UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

JUN 5 1996

Houston Lighting & Power Company
ATTN: William T. Cottle, Group
Vice President, Nuclear
P.O. Box 289
Wadsworth, Texas 77483

SUBJECT: PUBLIC MEETING TO DISCUSS INCOMPLETE CONTROL ROD INSERTION

This refers to the public meeting conducted in the Region IV office on May 24, 1996, related to South Texas Project, Unit 1, rod cluster control assembly (RCCA) drop test results. The attendance list for this meeting is provided in Enclosure 1. A copy of the handout material is provided as Enclosure 2.

This testing, performed on May 17-18, 1996, was conducted in response to NRC Bulletin 96-01, "Control Rod Insertion Problems," March 8, 1996. At the end of Cycle 6 operations, your staff identified a total of 11 RCCAs that did not fully insert during the testing. Our meeting with your staff was requested on short notice because: (1) more RCCAs had failed to fully insert than heretofore at your site, (2) three of these RCCAs failed to fully insert even in the manual operating mode, (3) the fuel assembly burnups associated with RCCAs failing to fully insert were lower than anticipated, and (4) your impending plant restart schedule. The purpose of the meeting was to provide a question and answer forum about your plans for addressing and resolving the potential safety issues. We appreciate your meeting with us. The informational discussion was quite beneficial to our understanding of the issue of control rod insertion problems at the South Texas Project.

Subsequent to the meeting during a telephone conversation between M. McBurnett of your staff and D. Powers and J. Whittemore of my staff, which took place on May 28, 1996, your representative verbally committed to provide or implement the following actions listed below. We understand that a written commitment to these actions, which relate to Unit 1, will be provided in your 30-day response letter to the bulletin.

As Soon As Available

- Provide the result of the cold RCCA drop testing (time/recoil).

Prior to Attaining Mode 2

- Provide the results of hot RCCA drop testing (time/recoil).
- Provide a general overview of the results of current outage visual inspections of fuel assemblies.

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By June 24, 1996

- Provide the July 1996 fuel assembly testing/examination plan and the schedule for its implementation.

Prior to 5 GWD/MTU in Cycle 7

- Provide the results from the shutdown margin safety calculations of stuck RCCAs.

In 1997

- Implement the actions of Bulletin 96-01 in 1997 during any mid-cycle outage during Cycle 7 that becomes necessary for steam generator inspections or other reasons that would place the plant in an outage of sufficient duration that would permit adequate time for implementing the specified actions of the bulletin.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the NRC's Public Document Room.

Should you have any questions concerning this matter, we will be pleased to discuss them with you.

Sincerely,

Thomas P. Gwynn, Director
Division of Reactor Safety

Docket: 50-498
License: NPF-76

Enclosures:
1. Attendance List
2. Licensee Handout

cc w/o Enclosure 2:
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Bellport, New York 11713

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Austin, Texas 78756

Office of the Governor
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Judge, Matagorda County
Matagorda County Courthouse
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Bay City, Texas 77414

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E-Mail report to D. Nelson (DJN)
E-Mail report to NRR Event Tracking System (IPAS)

bcc to DMB (IE01) \0

bcc distrib. by RIV/ w/enclosures:

L. J. Callan	Resident Inspector
DRP Director	DRS-PSB
Branch Chief (DRP/A)	MIS System
Project Engineer (DRP/A)	RIV File
Branch Chief (DRP/TSS)	R. Bachmann, OGC (MS: 15-B-18)
Leah Tremper (OC/LFDCB, MS: TWFN 9E10)	
R. Jones (NRR/RSXB)	

DOCUMENT NAME: ST1MS528.JEW *Previously concurred

To receive copy of document, indicate in box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

RI:MB:		C:DRP/A		C:MB	E	D:DRS	N		
JEWhittemore/lmb*		LJSmith*		DAPowers xlt		TPGwynn TPG			
06/ /96		06/ /96		06/3 /96		06/4 /96			

OFFICIAL RECORD COPY

060004

E-Mail report to D. Nelson (DJN)
E-Mail report to NRR Event Tracking System (IPAS)

bcc to DMB (IE01)

bcc distrib. by RIV/ w/enclosures:

L. J. Callan
DRP Director
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JEWhittemore/lmb*		LJSmith*		DAPowers		TPGwynn			
06/ /96		06/ /96		06/3 /96		06/4 /96			

