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840 N. Rampart St. New Orleans, La. 70116 (504) 525-5900

May 31, 1983

Mr. Jim Joosten
Office of Commissioner Victor Gilinski
U.S. Nuclear Regulatory Commission
1717 H Street N.W.
Washington, D.C. 20555

Dear Jim:

Enclosed are copies of everything I have written dealing specifically with quality assurance problems at Waterford. Also enclosed are copies of most of the documents that we have detailing the problems with the cracks in the common foundation mat out there.

The article dealing with the contract disputes between Combustion Engineering and includes much of the information that we have. I am also including a copy of a letter we wrote to LP&L regarding that problem and asking them to provide us with a list of documents, which are named by number and company code. That should put you on the right track there. My understanding of this dispute and its implications is that (one) there should be a long history of correspondence between these firms, including minutes of many meetings, etc., and (two) it is a very serious problem that LP&L really doesn't know the answer to. Did CE maintain an adequate QA/QC program on its Waterford project? LP&L doesn't know, but wants desperately to believe that the answer is yes. Based on what these documents show, an ambiguous picture at best, plus the assessment of LP&L's own QA auditor, it is hard for me to believe that CE did maintain the program. My guess is that they maintained the contracted for program, one that was far below NRC-mandated standards until the dispute was finally resolved -- a process that took over five years.

All of this points towards the contention raised in the first piece we did on LP&L's QA program out there: it was inadequate for a very, very long time. LP&L may or may not have a safe plant at Waterford. The problem is that even they don't know, couldn't know now even if they have a desperate desire to. The discovery of the most recent cracks in the foundation, we believe, punctuates this point. We believe the problems out there are very, very serious. I've been doing research in the PDR and I think I can show that that is the case and has been the case since the mid-70's. It is, based on the record, a problem the NRC seems to be unfortunately complicit in.

I hope this material will help you. If there is anything further that I can do, lease let me know.

Sincerely,

Ron Ridenhour

Ron Ridenhour, Reporter

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April 4, 1983

Mr. Jim Forte
Louisiana Power and Light Company
142 Delaronde
New Orleans, Louisiana

Dear Jim:

According to your request during our telephone conversation last week, I am submitting to you the following material, requests and questions in writing. Our deadline is Thursday at noon, by which time I must have my piece written and completed. If I am to include your responses in the piece I will write this week, I'll need them no later than Wednesday evening. I hope this schedule will not be too difficult for you.

Among the documents that have recently come into our possession are a series of letters exchanged between LP&L, EBASCO, and Combustion Engineering concerning what quality assurance (QA) standards, if any, had and would maintain during the engineering and manufacture of the reactor and its critical safety-related components for the Waterford III nuclear steam electric station.

At specific dispute in the letters in our possession is the question of who will pay for the costs incurred by Combustion Engineering, according to their assertions, in bringing their quality assurance program up to the NRC mandated standards to which LP&L is committed. In one letter, dated May 31, 1977, CE's Waterford III Project Manager, W.D. Mawhinney, complains about the high costs of meeting the NRC's "newly" required quality assurance standards and threatens not to meet them unless LP&L agrees to their terms for additional payment by a certain date, casting doubt throughout the letter that CE has in fact ever lived up to the NRC mandates because of the unresolved dispute over their costs.

If LP&L does not meet Combustion Engineering's demands, Mawhinney warns R.K. Stampley, the New York-based Project Manager of Waterford III for EBASCO Services, Inc., then CE will "curtail a considerable amount of the quality assurance effort for engineering" on the remainder of the project. Instead of meeting the NRC-required standards to which LP&L is committed on Waterford III, Combustion Engineering threatens to return to what it calls "contractual quality requirements" by June 30, 1977, unless LP&L accepts their claims for additional compensation. Mawhinney leaves no

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doubt that those "contractual quality requirements" fall far short of the standards demanded by the NRC.

Earlier in the sane letter Mawhinney asserts that "when this contract was signed, CE was almost the sole judge of what constituted an adequate quality program." CE's Waterford Project Manager also asserts that CE "believes that the products and systems we delivered at that time indicated that our judgement was adequate, in that plants which were designed and built under the self-imposed quality requirements have operated quite satisfactorily."

We have a number of questions regarding the above mentioned disputes, the documents our knowledge of them is derived from, and the assertions made in them by various parties.

1. What were CE's claims for additional compensation referenced in the document code numbered LW3-775-7 and discussed in the meeting on this subject that occurred on 4-19-77, the minutes for which were dated 4-22-77?

2. How was this dispute finally resolved, if it in fact was finally resolved?

3. Assuming that LP&L acquiesced to Combustion Engineering's demands for the additional compensation CE claims it is due because of the added costs of meeting the NRC-mandated quality assurance standards, what specifically were the terms of the agreement?

4. How much extra did LP&L pay Combustion Engineering as a result of this dispute and CE's threat to return to the original "contractual quality requirements"?

5. When was this contract supplement agreed to? On what date did it become a legally binding agreement?

6. When did LP&L make actual payment? Was more than one payment made? If so, how many payments have been made and for what amounts?

7. If there was more than one payment, on what dates were they made?

8. If LP&L and CE reached their agreement on a supplement to the original contract after June 30, 1977, CE's deadline, what assurance does LP&L have, indeed, what assurance does the public have, that CE met the NRC-mandated quality assurance standards throughout the contract period?

9. What assurance does LP&L or the public have that Combustion Engineering met the QA standards at any time during the contract's duration?

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10. Since "CE was almost the sole judge of what constituted an adequate quality program" when the contract was signed, who else, if anyone, assessed CE's quality program to ensure that both LP&L's interests and the interests of the public were protected?

11. What measures were taken by LP&L to ensure that the NRC-mandated quality assurance standards to which the company was committed (docketed PSAR, March, 1972, and LP&L letters LPL 2615 and LPL 2616 and LW3-727-73 and Amendment 44) were being complied with by Combustion Engineering?

12. Please provide a list of the nuclear steam supply systems, or whatever the projects are that Combustion Engineering is referring to in its assertion, quoted above, that their "self-inposed quality requirements have operated quite satisfactorily" in other plants designed and manufactured by them?

13. What is the operating efficiency percentage of each of those plants?

14. What was LP&L's evaluation of CE's claim that its "self-inposed quality requirements" have been satisfactory in the past?

15. Were these contract disputes reported to the NRC? If not, why not?

16. Was CE's threat to refuse to meet the NRC-mandated QA standards reported to the NRC? If not, why not?

17. Was CE's assertion, contained in other documents involved in these exchanges, that CE could not allow LP&L to take credit for meeting the NRC-mandated QA standards, the same standards to which LP&L was legally bound, reported to the NRC as a "significant construction deficiency" or as a "potential significant deficiency"? If not, why not?

18. Please provide us with copies of the following documents:
    a. Letter: LW3-727-73, dated 11-30-73
    b. Letter: LPL 2615
    c. Letter: LPL 2616
    d. PSAR, dated March, 1972
    e. Amendment 44 to PSAR
    f. Letter: LW3-401-74, dated 7-2-74
    g. Letter: C-CE-1900, dated 9-20-74
    h. Letter: C-CE-3725, dated 11-10-76
    i. Letter: C-CE-3803, dated 12-7-76
    j. Letter: LW3-2101-76, dated 11-2-76
    k. Memorandum: dated 12-28-76, to LP&L's A.E. Henderson, Jr. from LP&L's R.E. Hastings. Subject: Problems encountered during the December 15-17, 1976, EEASCO/LP&L records audit at CE-Chattanooga.

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l. Letter: C-CE-4319, dated May 31, 1977
m. Meeting minutes: LW3-775-77, dated 4-22-77, of meeting held on 4-19-77
n. Letter: LW3-2354-76, dated 12-13-76
o. Quotation: RWK-5276, dated 11-29-76
p. Letter: number unspecified, dated 10-8-76. Suject: delays on Waterford project and project payment.
q. Memorandum: dated 6-8-77, to LP&L's A.E. Henderson, Jr., from LP&L's R.E. Hastings. Subject: comments on CE quality assurance claims, reference C-CE-4319.
r. Letter: RKS-W77-079, dated June 29, 1977
s. Minutes of meeting scheduled for 8-4-77 in CE's Windsor office: in attendance; W.D. Mawhinney, R.K. Stampley, A.E. Henderson, B.P. Mazo, D.N. Galligan and top CE QA personnel.
t. Minutes of meeting scheduled for 8-3-77 in EBASCO's New York offices, attended by LP&L and EBASCO QA personnel.
u. Letter: C-CE-4609, dated 9-16-77
v. Letter: LW3-1907-77

We believe that these documents, among others not yet specified, are in or ought to be in the public domain. According to documents and other information now in our possession, the above listed letters and memoranda are material to critical questions concerning the adequacy of the quality assurance programs maintained by LP&L and its contractors on the Waterford III project, questions dealing directly with the public's real and continuing concern about whether or not the public's safety and well being have been adequately guaranteed by LP&L and its contractors during the design and manufacture of the Waterford III reactor and its components.

For example, In C-CE-3803, dated December 7, 1976, Combustion Engineering's W.D. Mawhinney tells EBASCO's R.K. Stampley that CE is "unable to take credit at this time for a quality assurance program which is responsive to these documents." The documents Mawhinney refers to are specified as "the 18 Criteria of 10CFR50, Apendix B, as well as the guidance provided in WASH 1283 (the 'Grey Book')."

In that regard, we have some additional questions.

19. What was LP&L's response to the news that CE had not been implementing the NRC-mandated QA standards in the design engineering and manufacture of the components for Waterford III?

