfully set during the last SALP period. Work activities on these items was generally limited to piping connections by welding to the components. The licensee experienced cracking on several steam generator to pipe welds because Westinghouse had installed an inconel weld band on the outside surface of the nozzles adjacent to the field weld. Westinghouse failed to identify this inconel band on the drawings. As a result, the field welded on this inconel band and cracking occurred. The NRC issued a violation on this item for failure to have a properly qualified weld procedure, but the underlying problem was a failure of the vendor to reflect the as-fabricated condition of the weld area.

Modification to the steam generator feedwater nozzles and thermosleeves was successfully made by the contractor. Inspection by the NRC found good management controls, extensive nondestructive examinations, and good Quality Controls in this area.

Fabrication and welding commenced on numerous storage tanks during this assessment period. Richmond Engineering Company (RECO) is the contractor performing the work. Audits conducted by the NRC in the areas of program, weld procedures, radiography, welding and hydrostatic test found that the contractor has excellent controls. Qualified management is involved and minimal problems were encountered.

A discrepancy was found in the storage specification versus the FSAR commitments. The specification and construction of the storage tanks are to a code addendum that has less restrictive requirements than the code specified in the FSAR. This open item has not been resolved. Similarly, a review of the FSAR versus the ordering requirements for the spent fuel racks found the ordered racks are different than described in the FSAR. The licensee stated that the correct description will be included in the next amendment to the FSAR. FSAR inaccuracies are discussed further in Section 4.8.

Three 50.55(e) reports, all vendor related, were issued during this assessment period. The corrective actions for one was reviewed and found acceptable by the NRC.

In conclusion, the licensee, the contractor who performed the steam generator feedwater modifications, and the tank fabricator, through planning, training, extensive quality controls, and management involvement, have insured that good controls were in place in this functional area. These controls have been successfully implemented as demonstrated by quality work with minimal problems.

Conclusion

Category 1

Board Recommendation

None.

4.5 Support Systems (9%)

Analysis

Four inspections were performed in this area, three by the resident inspector, and one by a region-based specialist and the resident inspector. Work continued throughout the assessment period with no significant problems reported by the licensee or identified by NRC.

A violation discussed in the last SALP report was corrected on schedule and in a very conservative manner. The concern regarded duct to duct connections. The corrective actions taken were to remove all accessible duct to duct bolts and replace them with new bolts and washers. Approximately 51,000 new bolts with washers were installed. This indicates a strong licensee commitment to correct deficiencies when identified.

Inspections were made in several areas of HVAC installation. Vendor records, general construction, and detailed inspections of HVAC supports were included. Good controls were found in each of these areas. An item identified in the last SALP report regarding HVAC supports and concrete anchor bolts is still open. Reinspections were performed and are being evaluated by Engineering.

In summary, the inspections found that the licensee and contractor have good controls in this area and no significant fabrication problems have occurred. Quality Control inspections of this area are especially good. Problems previously noted with engineering documents in this area did not recur.

Conclusion

Category 1

Board Recommendation

None.

4.6 Electrical Power Supply and Distribution (12%)

Ten inspections were made in this area, five by the resident inspector, four by region-based inspectors, and one by the resident and a region-based inspector.

Cable trays, conduits, and cable continued to be installed throughout the assessment period. 6,179 safety related cables have been pulled, 53 percent of the total. 985 safety related trays are installed (99 percent of the total), and 3,847 safety related conduits are installed (58 percent of the total). 99 percent of the ducts are installed.

Cable separation and compliance with Regulatory Guide 1.75 continue to be a concern to the NRC. Resolution of problems initially identified by NRC in this area did not receive adequate prioritization. Two meetings were held during this assessment period between Duquesne Light Company, Stone and Webster, and NRC to discuss progress and planned corrective actions. The licensee's planned program to meet Regulatory Guide 1.75 and internal documents appears to be an after-the-fact fix versus complying with the requirements during installation. As a result, the desired quality may be jeopardized. It appears that there will be areas where compliance with Regulatory Guide 1.75 will not be possible. Furthermore, NRC expects that this program will have an adverse impact on plant completion and operation schedules. Additional focused management attention on this problem area is warranted.