OFFICIAL RECORD COPY

ENCLOSURE 1

MEETING ATTENDANCE LIST

Licensee

*H. Butterworth, Operations Manager, Unit 2
T. Clonniger, Vice-President, Nuclear Engineering
*R. Dunn, Supervising Engineer, Reactor Engineering
*S. Head, Supervisor, Compliance
D. Hoppes, Supervisor, Nuclear Fuels
D. Leazar, Director, Nuclear Fuels Analysis
*R. Massey, Manager, Unit 2
M. McBurnett, Manager, Licensing

Central Power & Light

*T. Bosques, Site Representative

NRC

L. Callan, Regional Administrator
*M. Chatterton, Nuclear Engineer, Reactor Systems Branch
Office of Nuclear Reactor Regulation (NRR)
L. Ellershaw, Reactor Inspector, Maintenance Branch
P. Gage, Reactor Inspector, Maintenance Branch
T. Gwynn, Director, Division of Reactor Safety
C. Johnson, Reactor Inspector, Maintenance Branch
*R. Jones, Chief, Reactor Systems Branch
*J. Kennedy, Project Manager, NRR
*L. Kopp, Nuclear Engineer, Reactor Systems Branch, NRR
*D. Loveless, Senior Resident Inspector, South Texas Project
C. Paulk, Reactor Inspector, Maintenance Branch
D. Powers, Chief, Maintenance Branch
L. Smith, Acting Chief, Project Branch A
*K. Thomas, Project Manager, NRR
*E. Weiss, Section Chief, Reactor Systems Branch, NRR
J. Whittemore, Reactor Inspector, Maintenance Branch

*Participation by telephone

ENCLOSURE 2

LICENSEE HANDOUT

STP Response to NRC Questions on Incomplete Rod Insertion (IRI) Anomaly (05/22/96)

1. Are there any plans to perform rod drop testing prior to operation of Unit 1 Cycle 7?

   Yes, rod drop time testing is required prior to reactor startup following core alterations, and performed when RCS Tavg is greater than 561°F with four reactor coolant pumps running.

2. Why is drag testing being performed after the refueling outage? What is the basis for not performing this testing during the outage? Does STP have a spare RCCA to use for testing in the Spent Fuel Pool?

   Normal outage support requires all available resources. Since root cause testing is applicable to fuel that has shown incomplete rod insertion, there is no need to perform the testing during the outage when it can be performed promptly after the outage to obtain the required data. In addition, the short outage duration does not support performing the set of planned fuel testing. STP drag testing by itself will not determine root cause but will provide data to support the overall root cause investigation. Based on rod drop testing during Unit 1 Cycle 6, drag testing performed on high burnup assemblies in the Unit 2 spent fuel pool, RCS chemistry monitoring of silver-110m, the modified Cycle 7 loading pattern, and satisfactory startup rod drop testing, the operation of Cycle 7 core will meet all safety limits for control rod reactivity insertion without immediate knowledge of fuel assembly guide tube drag in the discharged assemblies. The STP fuel testing results, and planned Westinghouse schedule for root cause determination, will be available for STP evaluation prior to achieving fuel assembly burnups comparable to the affected assemblies from Cycle 6. Note that the above test plan has been described previously in our response to Bulletin 96-01.

   STP does have a spare AIC control rod in the SFP. STP is expediting tooling from Westinghouse to allow performance of drag testing on 5 fuel assemblies which are scheduled for reload and have higher potential for incomplete insertion based on core residence time.

3. What assurance do you have that Incomplete Rod Insertion (IRI) is related to the fuel and not the control rods?

   Our bases for concluding that the IRI is related to the fuel consist of the following:

   - Burnup dependency
   - Rod drop characteristics similar to Wolf Creek
   - Data taken on high burnup STP fuel in the Unit 2 Spent Fuel Pool indicates high drag in the dashpot region
   - No adverse RCS chemistry trends indicating failed RCCA cladding

   In addition, the BOC-7 rod drop testing will provide assurance that our control rod are not the cause of IRI.

4. How are you going to demonstrate that the control rods will provide adequate shutdown margin and trip reactivity through end of core life? How do you assure that the control rods are trippable?

   Core design calculations will be performed prior to startup to demonstrate that a bounding number of controls rods, independent of fuel assembly burnup, which stick at 10 steps, 16 steps, or 22 steps, assuming the most reactive stuck fully withdrawn, will meet shutdown margin and trip reactivity safety analysis requirements through end of core life. STP will make these calculations available to the NRC as soon as possible upon our receipt. These results will be used in the revision of the safety analysis. The revised safety analysis will be fully reviewed prior to Mode 2 entry, which is currently scheduled to occur on June 7, 1996. The revision to the safety analysis will be provided to the NRC in its Draft form as soon as it is available, and the final version of the revised safety analysis will also be provided to the NRC upon approval.