20. Did LP&L audit CE's records in an attempt to determine how far from compliance CE, and therefore LP&L, was?

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21. If there was an audit, what was the result of that audit?

22. Assuming that an audit was performed and that CE was sincere in its assertion that they had not performed according to the NRC requirements relative to QA, what affect has CE's failure to comply with those standards had on the ultimate safety of the reactor?

23. What elements of the Waterford III reactor were under design and or manufacture by CE and its contractors during the period of dispute (which we reckon to have been at least 65 months) in which CE informed LP&L that it and its agents were not meeting the federally established QA standards?

24. What is LP&L's legal obligation to report CE's failure to comply with the 18 10CFR50 QA criteria to the NRC?

25. What are the legal penalties, if any, for the failure to make those reports?

26. Does there now or did there exist during the aforementioned 65 month (at least) period of non-compliance a real possibility of a crippled and/or ineffective quality assurance program within CE and its fabrication subsidiaries or subcontractors which were providing safety-related items for Waterford III?

27. What affect does CE's failure to comply with the QA standards have on the safety of the reactor and its safety-related components?

28. Is there or was there a potential significant deficiency in the final design of the Waterford III nuclear steam supply system? How can LP&L be sure? How can the public be sure?

29. How thoroughly did LP&L and/or EBASCO investigate and/or analyze the CE design engineering and quality assurance related activities at Windsor and its fabrication subsidiaries in order to determine whether or not an incident or an SCD should have been reported to the NRC?

30. Assuming that LP&L and/or EBASCO did take some follow up investigative action after receiving C-CE-3803, what conclusions and/or recommendations were made by the auditors who undertook those investigations or audits?

31. What is/are the name(s) of the auditor(s) involved?

32. What was the response of LP&L's top level management to those conclusions and/or recommendations?

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33. Assuming that CE was ultimately paid the several million dollars demanded of LP&L, could they prove to LP&L that CE's committments were, from the beginning of the project, addressed in and/or implemented in accordance with the NRC's 10CFR50.55(e) QA criteria? If so, how?

34. How would CE's personnel working under the CE QA program, providing that there indeed was one, have then known which QA requirements applied to the Waterford III project?

35. How could or did CE prove that to LP&L's (and the public's) satisfaction?

Jim, I appreciate the energy and patience I know you will bring to bear in providing us with answers to these questions as well as the documents that are requested here. Thanks in advance.

Sincerely,

Ron Ridenhour

Ron Ridenhour

LOUISIANA POWER & LIGHT / 142 DELARONDE STREET
P. O. BOX 6008 • NEW ORLEANS, LOUISIANA 70174 • (504) 366-2345
MIDDLE SOUTH UTILITIES SYSTEM

August 1, 1977

LP&L QA		
	Action	Info
ALH		
AEH		

Suspense Item
Return Date
Foll
Remarks:

LPL, 7262
Q-3-A35.07

AEH

Mr. R. K. Stampley
Ebasco Services, Inc.
Two Rector Street
New York, N. Y. 10006

SUBJECT: Waterford SES Unit No. 3
Potential Significant Deficiency
Incident No. 8
Radial Cracks - Common Foundation Mat -
Inside Ring Wall

Dear Mr. Stampley:

Attached, for your information, is a documentation of a telephone communication.

Yours very truly,

D. L. Aswell
Vice President-Power Production

DLA:AEH:jhl
Attachment
cc: Ebasco (2), J. M. Brooks, J. O. Booth (2), D. L. Aswell, L. V. Maurin, A. E. Henderson, D. B. Lester, P. V. Prasankumar, C. J. Decarcuax, T. F. Gerrets, J. A. Reine, H. W. Otillio, C. G. Chezem, S. A. Alleman, D. N. Galligan, L. Biondolillo, W. Fadden.

TELE. 'ATION OF
:MUNICATIONS

DATE: 8-1-77 TIME: 8:00 A.M., ~~P.M.~~

PARTY CALLING: A. E. Henderson, Jr. (Name) LP&L (Company)

PARTY ANSWERING: W. G. Hubacek (Name) NRC - Region IV (Company)

SUBJECT: Potential Significant Deficiency - Incident No. 8 - Radial Cracks - Common Foundation Mat - Inside Ring Wall

FILE: 3-A1.04.01
Q-3-A35.07

SUMMARY: (INCLUDING DECISIONS AND OR COMMENTS)

Reported the following to Mr. Hubacek - "Water seeping from radial cracks in the Common Foundation Mat within the ring wall has been detected. This condition will require evaluation. A nonconformance has been written describing this condition." This was reported as a potential significant deficiency.

ACTION REQUIRED:

nterim report due August 30, 1977, if incident is evaluated as reportable.

:IBUTION:

QUALITY ASSURANCE REPORT

LOU-4294

REPORT NO. W3QA-2649

Waterford SES - Unit No 3

DOR, MANUFACTURER OR CONTRACTOR	ADDRESS

Action | Info

P.O. NO.

Suspense Item
Return Date
Reference By
Remarks:

AUG 1977 RECEIVED PRODUCTION DEPARTMENT

To: J Moaba

From: R A Hartnett

Date: July 29, 1977

Subject: POTENTIAL REPORTABLE INCIDENT NUMBER 8 (NOTIFICATION)

Enclosed herewith is the cover sheet to Attachment 2 of Company Procedure 21 entitled "Construction Deficiency - Incident Reporting" describing Potential Incident Report No 8. Please process this report and proceed as described in CP-21.

This notification follows verbal telecon notification on July 29, 1977 with the New York Licensing Department.

RAH bl

Enclosures

cc: (w/encl)
J O Booth
B D Fowler
F Rose
B R Mazo
C V Diz
D N Galligan
E J Gallagher
P Grossman
A H Wern
J M Brooks
A E Henderson
T F Gerrets
D B Lester
P V Prasankumar
M Renfroe
Power Production File (3)
W3QA File
QAS File

DESIGN AND CONSTRUCTION | REVISION | JANUARY 20, 1977

NCR No W3-535

REVISED ISSUED OF APRIL 11, 1975

ATTACHMENT 2 - REPORT FORMAT AND CONTENT
(COVER SHEET - FIRST PAGE)
DESIGN OR CONSTRUCTION INCIDENT REPORT

Incident Report # 8

GENERAL

CLIENT: Louisiana Power & Light Company

PROJECT: Waterford SES - Unit No 3

INCIDENT TITLE: Concrete Foundation Mat Cracking Beneath the Containment

Date of Discovery: 7-26-77 Date Considered Potentially Reportable: 7-29-77

Reported to Client: By 7-29-77 (2:30 p.m.) Date

Reported to NRC: By Date

Report due NRC: Interim due

Final due

INCIDENT EVALUATION

		QA	LICENSING
1.	DEFICIENCY ADVERSELY AFFECTS SAFETY OF PLANT IF LEFT UNCORRECTED, AND	☒	☐
2.	REPRESENTS,		
a)	BREAKDOWN OF QA PROGRAM, OR	☐	☐
b)	DEFICIENCY OF FINAL DESIGN, OR	☐	☐
c)	DEFICIENCY IN CONSTRUCTION, OR	☐	☐
d)	DEVIATION IN PERFORMANCE	☒	☐

COMMENTS: Due to water weeping from the radial cracks in the mat, placement of concrete over these cracks could possibly allow ground water to find a leak path through to the containment vessel, raising questions as to the integrity of the vessel. The 12 foot thick common foundation mat is considered thick enough to not require waterproofing to prevent leakage, therefore, this defect is considered to have possibly adversely affected the safe operation of the plant and is considered a significant deviation from performance specifications which will require extensive repairs to establish the adequacy of the structure.

REPORT PREPARATION

ENGINEER PREPARING DRAFT:

LIC. ENG. REVIEWING DRAFT:

QUALITY ASSURANCE

NONCONFORMANCE REPORT

NO. (1) W3-535

Distribution:
White - PQAE or Site QA Supervisor
Yellow - Organization recommending disposition
Pink - Initiator of NCR

INSTRUCTIONS: (See back of form)

PROJECT (2): Waterford SES Unit #3

DRAWING NO./SPEC NO. (3): PSAR Section 5.2.2.10

SUPPLIER, CONSTRUCTION QC OR CONTRACTOR (4): Construction

P.O. NO. (5):

DESCRIPTION OF COMPONENT, PART OR SYSTEM (6): Common Foundation Mat

I. DESCRIPTION OF NONCONFORMANCE (7) (Items Involved, Specification, Code or Standard to Which Items Do Not Comply, Submit Sketch if Applicable)

The top of the mat beneath the containment structure contains a number of cracks which were discovered to be weeping water. The rate of weeping is generally enough to she the crack and to moisten the surrounding concrete. ~~It appears that these radial cracks (x. are the result of the concave shape which the material has assumed due to differential settlement.~~ 7-28-77

NAME AND SIGNATURE OF PERSON REPORTING NONCONFORMANCE (8): R. A. Hartnett | TITLE: Q. A. Site Supervisor | DATE (9): 7-28-77

RECOMMENDED DISPOSITION (10) (Submit Sketch if Applicable)

SEE ATTACHED SHEET.