Two violations and several significant unresolved items were identified during this assessment period. One violation involved the attachment of an electrical tray support leg to a baseplate. This resulted from inadequate controls specified on drawings. As a result, the attachments were made outside the boundaries used for the calculations. Reinspections, recalculations and possibly rework of numerous supports are planned to correct this deficiency. This deficiency indicates weaknesses in the preparation and review of drawings and instructions before they are issued to the construction forces as also discussed in Section 4.3.

Another violation and an unresolved item identified that electrical cable which leaves a tray and extends unsupported for certain distances could exceed the loadings specified for tray rungs. This occurred because of omissions by two departments. QC failed to correctly interpret the engineering requirements for measuring unsupported armored cable and Engineering failed to correctly specify how unsupported cable for all cable applications would be measured.

As discussed in Functional Areas 4.3, Piping and Supports, and 4.5, HVAC Supports (previous SALP assessment), problems were identified in the support installation for those systems. Similar problems were also identified for electrical supports. No criteria existed (except for in containment) for inspection and installation of shims where needed between

the baseplate and concrete. Corrective actions are being taken, procedures have been issued and reinspection is finding that twenty-one percent of the supports inspected do not meet the specified criteria. Good corrective actions are being taken; however, again as discussed in Functional Area 4.3, a deficiency in basic documents is indicated in failing to identify these requirements before installation commenced.

One 50.55(e) report dealt with a QC inspector who accepted conditions contrary to the requirements. Excellent corrective actions were taken by the licensee in reinspecting all of this QC inspector's work, sampling the work of other QC inspectors, and restructuring reponsibilities of QC supervisors so as to allow more time for overviewing field work. These actions were inspected and accepted by the NRC.

Other items identified, and not yet resolved, involve control of hole sizes on tray to tray connections, raceway fills, welding versus bolting of process panels and as-built controls on cable lengths. A high number of problems and concerns have been identified in this Functional Area; they mostly pertain to engineering issues.

The electrical contractor has consistently demonstrated a technically sound approach to safety issues and no major problems have occurred in the construction and installation of cables and cable trays in accordance with specifications and procedures. The problems identified and discussed above are attributed primarily to inadequate specifications or procedures prepared by Engineering. QC inspectors, craft personnel, and supervisors are well qualified and knowledgeable of work requirements, good construction practices, specifications, and procedures. The training program was well conceived, thorough and well executed. QC management showed evidence of good planning by increasing and training personnel in anticipation of an increase in workload. They are aware of generic problems, identify them to management, and are actively involved in their resolution.

In summary, it appears that day to day construction by the contractor is good. QC inspection is good with minor exceptions and minimal problems are occurring in this phase. Deficiencies in documents used for field work (primarily documents generated by Engineering) have led to problems in that they often have insufficient information and/or are not fulfilling design requirements. Major reinspection and rework are a result of these omissions. The licensee/contractor has been very slow in developing and implementing an approach that will meet cable separation commitments and requirements so as to resolve widespread cable separation problems to achieve acceptable cable installations.

Conclusion

Category 3

Board Recommendation

Obtain licensee commitments for implementation of a systematic program with a timely schedule for resolution of cable separation problems.

4.7 Instrumentation and Control Systems (9%)

Analysis

Five inspections were performed in this area, one by the resident inspector and four by region-based specialist inspectors. Work commenced in this area during the assessment period. Terminations in control panels have occurred throughout the site. The storage batteries were placed, charged and turned over to the DLC Construction Start-Up Group. Several miscellaneous electric panels were also turned over to the DLC Construction Start-Up Group. Wiring and terminations are proceeding in the Control Building.

Inspection in the area of wiring, crimping, and terminations has found that the contractor is doing a good job. Workmanship of onsite work is evident and Quality Control inspection is good. Training and qualification of QC inspectors, craft personnel, and supervisors are as described in Section 4.6. No significant problems were reported in this area.