   Rod drop testing performed during Unit 1 Cycle 6 demonstrated that rod drop times will remain within Tech Spec limits, and that the rods are free to insert into the dashpot region with the IRI condition. During reactor operation, a monthly rod exercise test is performed to assure that the rods are movable, and thus assumed to be trippable.

5. For the fuel assemblies scheduled to be loaded under control rods, what does the previous cycle's rod drop recoil data predict for these assemblies? For assemblies with lack of recoil, what assurance do you have that the rods will function as designed?

   To date, recoil data has provided conservative estimates of which rodded assemblies may exhibit IRI. From the Cycle 6 recoil data, the "G", "H", "T" and "J" assemblies should demonstrate recoil at BOC-7. Meaningful recoil data is not available for the 5 "C" assemblies. With the lower fuel assembly burnups, STP expects to observe recoil for all rodded locations at BOC-7; refer to Question #7 response if no recoil is observed. Since five of the Cycle 6 affected assemblies did not show recoil at BOC-6, this data implies that Cycle 7 should experience a smaller number of incomplete insertions. Unit 1 Cycle 6 rod drop testing showed that rods with no recoil can still be relied upon to perform their safety function within analyzed limits.

6. Until root cause is determined and corrected, do you plan to perform periodic testing, or do you have a basis for not monitoring this condition?

   STP's testing plan is described in our response to Bulletin 96-01, and states that rod drop testing will be performed during planned or forced outages during 1996. In addition, STP is planning to perform an EOC rod drop test in Unit 2, and will perform rod drop tests in Unit 1 Cycle 7 during plant shutdowns in 1997, provided a meaningful delta burnup has accumulated since the last rod drop test.

   As a result of the 2 new indications of IRI in lower burnup assemblies, STP is evaluating this condition and strongly considering performing a rod drop test in January, 1997 when rodded assembly burnups approach the value corresponding to the lowest burnup fuel assembly with the observed IRI condition (~32 GWD/MTU).

7. What will you do if rod drop tests prior to startup indicate no recoil?

   Recoil data from Unit 1 Cycle 6 initial startup testing demonstrated that no recoil at BOC did not impede the affected control rod locations to perform their safety function through EOC. If no recoil is observed at BOC, then we will carry out the test plan as described in our response to Bulletin 96-01. This will be one of the factors used to consider additional rod drop testing described in Question #6 response.

8. How will Spent Fuel Pool drag testing be correlated to performance of the rods in the vessel under higher temperature conditions (in view of the improved insertions with cooldown)?

   One purpose of performing the drag testing is to develop this correlation. The SFP drag test results for the affected assemblies with IRI are expected to correlate to the observed condition, e.g., guide tube drag is expected to be higher for the assemblies experiencing incomplete insertion. The improved insertion phenomenon following plant cooldown is not yet well understood and the impact to this correlation is unknown at this time.

9. You had mentioned that during core offload, relative axial elevations of the fuel assembly top nozzles will be collected. Can you determine axial fuel assembly growth for rodded assemblies and project the growth to end of core life to determine if the growth would be outside the design basis, and therefore possibly cause assembly distortion? Can you determine if growth for once and twice burned fuel is outside the maximum growth limits?

   Approximate growth can be estimated from the Refueling Machine mast height measurement when the assembly is full down in the containment building upender. STP will evaluate the relative growth data versus assembly burnup to determine if it can be applied to axial growth projections for once- and twice-burned fuel. The fuel testing planned for July 8, 1996 will include fuel assembly skeleton axial growth measurements that will provide higher quality data to compare against the design basis. The data will be analyzed prior to exceeding rodded fuel assembly burnups with the observed IRI.

10. Provide an overview of fuel and control rod examinations during the 1RE06 refueling outage.

    During core offload, each fuel assembly will be visually inspected with binoculars. Following core offload, some of the worst affected IRI fuel assemblies will be video inspected. In addition, the control rods will be tripped into the core following reactor vessel head set, and we are planning to collect rod drop data during this evolution. Refer to Question #4 response for a discussion of drag testing.

11. For any fuel or control rod examinations performed during the outage, what conclusions can be realized by this data? More specifically, what is the scope of the planned visual examinations?