NAME AND SIGNATURE OF PERSON RECOMMENDING DISPOSITION (11): C. Griggs (C. Griggs) | TITLE: RES. ENG'S. - FIELD | DATE (12): 7/29/77

EVALUATION OF DISPOSITION BY EBASCO, REASON FOR DISPOSITION (13)

In the attached test method for repairs of cracking is presented a detailed test report is to be presented to ENGR for review final evaluation. A detailed work procedure for final repair will then be written prior to ~~completion~~ commencement of work.
7-29-77

[X] ENGINEERING	[ ] QUALITY ASSURANCE	[ ] CONSTRUCTION	[ ] OTHER AUTHORIZED PERSONNEL
(SIGNATURE) Gallagher	NAME (SIGNATURE)	NAME (SIGNATURE)	NAME (SIGNATURE)
7.29.77	DATE	DATE	DATE
[ ] ACCEPTED [ ] REJECTED [ ] ACCEPTED WITH COMMENTS	[ ] ACCEPTED [ ] REJECTED [ ] ACCEPTED WITH COMMENTS	[ ] ACCEPTED [ ] REJECTED [ ] ACCEPTED WITH COMMENTS	[ ] ACCEPTED [ ] REJECTED [ ] ACCEPTED WITH COMMENTS

VERIFICATION OF DISPOSITION [X] REQUIRED [ ] NOT REQUIRED (14)

EBASCO LEAD QA OR QA ENGINEERING SIGNATURE _____ TITLE _____ DATE _____

DISPOSITION OF
NONCONFORMANCE W3-535

In order to establish a method of repair, perform the following operations and resubmit the nonconformance with results.

A. Drill and grout in place three 1/8" pipe nipples to a depth of two-three inches. The above to be performed on at least two cracks. Pipe nipples to be approximately 8" $\pm$2" c.c.

B. Seal the surface of the crack using a quick setting epoxy. A window may be provided between selected nipples in order to monitor the flow of epoxy which is to be injected as follows.

C. Pressure inject Concressive 1380 epoxy as manufactured by Adhesive Engineering into the middle pipe nipple. Grouting pressure to be increased gradually as required to make the epoxy flow. Maximum pressure to be used is 180 PSI. New York Engineering (ESSE) to witness the grouting operation and provide final disposition of nonconformance.

EDAS QUALITY QUALITY ... INCORPORATED ENGINEERING ...CE REPORT

LOU-4294

IDENTIFICATION

Waterford SES - Unit No 3

REPORT NO. W3QA-2627 -Supp Ø1

MANUFACTURER OR CONTRACTOR

Action	Info
OPP	

Suspense Item________
Return Date________
Follow-up By________
Remarks:

To: J O Booth/L M Elliott

From: R A Hartnett

Date: August 2, 1977

Subject: COMMON FOUNDATION MAT RADIAL CRACKING WITHIN THE CONTAINMENT RING WALL

Radial concrete cracking of tha common foundation mat within the ring wall has been detected during a walk-thru surveillance of the subject area.

It is necessary that the above identified cracks be documented in the following manner. The cracks should be superimposed on a "G" size scaled plan of the subject area with the following information included:

1) Length and path of the cracks,

2) Orientation of the cracks by indicating the coordinates (not azimuths) of the ends of the cracks and points where the cracks change direction,

3) Width of the cracks in millimeters.

It is required that Concrete Hydraulics Engineering evaluate the presence and significance of these crack formations in the affected area prior to any further placements in the area. All concrete placements on the subject area is suspended as per attached Stop Work Order until Concrete Hydraulics Engineering completes an evaluation of the affected area. Quality Assurance Engineering will then evaluate the actions taken and determine when concrete placements may resume.

RAH/JG bl

Attachment

cc: (w/attach)

B P Mazo	D L Aswell
C V Diz	L V Maurin
D N Galligan	A E Henderson ✓
F Rose	T F Gerrets
W3QA File	
QAS File	
E J Gallagher	

EBASCO SERVICES
QUALITY ASSURANCE ENGINEERING
WATERFORD SES - UNIT NO 3

STOP WORK ORDER

Reference Procedure
10 CFR 50 Appendix B
Criteria XVI

Date: 7-26-77
Time: 1:00 p.m.

Affected Activity - Concrete Placement and related work within the ring wall area underneath the steel containment structure.

Reason for Stop & Exceptions - Formation of cracks with apparent seepage (weeping) on the Common Foundation Mat surface within the ring wall area. The intent of the Stop Work Order issued with Report W3QA-2627 was to prevent any installation which would make the cracks inaccessible.

Action Required - Mapping of the cracks with an evaluation by Concrete Hydraulics Engineering and subsequent repair if required.

NCR No - None generated

Reference Report No W3QA-2627 requiring engineering evaluation of the affected area.

Q A Site Supervisor

STOP WORK RELEASE

Date:
Time:

Action taken to lift Stop Work Order -

Q A Site Supervisor

EBASCO SERVICES
INCORPORATED

UTILITY CONSULTANTS - ENGINEERS - CONSTRUCTORS

P. O. Box 70
Killona, Louisiana 70066

Mr. D. L. Aswell
Vice President - Power Production
Louisiana Power and Light Company
142 Delaronde Street
New Orleans, Louisiana 70174

LOUISIANA POWER AND LIGHT COMPANY
WATERFORD STEAM ELECTRIC STATION
1980 - 1165 MW INSTALLATION - UNIT NO. 3
MODIFICATIONS TO EXISTING PUMPED RELIEF WELL SYSTEM

Ref: Ebasco letter LW3-811 dated May 5, 1977

Dear Mr. Aswell:

As you know, control of heave and settlement of the common mat foundation during construction is of primary consideration. This control is obtained in part through control of the piezometric pressures beneath the nuclear plant island. As construction progresses, the site dewatering system will be released in a controlled manner to balance piezometric pressures in such a manner as to maintain foundation soil stresses in excess of the original overburden stress but within the maximum allowable stress of 4500 pounds per square foot. As explained in the Allowable Mat Bearing Pressure Report (Ebasco letter LW3-811, dated May 5, 1977), this is done to recompress the heave which occurred during the plant island excavation and to induce any additional minor settlements which may occur prior to the installation of piping and equipment sensitive to differential settlement. Based on our continuing review of the excavation instrumentation (particularly piezometric levels and heave points), sufficient means no longer exists to support a rigidly controlled recharge program.

In the past 2 months, piezometric levels have fluctuated widely. Water levels in the Elevation -85 aquifer have risen some 20 to 25 feet to just below the base of the common mat. The main reason for the rise in piezometric pressure is that the existing pumped relief wells which surround the common mat have been overpowered by water used to compact the sand backfill. A large amount of water (20 to 25 percent saturation) is required to attain compaction of the fill. This water remains perched in the backfill by the underlying and surrounding clays. As the pumped relief wells were extended through the backfill, they were extended using slotted casing in an effort to control the water levels in the backfill. The amount of water required for compaction of the fill is much greater than anticipated, however, and is infiltrating the pumped relief wells at such a rate that the existing pumps are overpowered from above and no longer offer pressure relief to the -85 aquifer.

Two main alternatives have been investigated to regain sufficient control of piezometric pressures in order to support the Recharge Program. One alternative investigated involves sealing off the lower aquifer from above through the use of expandable pneumatic packers inserted into the pumped relief well casing. This would have the effect of returning the pumped relief wells to the same relative condition they were in before slotted casing was used to extend the wells through the backfill. The second alternative was to install larger pumps and motors in the existing well casings. The larger pumps would triple the capacity of the existing pumps (40 gpm vs. between 10 and 15 gpm) and be of sufficient size to handle all water infiltrating the slotted casing from the backfill as well as to offer pressure relief to the -85 aquifer.

Installation of larger pumps and motors has several advantages over the packers. First, the larger pumps will take care of the immediate problem of lowering the piezometric levels in the -85 aquifer while at the same time helping to control the perched water table in the sand backfill. Second, larger pumps will provide better control of water levels during the recharging effort. Third, installation of larger pumps and motors is less expensive than installation of the packers.

We have received estimates from Boh Brothers Construction Company for each alternative. The estimated cost to install the larger pumps and motors is $24685.10, broken down as follows:

(1) Mobilization (Materials and Labor)		$ 1294.70 l.s.
(2) Furnish and install Pumps (Materials and Labor) - $1949.20/pump x 12 pumps		$23390.40 l.s.
	Total	$24685.10

Additional maintenance and operation costs for larger pumps and motors are also required as follows:

(1) Maintain and operate larger pumps (in addition to current rates) $25.76/pump x 12 pumps	$ 303.60/month

The estimated cost of installing expandable pneumatic packers in the existing pumped relief wells is $39,403.10, broken down as follows:

(1) Mobilization (Materials and Labor)		$ 1294.70 l.s.
(2) Furnish and install packers (Materials and Labor) - $3175.70/packer x 12 packers		$38108.40 l.s.
	Total	$39403.10

The packers would also require expensive additional maintenance and operation costs as follows:

(1) Maintain packers (in addition to current rates) - $533.50/packer x 12	$ 6402/month

Installation of larger pumps will enable control of the water levels, thereby permitting the required recompression described above, and shortening the total period of time the dewatering system will be in use. Shortening the period of dewatering will also ultimately reduce the costs involved in maintenance of the dewatering system, which presently runs $29,830.00 per month. Your immediate approval is requested to install the larger pumps and motors in order to avoid possible delays to construction and/or to the recharge program.