One violation and other unresolved items identified problems in the wiring of numerous electrical panels supplied by four different vendors. A large number of cables in process control cabinets were terminated improperly. The licensee is presently analyzing and performing sample inspections of such components. 50.55(e) reports were submitted for work performed by three of the vendors. The problem with components supplied by the fourth was only recently identified. The cause of this problem appears to be a lack of specificity in the ordering specification and a lack of commitment to quality on the part of the vendors. Three other 50.55(e) reports were issued regarding fabrication error or component failure for vendor supplied equipment. Two were for Westinghouse supplied equipment and the third was a General Electric product. Most 50.55(e) reports from this licensee involved instrumentation and control equipment indicating that more problems with vendor supplied equipment occurred in this area than with any other type of vendor. More licensee attention needs to be devoted to vendor control, audits, receipt inspections, etc., for such vendors.

In summary, the onsite construction activities in this area appears to be well controlled, quality control inspections are good and no major problems at the site were identified in this area. Items fabricated offsite and now inplace onsite will require significant reinspections and probably rework. More attention by management is needed in this area to assure that high quality products are being obtained from vendors.

Conclusion

Category 2

Board Recommendation

Discuss with licensee management the desirability of 100% reinspection cf vendor supplied items.

4.8 Licensing Activities (3%)

Analysis

The Final Safety Analysis Report (FSAR) was issued January 26, 1983, and docketed on May 18, 1983. Since its submittal, five amendments to the original were issued.

The primary basis for this assessment was the interaction between the staff and DLC associated with generating the BVPS-2 draft SER. Communication was primarily devoted to staff questions and DLC responses. In addition to the safety aspects of licensing activities, an environmental site visit and public meeting were also held during this period.

Throughout the review process, DLC's activities exhibited evidence of prior planning. The applicant provided a computer terminal for the PM's use to expedite communications. Open issues in the Draft Safety Evaluation Report were predominately areas under review by the staff and not actual technical disagreement or the staff's need for additional information. DLC management involvement was evident in resolving identified issues in that, for the most part, supplied information was timely, thorough and generally technically sound. The applicant provided adequate management and technical representation from corporate offices, site staff and NSS vendor staff. Management and technical involvement are also evident by positions the applicant has taken in a number of areas which question staff practices.

Resolutions to questions were generally acceptable. With few exceptions, DLC provided timely written and oral responses to the staff's requests for additional information. Responses to NRC initiatives have been, thus far, timely and generally sound and thorough. However, the applicant has not provided the necessary information for the staff to conclude that the following training program requirements have been met:

a. initial training program

b. simulator training program

c. requalification program

d. TMI Action Plan Items I.A.2.1 and I.A.2.3

e. cross-training program (between 2 BVPS Units)

f. STA training program

The applicant has indicated that program necessary to meet these requirements are in place and operating and proposes to provide this information during a staff site visit which will permit detailed review of the complete documentation, hardware, and discussions with training

staff and students. The lack of submittal of information during the review period in the area of training is a cause for concern because of delays introduced in the licensing process.

As discussed in Functional Areas 4.3 and 4.4, an onsite inspection was made by the senior resident inspector, on a sampling basis, to determine if the hardware is being purchased, fabricated, inspected, and installed in accordance with the minimum requirements and commitments of the FSAR. Three deficiencies were found. In two cases, post weld heat treatment of main steam lines and nondestructive examinations of safety related storage tanks were performed using addenda of the ASME Section III Code which are less restrictive than committed to in the FSAR. In the other instance, the spent fuel racks were ordered with requirements different than described in the FSAR. Corrective actions are being taken in these areas which should resolve these differences. The licensee needs to strengthen their program for review and updating the FSAR to assure that it consistently and accurately reflects the as designed/constructed plant since the FSAR represents the primary input to NRC during the ongoing review to determine if an OL should be issued.

In summary, the licensee has taken positive management actions in this functional area as evidenced by prior planning with a thorough and technically sound approach to licensing questions. Responses are generally timely and exhibit a conservative approach. The licensee's lack of adequate responses to staff questions in the area of training requires increased management attention in order to assure that it is not a critical path item for the licensing process.