The scope of fuel examinations includes binocular inspection of all offloaded assemblies, and underwater video inspection of several affected assemblies. The underwater video inspections are expected to provide an estimate of fuel rod growth relative to the thimble tubes. In addition, the inspections should provide indications of fuel assembly bow which is an indication of guide tube bowing.

12. Do you believe RCS chemistry indications of silver (Ag-110m) provide for detection of control rod cladding defects or failure. What has your chemistry data indicated? Silver is provided as an example. Is your chemistry telling you anything relative to RCCAs?

We do believe that RCS chemistry indications of silver provide for detection of control rod cladding defects, and Ag-110m levels in the RCS are monitored daily. Based on discussions with Westinghouse, chemistry data to date does not indicate control rod defects, as it is scattered, and does not exhibit a gradual increase over time which is typical of those situations.

13. Are any thimble tube probes available during the outage?

The Westinghouse guide tube probe testing equipment is committed to other plants and is not available to support the 1RE06 outage. It is important that the same equipment setup be used to provide for consistent test data from plant to plant. The data obtained at several sites will be used collectively to support the root cause investigation. STP will be using this equipment during the July, 1996 fuel inspections.

14. What measures will be taken to limit rodded fuel assembly burnups in Unit 1 Cycle 7?

The initial step to minimize IRI in Cycle 7 was to reduce the burnup in rodded core locations to less that 40 GWD/MTU, while maintaining acceptable peaking factor and other reload safety analysis limits. The resultant core loading pattern limits rodded fuel assembly burnups to less than 38 GWD/MTU at a postulated, nominal EOC cycle burnup of 16 GWD/MTU.

15. What is the basis for allowing medium burnup (mid 30's GWD/MTU) assemblies to be loaded under control rods given that two from Cycle 6 did not fully insert?

The conditions observed in Unit 1 Cycle 6 are expected to provide a bounding scenario with respect to fuel assembly burnups and incomplete rod insertion. Also, it is not possible to place feed assemblies under RCCAs in many locations due to power peaking considerations and the ejected rod analysis. Therefore, once-burned, or twice-burned fuel with acceptably low burnup, must be used in many control rod locations. The Cycle 7 safety evaluation will demonstrate that shutdown margin and trip reactivity for a bounding case will be met through end of cycle, given the assumption that IRI occurs in limiting sets of rodded assemblies (refer to Question #4 response).

16. If during the next fuel cycle in Unit 1, you observe stuck control rods, what would be the basis for their continued operability?

    Control rod operability will be based on whether the observed stuck control rod configuration meets the safety analysis assumptions and limitations. Rod drop timing tests would be performed for shutdowns with a sufficient delta burnup since the last rod drop test to confirm rod drop times.

17. Did you discuss the recent rod drop test results with Westinghouse? What insights did they provide you about the new indications?

    The recent rod drop results have been provided to both Westinghouse and to the Westinghouse Owners Group Subcommittee Task Team involved with this issue. Initial discussions have occurred with Westinghouse and will be continuing with both Westinghouse and the Task Team. Westinghouse is in the process of developing a model to more accurately predict fuel assembly axial growth, and they feel that this model will be important for the eventual determination of root cause. Zircaloy growth will be evaluated with consideration given to the time-history of the individual fuel assemblies (power density, fluence, and temperature). This model is currently being applied to the test data from Wolf Creek and then it will be applied to model South Texas fuel performance.

18. Have you identified bounding parameters and an apparent cause to ensure that the safety evaluation's critical assumptions will be valid during core operation?

    The bounding parameters that could affect the critical assumptions of the safety analysis are fuel assembly burnup, rod drop times, and assumed stuck rod positions. The apparent cause of incomplete rod insertions is thimble tube distortion possibly caused by atypical fuel assembly growth.

    Based on the EOC-6 data of 11 control rods not fully inserting, the safety analysis for Cycle 7 will examine limiting sets of control rods not fully inserting (e.g. 20 rods inserting to 16 steps). With these limiting conditions, the required shutdown margin and trip reactivity will be shown to be met. Also, these limiting conditions are based on the highest worth rod remaining fully withdrawn, consistent with existing shutdown margin analysis methodology.

19. What rod drop testing will be conducted in cycle 7 at startup and during the cycle?

    Rod drop testing is planned following reactor vessel head set, just prior to reactor startup, and during outages if the accumulated cycle burnup since last rod drop testing is sufficient. Refer to Question #1 and #6 responses.