Yours very truly,

J. O. Booth

J. O. Booth
Project Superintendent

GFG/jah

cc: L. Maurin
A. Henderson
D. Lester
Power Production Department (3)
P. Prasankumar
T. Gerrets
C. Chezum
H. Otillio
F. Shaughnessy
A. A. Ferlito
A. H. Wern
R. Stampley
J. Cianci
D. Galligan
J. Brooks
E. Henderson
J. Ehasz
G. Goodheart

LOUISIANA POWER & LIGHT / 142 DELARONDE STREET
P. O. BOX 6008 • NEW ORLEANS, LOUISIANA 70174 • (504) 366-2345
MIDDLE SOUTH UTILITIES SYSTEM

March 25, 1977

LPL 6639
Q-3-A28.14
Response Req'd: Yes
By: April 11, 1977

Mr. R. K. Stampley
Ebasco Services, Inc.
Two Rector Street
New York, New York 10006

SUBJECT: Waterford SES Unit No. 3
Allowable Soil Bearing
Pressure Limit

REFERENCE: (1) Letter LW3-452-77 dated March 15, 1977
(2) Letter LPL 6635 dated March 23, 1977
(3) Letter LPL 6640 dated March 24, 1977

Dear Mr. Stampley:

We have reviewed reference 1 and concur with Ebasco's recommendation that the soil bearing pressure limit prior to recharging be increased from 4,000 to 4,500 pounds per square foot. We understand that the factor of safety against any bearing failure under this increased loading is still in excess of 3,based on the maximum allowable soil bearing pressure of 15,000 pounds per square foot. This change should be appropriately documented and included in the Waterford 3 Final Safety Analysis Report.

Reference 2 forwarded a documentation of a telephone communication between LP&L and the NRC on March 23, 1977. In this communication LP&L reported as a Potential Significant Deficiency that the soil bearing pressure prior to recharging will exceed the 4,000 pounds per square foot as stated in the Waterford 3 Preliminary Safety Analysis Report. This information was also communicated by telephone to the NRC Licensing Branch by LP&L. In this regard we ask Ebasco to prepare a report detailing the reason why the Soil Bearing Pressure Limit of 4,000 pounds per square foot will be exceeded and justifying the recommended change in the Soil Bearing Pressure Limit to 4,500 pounds per square foot. This report should be provided in a suitable format for submission to the NRC.

We request that you advise LP&L of Ebasco's recommendations for handling this potential deficiency. Should it be treated as a reportable deficiency or should the NRC be provided a written report for information only.

IE Inspection Report No. 50-382/77-03 which was forwarded to you by reference 3 addresses the Turbine Building Foundation Design Change as an item of concern. We recommend that Ebasco consult this reference prior to responding to the above requests.

Please note that LP&L must respond to the Potentially Reportable Deficiency with thirty (30) days.

Yours very truly,

D L Aswell

D. L. Aswell
Manager of Power Production

DLA/FJD/dd

cc: Ebasco (2), J. M. Brooks, J. O. Booth (2), D. L. Aswell, L. V. Maurin, A. E. Henderson, D. B. Lester, P. V. Prasankumar, H. W. Otillio, F. X. Shaughnessy, L. Biondolillo, C. G. Chezem, T. F. Gerrets, D. N. Galligan, C. J. Decareaux, F. J. Drummond

DOCUMENTATION OF
TELEPHONE COMMUNICATIONS

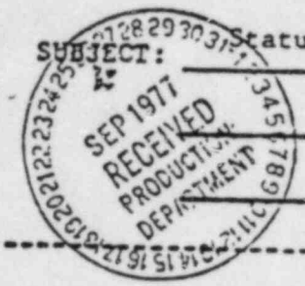
LP&L QA		
	Action	Info

DATE: 9/22/77 TIME: 9:57 A.M., ~~XXXX~~

PARTY CALLING: W.G. Hubacek (Name) USNRC (Company)

PARTY ANSWERING: T.F. Gerrets (Name) LP&L (Company)

Return to AE



SUBJECT: Status of Low Strength Concrete

FILE: Q-3-A35.02.01

3-A1.04.02.02

SUMMARY: (INCLUDING DECISIONS AND OR COMMENTS)

Mr. Hubacek called to inquire about the status of our low strength concrete problems. He wanted to know if any further developments had taken place. I told him that we had received some further information from the Portland Cement Association. They had identified three areas regarding the concrete that should be changed. First, our present type II cement has approximately 50% plaster and 50% anhydrides which preclude false set. The Portland Cement Association recommends that this be changed to 75% plaster and 25% anhydrides. Secondly, the Portland Cement Association recommends a higher burning temperature for the cement and a faster rate of cooling. Thirdly, the Portland Cement Association recommends that we change from our present lignin base admixture to a hydroxylated carboxylic acid base. I told Mr. Hubacek that I had been informed by Ebasco that the chemist at the cement plant basically agrees with the recommendations regarding the cement. However, we have not made any determinations regarding changing admixtures.

I told Mr. Hubacek that the strength test that Portland Cement Association had run on the cores from the affected slabs showed lower strength than the tests which were run by Peabody. There is no current explanation as to why these differences occurred. I also told him that we had not yet run strength tests on cores from wall 15A4.

ACTION REQUIRED:

DISTRIBUTION: D.L. Aswell, L.V. Maurin, A.E. Henderson, T.F. Gerrets, Power Production File (2)

DATELINE

Cracking Foundations At Waterford III

By RON RIDENHOUR

Louisiana Power and Light Company's troubled Waterford III nuclear power plant, beset by yet another delay in its scheduled start-up date and even more cost overruns, the amounts of which were not announced last week when LP&L told the public that Waterford would not be ready to operate next January, has problems far larger and more serious than the company has thus far been willing to admit. Among them, apparently, is a serious design flaw that could affect the plant's safe operation and may threaten the integrity of the nuclear reactor itself.

Symptoms of the design flaw began to appear as far back as the middle of 1977 when cracks started appearing in the massive foundation of what is called the nuclear island. Waterford III has four main buildings. Three of them, the nuclear reactor containment building, the fuel handling building and the reactor auxiliary building all sit on a single, enormous slab of concrete called the common foundation mat. Taken together, the three buildings, all of which are directly involved in the handling and processing of nuclear materials, and the common foundation mat upon which they are built, compose the nuclear island.

Built without pilings, the mat and the buildings that sit on it can be thought of as a sort of enormous concrete and steel boat floating on the water-charged sands composing what many people here call the jelly-ground common to land adjacent to the Mississippi River. Waterford's nuclear island, undergirded by the common foundation mat that measures 270 feet in width, 380 feet in length and 12 feet in steel reinforced thickness, began to spring leaks not long after it was finished.

Cracks, accompanied by seeping water, began appearing in the common foundation mat in July, 1977. The first cracks were discovered on July 26 in the area directly beneath where the reactor itself was supposed to go, according to LP&L internal documents *Gambit* has recently obtained. That was not supposed to happen. Waterford's nuclear "boat" was designed to be watertight. Although the mat was underlain with no waterproofing material, the engineering theory of LP&L's architect/engineer for Waterford, EBASCO Services Inc., hypothesized that no water could penetrate the foundation's 12 foot thickness.

Like an enormous concrete and steel boat, floating on sand

New fissures, also accompanied by water seepage, were discovered in the floor of the reactor auxiliary building earlier this month on May 11, the day after an inquiry into the problem by *Gambit*. Other cracks and water seepage have been discovered in the floor of the nuclear island from time to time in the intervening years, according to Tom Gerrets, LP&L's Quality Assurance Manager at Waterford.

When *Gambit* first interviewed Gerrets and EBASCO civil engineer Brian Grant about the problematic cracking in Waterford's foundation, both discounted the seriousness of the situation. Concrete does that, Grant told *Gambit*. It's not necessarily anything to worry about.

"You see," Grant said, "when concrete is loaded, it bends in order to accept the load. The part that's in tension does crack and reinforcing bars pick up the tension load. In order for them to do that the concrete has to crack. That's the way concrete normally acts. The cracks are hairline cracks. Very often you don't even see them, but we know they're there."

Grant acknowledged, however, that the water seepage through the cracks was an unexpected development. "The fact that there was a crack path all the waythrough (the foundation mat)," he said, speaking of the cracks discovered in July, 1977, "was the part that was unanticipated."

EBASCO's first reaction to the "seeping" in the foundation beneath what would eventually be the nuclear reactor was one of alarm, according to the documents now in *Gambit's* possession, despite the sanguine attitudes of Gerrets and Grant before their discovery of the latest cracks. EBASCO's quality assurance engineers issued a stop work order on July 26th, 1977, the day the problem was discovered, a move designed to prevent the cracks from becoming inaccessible. The stop work order also called for a mapping of the cracks with an evaluation..."and subsequent repair if required."

Two days later, July 28, 1977, EBASCO's quality assurance supervisor for Waterford, a man named R. A. Hartnett, wrote a report detailing the foundation's failure to conform to engineering expectations and his assessment of the reason why. "The top of the mat beneath the containment structure contains a number of cracks which were discovered to be seeping water," Hartnett wrote. "The rate of seeping is generally enough to show the cracks and moisten the surrounding concrete. It appears that these radial cracks are the result of the concave shape which the material has assumed due to differential settlement."

Cracking in the foundation was therefore the symptom of differential settlement, in Hartnett's estimation, a process which is very much like it sounds: some parts of the foundation mat were settling more than others. The next day, July 29, another report on the problem, a "design or construction incident report" was written by EBASCO's quality assurance engineers, this one describing not only the characteristics of the problem, but its potential implications as well. According to it, the cracking raised serious questions concerning the integrity of nuclear contain-

ment vessel, the safe operation of the plant and was a significant deviation from performance specifications that would require extensive repairs.

"Due to water seeping from the radial cracks in the mat," the report reads, "placement of concrete over these cracks could possibly allow ground water to find a leak path through to the containment vessel, raising questions as to the integrity of the vessel. The 12 foot thick common foundation mat is considered thick enough to not require waterproofing to prevent leakage, therefore, this defect is considered to have possibly adversely affected the safe operation of the plant and is considered a significant deviation from performance specifications which will require extensive repairs to establish the adequancy of the structure."