Conclusion

Category 2

Board Recommendation

None.

4.9 Storage of Safety Related Components (7%)

Analysis

In addition to the resident inspector's daily site tours, five inspections were performed in this area; four by the resident inspector, and one by the resident inspector and a region-based specialist.

This area is listed as a separate functional area because this area has been assessed in the last two SALP reports as a weak functional area.

On January 15, 1983, the licensee implemented major changes in this program in order to correct the previously identified concerns. These changes involved consolidation of the storage program under a construction supervisor with authority to implement proper storage requirements. In addition, special cleanliness zones for sensitive equipment were established. Only one storage problem was identified in this assessment period. It involved storage of the spent fuel transfer bellows in that this item was not included in the storage requirements. Corrective actions are being taken by the licensee.

Except for the problem with the spent fuel transfer bellows, the inspection of storage conditions throughout the site has found storage conditions and controls to now be excellent, representing a complete reversal of the conditions noted during the last SALP period. A strong program has now been established and is being properly implemented. The revised program properly addresses previously identified problems in this area. The Construction Team Inspection (CTI) also included concentrated inspection efforts in this area and concluded that storage and maintenance is a strength of the project. Similarly, other specialist inspectors who have recently been onsite have found this area well controlled.

Based on the licensee's program changes and their successful implementation as found in the CTI inspection, as well as the inspections performed by the resident and other NRC inspectors, we find this area to now be well managed and controlled.

Conclusion

Category 1

Board Recommendation

None.

4.10 Engineering/Construction Interface (8%)

Analysis

In tne last SALP assessment, it was concluded that, based on the violations identified in inspection of other functional areas where the root cause was deficiencies in design information provided to the field, certain weaknesses existed in the AE's engineering effort. Additional licensee involvement and overview of engineering was recommended to assure that regulatory requirements and the SAR design bases are properly incorporated into the actual plant design.

During this assessment period, the CTI identified weaknesses in the licensee's and contractor's programs in two areas. The licensee's engineering department lacked direction, performed very little if any design review, and did not document any design reviews performed. The AE's site engineering group did not identify qualified reviewers, did not properly identify approval of design changes, was deficient in control of training and did not identify design inputs.

On October 21, 1983, at DLC's request, a meeting was held with Duquesne Light Company, Stone and Webster, and NRC to discuss the planned program to address concerns in this area as expressed by NRC. The proposed "Engineering Confirmation Program" program involved both DLC and S&W Engineering. The overall objective of the program was to assure that the installation met the design requirements. If effective, it should resolve many of the concerns about the type of engineering deficiencies described in the last SALP and the numerous ones found during this assessment period. The deficiencies identified in the SALP reviews occurred before implementation of the present program; therefore, the effectiveness of corrective actions cannot yet be assessed. This SALP assessment does, however, reinforce concerns about this area. As discussed in Section 4.3 and 4.6, engineering documents frequently failed to contain sufficient and/or information that is clear enough for field use by Construction and QC personnel. Problems similar to those noted in the last SALP recurred. Performance by the AE in this area has not been commensurate with the generally good performance which has been characteristic of other major project groups such as QC and Construction. The positive action in increasing DLC involvement in engineering by assigning two full time engineers to the onsite S&W engineering office is noted. Their presence in day to day engineering discussions has also been noted.

In summary, the ratings in the two Category 3 functional areas were affected by the numerous deficiencies in the contents of design related documents issued by vendors or contractors. The "Engineering Confirmation Program" could help alleviate concerns in this area if results demonstrate that such deficiencies are not widespread and do not adversely affect the overall integrity of safety related systems. Effec-

tive corrective actions to improve performance in the engineering area would lead to increased confidence in plant design/construction as well as favorably affecting future SALP ratings in other functional areas.

Conclusion

Category 3.

Board Recommendation

In view of the continuing NRC concerns in this area, implementation and results from the "Engineering Confirmation Program" should be closely monitored by NRC. The licensee should be requested to propose a program for resolution of engineering/construction interface problems.