Despite this anxious assessment of the seriousness of the cracking in Waterford's foundation, the LP & L/EBASCO resolution of the problem hardly seems to address the concern expressed above. After failing in an attempt to pressure inject epoxy into the cracks, an effort apparently designed to literally glue them together, another, less artful but similar measure was taken. A one inch deep trench was chipped away along the length of each crack which was then filled with epoxy. "A final surface coat of epoxy was brushed on," EBASCO's Brain Grant explained to *Gambit*, describing the process of repair EBASCO turned to "to established the adequacy" of the foundation's structure. "This was repeated as necessary," Grant said, "until the seeping stopped before the fill concrete was placed so there wouldn't be any damage to the fill concrete from water welling up from below."

Before the fill concrete was placed? That's right. The reactor containment vessel might be likened to a giant steel pressure cooker. The containment building surrounds and encloses it and it in turn surrounds and encloses the nuclear reactor and its essential working parts. The containment vessel, at its lowest point in the dead center of the containment building, is only 2½ feet from top of the foundation mat. Once the vessel is in place unreinforced "fill concrete" is poured around it and up its sides for 33½ feet. The entire 33½ lowest elevation feet of the containment building surrounding the containment vessel, in other words, is filled with concrete.

When the cracks in the foundation mat beneath the containment vessel were discovered, the beginning of this process was only a few days away. The only reason the cracks in the foundation mat presented a problem, according to Grant, is that they might provide enough moisture to weaken the bond between the fill concrete and the foundation mat. That had to be prevented. So the cracks were chipped out, filled with epoxy, painted with epoxy again until the seeping stopped, observed for *one* day and then the pouring of the fill concrete began.

EBASCO's engineers had two primary concerns regarding the cracks, according to both Grant and LP&L's Gerrets. One: would the seepage of water up through the cracks destroy the integrity of the bond between the fill concrete surrounding the containment vessel and the nuclear island's foundation? Two: could water seeping through the cracks reach the containment vessel itself and create corrosion, perhaps enough corrosion to weaken the vessel? The epoxy solution and other technical assessments resolved both of those questions successfully, according to Brian Grant.

The epoxy solution apparently also satisfied inspectors from the Nuclear Regulatory Commission. In late August, 1977, NRC inspector W.G. Hubecek filed a report describing the procedure EBASCO used to seal the cracks in Waterford's foundation mat, commented on it favorably and concluded that the significant construction deficiency involving the cracks in the mat was considered closed.

But was it?

It now seems not. The appearance of more cracks in the foundation mat in the intervening years, including those discovered within the last few weeks, suggest that the problems they disclose are more fundamental. Waterford's nuclear island was designed on the engineering assumption, according to EBASCO's Brian Grant, that the hydrostatic pressures beneath the plant would remain constant once the structure was completed. Things do not seem to have worked out according to plan.

Because the water table along the Mississippi River is so close to the surface and Waterford's common foundation mat begins 48 feet below mean sea level, much of the plant's weight is displaced by the water surrounding it. Although it is far from a true "boat" the physics of the process has many similarities, thus the "nuclear island" concept and the idea to "float" Waterford's huge mass without the benefit of pilings. In order for this engineering theory to hold, however, the hydrostatic pressures beneath and surrounding the plant must stay constant, according to Grant. That seems not to have happened.

When Waterford's construction began a giant excavation was dug where the plant now sits. In order to keep the hole dry while the work proceeded, however, a complex arrangement of powerful water pumps was installed with two purposes in mind. One was to keep the hole dry while the work inside it proceeded. The other was to allow a controlled "re-charging" of the water table around the plant as it went up.

"There was a stage release of the ground water," as Brian Grant describes the process, "It was designed to keep the load on the foundation soils at a roughly constant level during the progress of the work. As the foundation was loaded by the construction of the superstructure above it, the ground water would be allowed to return to a higher and higher level in stages in order to keep the load on the soils roughly constant."

Sometime in March, 1977, however, problems developed with the pumping process and EBASCO's engineers were not able to maintain the water levels and the corresponding hydrostatic pressures beneath the common foundation mat their engineering theory assumed they could. According to Grant, that failure may have been the cause of the initial cracks in Waterford's foundation mat.

"The loading of the foundation mat could have reversed during that time," he told *Gambit* during the May 10 interview at Waterford. "this may be where some of the cracks developed that subsequently seeped because the nature of the load on the mat and the way it was flexing would have been changed by the rise in the water table and the creation of uplift underneath the mat which was not there before."

Although acknowledging the possible

role of the failure of the engineering theory in the appearance of the initial cracks in Waterford's nuclear island foundation mat, both Gerrets and Grant insisted that there were no other cracks of significance in the foundation. On the following day, however, an inspection was conducted and the cracks in the floor of the gas surge tank room, the waste gas tank room and waste gas compression room "B" of the reactor auxiliary building were reported in a non-conformance report dated May 11, 1983.

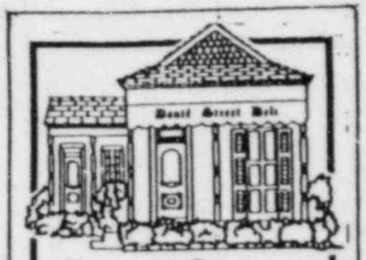
"There are concrete cracks in the base mat of the reactor auxiliary building," the report reads. "This is evidenced by the percolation of water in small amounts up through the cracks." The cracks reported are a mirror image of those first discovered in July, 1977, beneath the reactor containment vessel.

Tom Gerrets, LP&L's Quality Assurance Manager for Waterford, acknowledged the discovery in a telephone interview on May 18, saying that the plant's foundation mat could be described "as not being water tight at the present time." Gerrets said that he didn't know how the problem would be resolved, but he thought that it was written up to get Waterford's Final Safety Analysis Report (FSAR) changed.

"We found some (cracked and seeping) areas that are fairly limited and that has been documented," he said. "I think the main reason for the NCR (non-conformance report) is to really get the FSAR changed. The Final Safety Analysis Report is a comprehensive report the Nuclear Regulatory Commission requires utilities building nuclear power plants to compile detailing their design, construction, engineering and quality assurance program, among others, that will be adhered to in the company's plant. It is a form of a contract between the federal regulatory agency and the utility, requiring the utility to execute the construction and engineering plan the FSAR describes.

Changing the FSAR, however, is not an unusual approach taken by utility companies hooked on the horn of a thorny construction or design dilemma, according to sources familiar with practices in the nuclear power industry.

Questions revolving around the cracks in Waterford's foundation mat, meanwhile, are among the topics staff investigators for the U.S. House of Representatives' Subcommittee on Energy and the Environment have asked investigators for the NRC in Washington to check into. ■



Dante Street Deli

Menu for May 23-May 28

Monday • 23rd
Chicken Picata
Crab-Artichoke Quiche
Seafood Bisque

Tuesday • 24th
Veal Dante with Fettucini
Zucchini Quiche
Cold Curried Carrot Soup

Wednesday • 25th
Top Hat Pork Medallions
Baked Vidalia Onions
Spinach Soup

Thursday • 26th
Poached Redfish with Caper Sauce
Green Beans Almondine
Vichyssoise

Friday • 27th
Jambalaya
Crawfish Pie
File Gumbo

Saturday • 28th
Dewey's Barbequed Chicken
Iler's Baked Beans
Sally's Cole Slaw

DATELINE

Not To Worry

By RON RIDENHOUR

Jim Fort, Louisiana Power and Light Company's public spokesman, told *Gambit* last week that LP&L officials met on Monday, May 23, and agreed to take a clear-eyed hard line about the weeping, hairline cracks that have been appearing in the foundation of the Waterford III nuclear power plant since 1977. Don't worry about the cracks, Fort said. They don't mean anything.

"These hairline cracks... are absolutely insignificant to the structural integrity of that plant," Fort said. "We met Monday, several of us did, on this particular thing. Of course, as everybody who's knowledgeable about it said, it's just absolutely nothing to worry about and we're not going to worry about it." Fort also said that LP&L officials are sure that the U.S. Nuclear Regulatory Commission will agree.

That remains to be seen.

There is, in fact, a good deal of information available, including comments made by LP&L officials on the day before the newest cracks were discovered, which suggests that the cracks in Waterford's foundation raise fundamental questions about the integrity of the plant's design and the effect it may have on Waterford's promise to operate safely.

— Although the water seeping through the cracks in Waterford's foundation is currently a minimal amount, the plant's design requires the foundation to be watertight throughout its expected 30-40 year operating life.

— LP&L internal documents written in 1977 after cracks in the foundation directly below Waterford's nuclear reactor were first discovered called them a "significant deviation from performance specifications" which could affect the "safe operation of the plant."

— Water seepage through the foundation was not anticipated by Waterford's designers, raising questions about the adequacy of the original design and the engineering assumptions it is based on.

— New cracks in the foundation, discovered on May 11, suggest that the design and engineering problems responsible for the first cracks are yet to be resolved, raising further questions about LP&L's assumptions about their ability to guarantee Waterford's safe operation.

Waterford's "floating" design is unique among U.S. nuclear reactors. Louisiana's peculiar geology, particularly the mushy "jelly ground" nature of the soils nearest the river, induced Waterford's designers to plan a foundation for the plant that included no pilings. Three of Waterford's four major buildings, all of those dealing with the handling of nuclear materials, were built on what is called a "common foundation mat", an enormous steel-reinforced concrete slab measuring 270 feet in width, 380 feet in length and 12 feet in thickness.

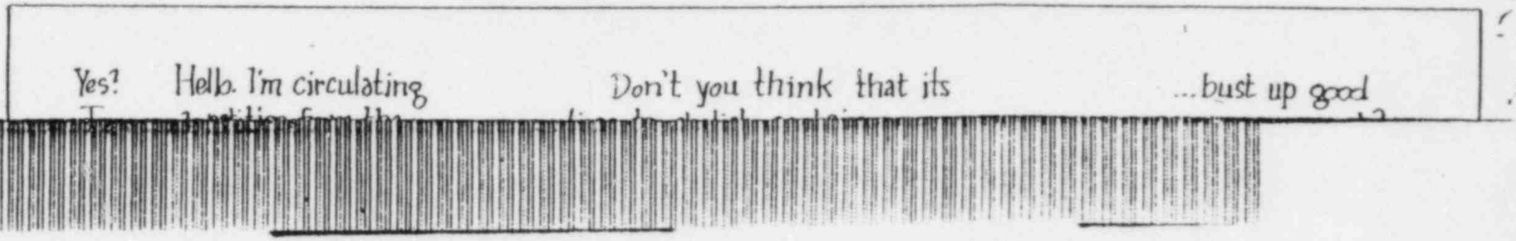
Waterford's design calls for the plant to be a sort of steel and concrete boat floating on the water-impregnated sands beneath and surrounding it. In order to get their boat in the water, however, Waterford's engineers had to install a complicated water control and pumping system designed to keep the excavation dug for the common foundation mat dry while the huge slab was put together and the three structures it supports went up.

According to Waterford's design theory the ground water at the plant site would be allowed to flow back into the area beneath and around the nuclear island on a controlled basis as the plant went up, a process called re-charging. Under the re-charging theory, the flow of groundwater would be controlled in such a way that the water surrounding the nuclear island would be in a state of equilibrium vis a vis the weight of the nuclear island, creating a buoyant effect that would actually "float" the island on the hydrostatic sand around it.

In the spring of 1977, however, not long

CAYENNE by Robert Landry

Collecting A Mandate



before the first cracks beneath the plant's reactor were discovered at Waterford, there was a problem with the water recharging system. Waterford's engineers were not able to control the rate of recharging in the way their design and construction plan called for. According to a civil engineer for Waterford's prime contractor, the architect-engineering firm of EBASCO Services, Inc., there was a lag in the called for state of equilibrium between the weight of the plant and that of the water in the soils surrounding it. That lag, according to Brian Grant, the EBASCO civil engineer, caused the common foundation mat to flex in an unanticipated way, creating a condition EBASCO's engineers have since analyzed as "stress reversal". Stress reversal, a reflection of motion in the foundation, created cracks in the foundation that ran all the way through it, which in turn allowed water to come through.

Waterford's boat, in other words, was springing leaks.

Despite the sanguine attitude towards the problem currently being displayed by LP&L officials, the discovery of those cracks in 1977 caused a great deal of concern then. In a report written on July 29, 1977, an unidentified EBASCO official wrote that: "The 12 foot thick common foundation mat is considered to be thick enough to not require waterproofing to prevent leakage, therefore, this defect is considered to have possibly adversely affected the safe operation of the plant and is considered a significant deviation from performance specifications which will require extensive repairs to establish the adequacy of the structure." A few days later EBASCO/LP&L reported the problem to

particular given amount, because it comes in several varieties... At this time in the plant life you'd expect it to be pretty stable and I understand that's exactly the case."

On the day after this conversation occurred, May 11, 1983, EBASCO engineers wrote a new non-conformance report announcing the discovery of new cracks in the foundation of Waterford's nuclear island. According to non-conformance report #6212, reported in language mirroring that used back in 1977 to report the first cracks discovered, water was discovered to be percolating up through new cracks discovered in the floor of the reactor auxiliary buildings, which is in turn the top of the common foundation mat.

While LP&L officials and spokesmen continue to minimize the importance of the cracks and the water seeping through them, they also say they are considering seeking NRC approval to change their Final Safety Analysis Report (FSAR) in a way which doesn't require Waterford to be watertight. The FSAR is LP&L's basic blueprint for the construction of Waterford, a sort of contract with the NRC which outlines how Waterford is built and guarantees its safety. ■

Shelter May Close

Rumors that the city plans to close the Civil Defense Center at the lake end of West End Boulevard are proving to be true. City Hall officials are now admitting that the proposal is under consideration. There is much speculation as to what the city will do in the event of a closure. Some ideas include developing the property, converting the facility into a prison or possibly turning the facility over to the national guard or state police.

For years there has been talk about closing the facility, which is located on a median strip bounded by West End, Robert E. Lee and Pontchartrain boulevards.

At one time there were discussions that the center should be used by the Mosquito Control Board to breed cannibal mosquitoes. Another plan was to use the underground shelter to store city records. Both proposals were dropped, however, and City Hall officials won't indicate any definite future plans. Officials only say that closure is a possibility.

Of course, the proposal raises questions as to whether there is a need for the Civil Defense Center. The facility was built in the late '50s when there was much concern

Quality Control Failure At LP&L

page 1
3-19-83

By RON RIDENHOUR ©1983

Reports by the Nuclear Regulatory Commission and a series of management audits of Louisiana Power and Light Company indicate that LP&L's Waterford III nuclear power plant was built with inadequate quality assurance programs because of one of the leanest technical staffs in the nuclear power industry. The management audits, commissioned by LP&L but not previously made public, took place over a period of several years from the mid-1970s to the present, while the NRC reports reaching the same conclusions appeared in 1981 and 1982. Taken together, the reports raise serious questions about the entire quality assurance program at LP&L, which is responsible both for assuring safety at the plant and avoiding costly delays and reworking of systems. Waterford III has been subject to repeated delays and cost overruns throughout its more than 10-year history.

While conceding that their record at Waterford has been blemished by a critical NRC report and an accompanying $20,000 fine, both filed by the commission last December, LP&L executives vigorously defended the company's construction and safety record at the nearly complete nuclear plant in a three-hour interview last week, staunchly asserting that LP&L's decision to maintain a "lean and mean" quality assurance group at Waterford will ultimately benefit the company's customers through decreased costs.

Charges filed against LP&L by the NRC in its December 6, 1982 report, however, raise doubts that a skeleton quality assurance (QA) crew has cut the costs of Waterford's construction. To the contrary, the report details the failure of LP&L's construction QA staff to catch numerous

cool the reactor in an emergency, a failure leading directly to significant re-working on each of the systems and the NRC mandated re-training of workers involved in those projects.

LP&L spokesman Jim Forte and Waterford plant manager David B. Lester both told *Gambit* that they had no idea what impact the failure to catch the problems at an early stage has had on the cost of Waterford's construction nor how long the problems would delay the project's completion. Neither would say what the relationship between the problems of the four emergency coolant systems had on LP&L's rescheduling of the plant's projected completion date from mid-1983 to early 1984. Nor would they comment on the relationship between those problems and LP&L's simultaneous announcement that the six or more months of delay would be accompanied by a $500 million leap in Waterford's ultimate cost.

The timing of the two events, however, suggests that there may indeed by a substantive link. Although the critical NRC report and the accompanying fine were announced to the public in December, they were based on an NRC quality assurance inspection conducted between May 16 and July 15, 1982.

Lester professed complete confidence in the quality assurance philosophy employed by LP&L at Waterford throughout the course of the construction project, which is now said to be 97 percent finished. But a series of NRC reports has been sharply critical of LP&L's management of the Waterford project in general, particularly their approach to quality assurance on the construction site.

In an interim report on Waterford filed by the NRC's Advisory Committee on Reactor Safeguards on August 11, 1981, committee chairman J. Carson Mark complained to the NRC that "the management and staffing at Waterford III is less well established than at other nuclear plants at a similar time during their construction and plained: "Of particular concern is the lack of nuclear experience throughout the organization and the apparent lack of appreciation by high-level management of the magnitude of the project it is undertaking."

LP&L's downplaying of the importance of the quality assurance program throughout the plant's construction process is seen in many quarters as the most egregious example of the company's lack of understanding of the magnitude of Waterford's complexity.

According to Richard Hubbard of MHB Technical Associates of San Jose, California, LP&L's high level management's reaction to the demands of quality assurance is shared by many utility executives, generally people who tend to think of nuclear reactors as simply another way of boiling water.

"The NRC says that quality assurance is essential," Hubbard, the former manager of quality assurance for General Electric's Nuclear Division, told *Gambit* in a telephone interview last week. "Quality assurance must be a program and it must be implemented. One of the things that I've found is that almost everybody has a program. If you went out to Waterford they'd show you a set of manuals a foot high, but what the results of Diablo Canyon and other plants have shown is that while utilities had a program they didn't implement it. That may be because they didn't have enough people or the people weren't properly trained. It usually gets back to the fact that the management wasn't behind

"Of particular concern is the lack of nuclear experience throughout the

such a program to the extent that they should have been."

Licensing, construction and operation of nuclear power plants are regulated by the Nuclear Regulatory Commission. Quality assurance is more than a simple phrase under the NRC's guidelines. It is a carefully mandated and defined program designed to guarantee that nuclear power plants are built according to the NRC's standards, something the NRC calls "essential to the protection of public health and safety and of the environment." (See box). It is, typically, an area of primary concern to contractors working on a nuclear power plant construction site because any part of the plant that does not meet the NRC's construction standards must be brought up to those standards, at least theoretically, before that part of the project will be okayed by NRC inspectors. It is particularly important to contractors because on most nuclear projects the work must pass NRC QA standards before final payment is made.

Work that doesn't measure up is simply ordered re-done, no questions asked, or at least that's the way it's supposed to be.