V. SUPPORTING DATA AND SUMMARIES

5.1 Construction Deficiency Reports (CDRs)

Thirteen CDRs were submitted by the licensee during the assessment period. Ten of the deficiencies were associated with vendor supplied hardware. Three corrected CDRs, 83-00-02, 83-00-04, and 83-00-07 were reviewed by the inspector during this period, with corrective actions considered acceptable. Deficiency reports are listed in Table 1.

5.2 Investigation Activities

There were no investigation activities during this assessment period.

5.3 Escalated Enforcement Action

None.

5.4 Management Conferences

February 15, 1983 - A special, announced management meeting at NRC request to discuss the results of the Region I SALP board convened to assess licensee performance from December 1, 1981 to November 30, 1982.

October 21, 1983 - A special meeting, at NRC Region I, held at licensee's request, to discuss the Duquesne Light Company and Stone and Webster Engineering confirmation programs and plans for confirming quality of the engineering effort for Beaver Valley, Unit 2.

TABLE 1

CONSTRUCTION DEFICIENCY REPORTS

(December 1, 1982 - March 31, 1984)

BEAVER VALLEY POWER STATION, UNIT 2

CDR NUMBER	DEFICIENCY	CAUSE CODE
83-00-01	Westinghouse Gate Valves	B
83-00-02	Quality Control Acceptance of Nonconforming Conditions	A
83-00-03	Reactor Trip Switchgear Undervoltage Attachments	B
83-00-04	Bergin Paterson Clevis Welds	B
83-00-05	Determined by the licensee to be non-reportable	
83-00-06	Defective Circuit Cards in 7300 Process Protection System	E
83-00-07	Diesel Generator Thermostatic Control Valve "O" Ring	B
83-00-08	Heavy Wall Thickness on Diesel Generator Exhaust System	B
83-00-09	Diesel Generator Themostatic Control Valve Loading Spring	B
84-00-01	Clamp Anchor Assemblies with Undersized Welds	B
84-00-02	Wiring of Gould 480V Motor Control Center	B
84-00-03	GE Type HEA Lock-out Relays	B
84-00-04	Wiring of York and System Control	B

Cause Codes

A - Personnel Error

B - Design/Fabrication Error

C - External Cause

D - Defective Procedure

E - Component Failure

F - Site Construction Error

TABLE 2

VIOLATIONS

(December 1, 1982 - March 31, 1984)

BEAVER VALLEY POWER STATION, UNIT 2

A. Number and Severity Level of Violations

1. Severity Level

Severity Level I	0
Severity Level II	0
Severity Level III	0
Severity Level IV	8
Severity Level V	2
Deviations	2
TOTAL	12

B. Violations vs. Functional Area

	Functional Area	Deviations	Severity Level IV	Severity Level V
1.	Soils and Foundations	0	0	0
2.	Containment and Other Safety Related Structures	0	1	0
3.	Piping Systems and Supports	1	3	2
4.	Safety Related Components	0	1	0
5.	Support Systems (HVAC)	0	0	0
6.	Electrical Power Supply and Distribution	0	2	0
7.	Instrumentation and Control Systems	0	1	0
8.	Licensing Activities	0	0	0
9.	Storage of Safety Related Components	0	0	0
10.	Engineering	1	0	0
	TOTAL	2	8	2

TABLE 3

INSPECTION HOURS SUMMARY (12/1/82 - 3/31/84)

BEAVER VALLEY POWER STATION, UNIT 2

	Functional Area	Hours	% of Time
1.	Soils and Foundations	16	1
2.	Containment and Other Safety Related Structures	136	6
3.	Piping Systems and Supports	858	36
4.	Safety Related Components	221	9
5.	Support Systems (HVAC)	210	9
6.	Electrical Power Supply and Distribution	282	12
7.	Instrumentation and Control Systems	202	9
8.	Licensing Activities	70	3
9.	Storage of Safety Related Components	162	7
10.	Engineering	207	8
	TOTAL	2364	100%