To ensure that NRC QA standards are met, the commission requires the company holding the construction permit, LP&L in the case of Waterford, to be ultimately responsible for quality assurance. As a further cross-check the commission requires quality control and quality assurance inspections to be made and "signed off" at every level: i.e. subcontractors, contractors and the prime contractor, a company in the case of Waterford called EBASCO Sevices, Inc. Ultimately, however, the responsibility to assure the quality of the work of the 4,000 workers at Waterford is LP&L's.

According to a management consulting firm hired by LP&L to assess the company's management of the Waterford construction project in 1979, Management Analysis Company (MAC) of San Diego, California, LP&L's five-person quality assurance staff for construction was the smallest of any nuclear power plant then under construction in the country.

"MAC is not aware of any other nuclear project in this country wherein construction is being monitored by as few owner individuals," the July 31, 1979 report reads. "The personnel... for LP&L at the Waterford III site are hardworking, dedicated and loyal individuals. In spite of these traits, these personnel cannot, in MAC's opinion, adequately cover those facets of construction monitoring that should be covered to ensure LP&L is receiving appropriate performance for the dollars being expended." The report went on to suggest that LP&L's QA staff at Waterford be expanded to cover a number of areas that were then going un-monitored by LP&L, the same recommendation the report said Management Analysis consultants had made to LP&L in 1977, two years earlier, when they had conducted a similar assessment of Waterford's construction operations.

Interestingly, nearly every short-coming of LP&L's QA program cited in the NRC's complaint filed in December, 1982, was forecast in the 1979 management report Management Analysis Company submitted to LP&L in 1979. Despite the MAC recommendations, however, as well as some in-house pressure to heed them, LP&L's top management levels continued to insist that a five-person quality assurance group could adequately monitor the work of 5,000 laborers. According to LP&L documents now in *Gambit*'s possession, the debate over the size and adequacy of LP&L's QA team bubbled quietly throughout the entire period of construction until it was finally forced to the surface by the approaching completion of the plant and the need to begin preparations for actual operation.

The chronology of events revealed in the NRC report, reflected against the background of the ignored MAC study, raises serious questions about the huge cost overruns of Waterford, the adequacy of the plant's construction, its safety and could call into question the viability of the entire construction quality assurance program at Waterford, including the NRC's role in the

The application of disciplined engineering practices and thorough management and programmatic controls to the design, fabrication, construction and operation of nuclear power plants is essential to the protection of the public health and safety and of the environment. Quality assurance provides this necessary discipline and control. Through a quality assurance program that meets Nuclear Regulatory Commission requirements, all organizations performing work that is ultimately related to the safety of a plant operation are required to conduct the work in a preplanned and documented manner to independently verify the adequacy of the completed work, to provide records that will confirm the acceptability of work and manufactured items and to assure that all individuals involved with the work are properly trained and qualified to carry out their responsibilities.

— Nuclear Regulatory Commission Annual Report.

process.

As Waterford neared completion in the closing days of 1981, the NRC began to pressure LP&L to add the final component to its QA program, an element called operations quality assurance, an entity wholly separate from construction QA. Construction QA is charged with assuring the integrity of the construction process, but operations QA must assure that the plant is fit for nuclear operations. Operations QA is not added until the plant is nearing the point in its construction schedule where the prime contractor is preparing to start turning the plant over to its owner: LP&L in the case of Waterford. The plant is not turned over in one fell swoop, but rather in a piecemeal, system-by-system fashion.

Under pressure from the NRC and behind schedule in late 1981, LP&L finally filled two of its six permanent operations QA positions in December, bringing in three other QA people from other positions in the company on a temporary basis to fill all but one of the six positions. By then EBASCO, LP&L's prime contractor of Waterford had already certified three systems as being completed and ready for turnover. By early 1982, EBASCO and its contractors and subcontractors had certified four more systems, which together comprise the heart of the critically important emergency core coolant system: the containment spray system, the high pressure safety injection system, the low pressure safety injection system and the safety injection tanks.

Prompted by inadequacies discovered by LP&L's operations QA group in the systems EBASCO represented as ready for operations, LP&L's construction QA undertook a careful audit of what are called the four "turnover packages." Discovering serious discrepancies in EBASCO's quality records, an extensive set of "controls" the NRC requires the contractors to maintain, construction QA then undertook actual "walkdown" audits or physical inspections of the systems to compare the actual work to the paper trail EBASCO and its minions had prepared.

What followed was a distressing set of revelations. LP&L's QA auditors, who theoretically had been at least spot-checking the work of EBASCO and its contractors and subcontractors as the work developed, discovered that, "although EBASCO QA had represented the systems as being ready for turnover and had included statements that the quality records had been reviewed, (they) had not actually compared the records with the as-built systems." In fact, "the records did not actually represent a true status of the systems at that time." Additionally, the packages included statements from contractors and EBASCO QA indicating that portions of the packages were incomplete and not QA/QC acceptable.

Ultimately LP&L uncovered a myriad of problems in the four systems as 1) the as-built drawings didn't accurately reflect what was in fact built; 2) reverse slope tubing runs; 3) incorrect seismic support designations; 4) dimensional errors; 5) supports not installed; 6) improper bolting; 7) deformed tubing; 8) tubing and bolt heads not allowing for thermal expansion. These problems and others prompted a series of immediate re-training programs for contractor personnel, re-work and re-inspection of all the various specified problem areas. On one system only 50 of 338 hangers were found acceptable.

Suddenly, after fighting the prospect of adding to its construction QA staff for over seven years during which the vast bulk of Waterford's construction had been completed, LP&L acted swiftly to beef up their and EBASCO's construction QA staffs. LP&L doubled the staff of its construction

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QA group. EBASCO raised its QA numbers from 10 to 17 and added another 30 record reviewers.

Although LP&L stoked up its QA crew in the beginning of 1982 and the period that followed, they had been informed of the problems long before. According to George "Les" Constable, the NRC's resident inspector at Waterford, LP&L "didn't perceive" the situation as problematic. "They argued very strongly that what they were doing was saving their consumers money," Constable told *Gambit* last week, "because they didn't need to have all those layers of quality control. That's what they hired EBASCO to do. That was their standard argument."

How many errors in quality are now covered with cement or hidden behind insulation?

According to Constable LP&L's actions were all legal, as long as they're the "bag holder." LP&L did finally discover that breakdowns had occurred in a number of areas, Constable said, but "we still cited them for allowing it to happen in the first place because some of the problems had gone through several layers on inspection."

In other words, the quality insurance inspectors for the subcontractors, the contractors, the prime contractor (EBASCO), LP&L and the NRC failed to discover numerous instances of substandard construction work in four of the reactor's most critical safety systems. What else did they miss?

"I guess it just comes down to a philosophy difference," Constable finally observed. "LP&L hired EBASCO to build the plant for them and to do the quality inspection of the plant."

The unanswered questions in all this revolve around money and safety. How much has LP&L's insistent failure to follow the advice of its consultants and the urgings of NRC officials concerning the inadequate size of Waterford's quality assurance staff cost in terms of re-work and delays in completion of the plant? How many errors in quality are now covered with cement or hidden behind insulation or lost in the bowels of the plant's conduit or... or what? What is the danger to the public?

According to Dr. James MacKenzie of the Washington D.C.-based Union of Concerned Scientists, a group of primarily Ph.D. refugees from the nuclear power industry who now oppose it, the consequences of poor QA can be very serious. "The technology really requires uncompromising quality everywhere," MacKenzie told *Gambit* in a telephone interview, "in the design, in the construction of the plant and the components that go into it. To the extent that a utility fails to maintain this program it is just jeopardizing the people around it. As soon as an incident occurs, whether it is a valve or a pump or whatever that breaks down, then the chickens are going to come home to roost. The safety of the public requires a very thorough quality assurance program."

MHB's Richard Hubbard shares MacKenzie's concern. "Anytime there are allegations made that the quality requirements are not being met the public has concern," according to Hubbard. "You do all these analyses of accidents and so forth, but all those analyses are based on things working the way they're supposed to and being designed correctly. If you find out that the design was not implemented properly or the construction that was supposed to be done in a certain way wasn't, then all the assurances you have are meaningless."

Gary Groesch of Citizens for Safe Energy, is concerned about the vision of Waterford's quality assurance program outlined by the NRC disclosures and other documents. "Who knows what kind of plant LP&L has at Waterford?" Groesch told *Gambit*. "LP&L doesn't know. With that kind of quality assurance program they couldn't."

LP&L of course takes exception to Groesch's contention that they couldn't know whether or not Waterford III is safe. According to plant manager Dave Lester, a product of Admiral Hyman Rickover's nuclear navy, there are systems on top of systems on top of systems at the plant, all designed to prevent accidents. Lester spent part of last week running the plant through mock emergency operations. He is convinced that the odds of an accident happening at Waterford are off the chart. "So many things have to go wrong at once," he said, "so many things have to break down at the same time, it's just inconceivable."

Lester also believes that the fact that the problems with the emergency cooling system were discovered during the audits conducted by the operations quality assurance staff and further nailed down by the construction QA staff is proof that the plant's cross-checking system works. Admittedly, it would have been better if they had been discovered earlier, Lester said, but the important point is that they were caught. And, he cautions, there were several other layers of tests yet to be conducted after the audits that finally did disclose the trouble in the emergency cooling system.

Richard Hubbard has a different view. "You test and inspect along the way," Hubbard said. "Some things become impossible to test or inspect later on because you pour concrete around it or you put insulation over it or things of that sort and it makes it very difficult to go back and take a look. So if you've had a real breakdown along the way there are some things that are very difficult to know the quality of."