TABLE 4

INSPECTION ACTIVITIES

BEAVER VALLEY POWER STATION, UNIT 2

Report Number	Inspector	Areas Inspected
83-01	Specialist 33 Hours	Welding, nondestructive testing, quality assurance and quality control on reactor coolant pressure boundary piping and vessels, and other safety related piping.
83-02	Resident & Specialist 167 Hours	Electrical cable, tray connections, installation of spare penetration covers, repairs to piping, control of contaminates on stainless steel.
83-03	Specialist 30 Hours	Installation of safety related cables, cable trays/conduits and equipment.
83-04	Resident 161 Hours	Record review of shop fabricated piping and HVAC fire dampers, supports and piping installation; inspection of concrete.
83-05 (CTI)	Specialist & Resident 608 Hours	Construction Team Inspection of construction management, quality assurance, design control, equipment storage and maintenance, electrical construction and installation of piping and supports.
83-06	Specialist 16 Hours	Environmental protection program for construction phase.
83-07	Resident 148 Hours	Pressure testing of piping systems, program review of tank fabricator and FSAR commitments.
83-08	Specialist 30 Hours	Piping installation and review of related QC records.
83-09	Resident 177 Hours	Quality Control training, procedure reviews, document review of shop fabricated piping, site modifications and torquing of supports.
83-10	Specialist 30 Hours	Installation of safety related electrical/instrumentation equipment.

Report Number	Inspector	Areas Inspected
83-11	Resident 182 Hours	Postweld heat treatment of piping welds, material certifications, specification and field procedure review, storage, weld qualifications, weld material controls, welding on storage tanks, cable tray installation, battery placement, DLC engineering and regulatory activities.
83-12	Specialist 30 Hours	Installation of safety related instrumentation, associated wire/cable circuits.
83-13	Resident 83 Hours	Installation of structural steel, nondestructive examination of electrical penetrations, personnel qualifications.
83-14	Specialist 24 Hours	Installation of safety related electrical/instrumentation equipment.
83-15	Resident 79 Hours	Electrical support installation, piping fabrication, mechanical shock arrestors, record review of pipe welding and Quality Control inspection of electrical supports, seismic classification of piping system and vendor documentation.
83-16	Specialist 15 Hours	Stainless steel piping outside diameter (OD) weld buildup effects on corrosion performance, the use of Gap-O-Lets for socket fillet weld joints and review of safety related pipe support welding.
83-17	Resident 190 Hours	Nondestructive examination, hydrostatic test, fabrication processes, installation of supports, welding interpass temperature checks, storage of batteries, pumps and heat exchangers.
84-01	Resident 160 Hours	FSAR Description, PWHT, storage, piping, installation.
84-02	Specialist 61 Hours	Welding of supports, resolution of unresolved items, drawing control.
84-03	Resident 140 Hours	Electrical, hydro, welding, supports, startup and storage.
20 Inspections	2364 Hours	

ATTACHMENT 1

ENFORCEMENT DATA

Report Number	Subject	Severity Level	Functional Area
83-01	Welding to inconel with stainless steel GTAW on SG lower HD Nozzle - insufficient information to construction of nozzle detail.	IV	4
83-04	Piping installed without supports.	IV	3
83-05	Failure to calibrate a torque wrench calibration fixture within the required due date and use of uncalibrated fixture.	V	3
	Failure to comply with ANSI-N45.2.11 for design control.	Deviation	10
83-07	Failure to correctly consider "dead weight" when performing calculations for pipe supports.	IV	3
83-08	Failure to comply with the requirements of the QA procedure for the control of "Hold Tags."	V	3
83-09	Failure to meet a commitment date for performing inspections of pipe supports for excessive baseplate gaps.	Deviation	3
83-11	Failure to perform postweld heat treatment in accordance with procedures.	IV	3
83-13	Failure to install washers over long slotted holes in structural steel.	IV	2
83-15	The omission of tolerances on drawing details resulted in installation of supports which do not have calculations justifying their installed conditions.	IV	6
84-03	Failure to secure wiring to panel.	IV	6
84-03	Failure to properly inspect electrical cable.	IV	7