"There is a very large economic aspect to this," Hubbard continued. "Catching it that late in the cycle means that there's more delay... and that costs money. There are severe economic consequences for not catching these problems in a timely fashion." ■

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Why All The Delays?

Louisiana Power and Light Company President Jack M. Wyatt, speaking for LP&L's executive suite, is convinced that Waterford III's mounting cost can be laid directly at the feet of the people who intervened in the Waterford's initial attempts to obtain a construction permit.

"We believe that if it were not for the lengthy delay in obtaining the construction permit, 30 months, Waterford-III would be operating today at the capital cost less than $1 billion," Wyatt said last August when LP&L announced an additional delay in Waterford's completion date and another cost increase to the tune of $500 million. "Had there been no delay in obtaining the construction permit the plant would have been completed prior to the myriad of regulatory changes and the increasing difficulty in constructing a nuclear power plant during a period of record inflation."

"Federal regulatory influences relative to safety, environmental and legal issues with associated uncertainties in the inter-relationships have been the primary cause of at least $1 billion dollars of the presently estimated cost of Waterford III," Wyatt added.

Not everyone agrees.

Congress, in fact, takes specific issue with Wyatt's contentions in an October, 1981 report of the House Committee on Government Operations. "Unforeseen difficulties in managing this complex and sophisticated technology (nuclear power), unanticipated problems in raising the necessary capital and plain old mistakes by utility management are the real reasons for construction stretchouts, no matter how attractive it might be to scapegoat the NRC and its processes for lagging construction schedules."

Specifically addressing the case of Waterford III the committee report laid 27 months of construction schedule slippages for Waterford at the feet of LP&L for a variety of reasons. As soon as LP&L received its construction permit, according to the report, the utility announced a two-month delay in construction startup to deal with a lengthy antitrust proceeding. In February, 1976, according to the report, LP&L announced another 15 month revision of Waterford's completion schedule, based on what LP&L told the NRC was a more "realistic" evaluation of its construction schedule. In 1978 LP&L again moved the plant's completion date back by six months to reflect "a more realistic and precise" construction schedule. In January, 1981, LP&L again revised its completion date, moving it back another five months, this time without providing the NRC with any whys or wherefores.

LP&L's latest announced delay was last August, when Waterford's schedule slipped at least another six months, bringing the total slippage in the plant's completion date following LP&L's receipt of a construction permit to at least 33 months. None of these delays, according to a 1978 House Committee on Government Operations, can be hung on the NRC or citizen intervenors.

"To the contrary," the House report claims, "FPC (Federal Power Commission — now called the Federal Energy Regulatory Comission) statistics show that mismanagement is more of a determinant than regulatory changes and citizen opposition in increasing costs." Quoting a 1977 Congressional Research Service study, the report said that "lengthy construction times are less the result of the present federal licensing system than they are of the uncertainty about expected growth in electrical demand and of the financial difficulties of utilities in obtaining capital to fund expensive nuclear construction projects."

Indeed the timing of LP&L's latest rescheduling announcement for Waterford's completion raises the question of mismanagement on the part of LP&L, rather than any of the reasons Wyatt listed when the company announced the delay and another enormous ($500 million) cost overrun.

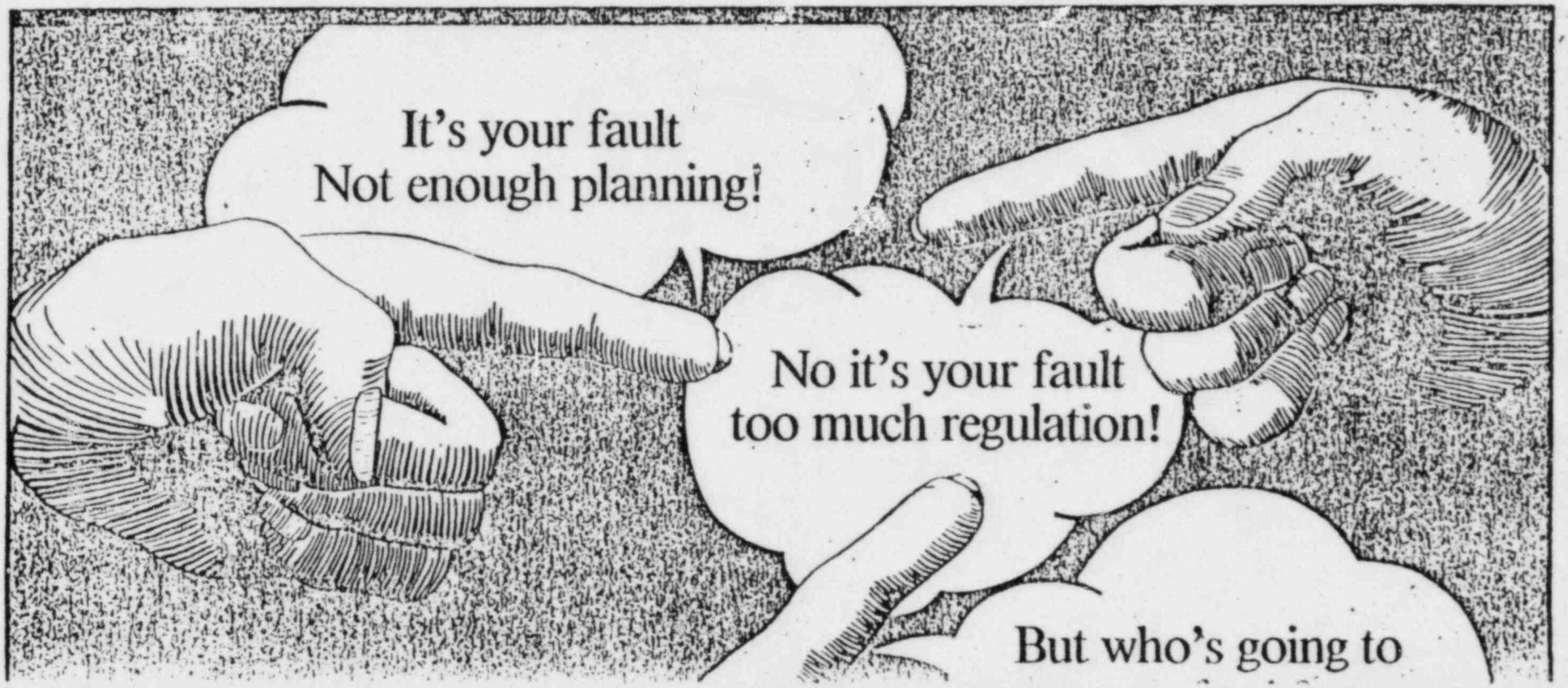
While LP&L officials are not the least bit shy about speculating on the cost impact on Waterford of the actions of the NRC and environmentalists, they are reluctant to put a value on the impact of the breakdown of their own quality assurance program at the plant. What is the relationship between the discoveries in May, June, and July, 1982, or the rejection of EBASCO's work on the four emergency coolant systems, and the August, 1982 announcement of Waterford's re-scheduled date of completion and the additional $500 million cost increase?

Jim Forte and Dave Lester both agreed that they didn't know. Each doubted that the answer could be discovered.

GAMBIT

Who's To Blame?

The utilities blame environmentalists. Consumers blame the utilities. An exclusive report on an unpublished study, actually commissioned by the utilities, which indicates who is to blame for cost overruns. By Ron Ridenhour. Page. 16.



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DATELINE

NRC "Looking Into" Waterford III

By RON RIDENHOUR

Nuclear Regulatory Commission officials, under pressure from a congressional subcommittee, began "looking into" three separate areas of quality assurance-related questions at Louisiana Power and Light Company's Waterford III nuclear power plant on Wednesday, April 20, an assistant to NRC Commissioner Victor Gilinsky has told *Gambit*.

According to James Joosten, technical assistant to Gilinsky, he met with staff investigators from U.S. Representative Morris Udall's Subcommittee on Energy and the Environment on Tuesday, April 19, to discuss possible problems in the quality assurance program at Waterford, located 25 miles upriver from New Orleans at Taft, Louisiana.

Udall's staff investigators, who confirmed that the meeting occurred, asked the NRC to look into three possible problem areas in the quality assurance program at Waterford:

— a contract dispute between LP&L and the manufacturer of the nuclear reactor at Waterford that may have resulted in a "crippled quality assurance program" during a critical stage of the reactor's design and manufacture, raising serious questions about the unit's safety;

— potential irregularities in the handling of an NRC inspection report and resulting $20,000 penalty of LP&L for the breakdown of its quality assurance oversight program that ultimately led to the rejection of four critical safety systems by LP&L, an NRC order to retain the employees of at least two subcontractors and substantial rework on the four systems at a so-far unspecified cost;

— an unspecified potentially significant construction deficiency.

NRC officials from the Office of Reactor Regulation and the Office of Inspection and Enforcement have agreed to pursue the questions raised by Udall's staff investigators, according to Joosten. Robert Purple, the Deputy Director of the NRC's Division of Licensing, part of the Office of Reactor Regulation, told *Gambit* that he attended the meeting and agreed to pursue the questions that were raised in it, although it is too early to call his inquiry an "official investigation." According to Purple, he is still awaiting a list of specific questions Udall's staffers have promised to provide.

Gambit has learned that NRC officials involved in the inspection of LP&L quality assurance and quality control programs during May, June, and July, 1982, originally intended to impose a larger fine on LP&L for "deficiencies involving QA records and actual construction practices" at Waterford. LP&L executives learned of the larger fine, however, and interceded in the company's behalf, successfully arguing that since LP&L quality assurance officials originally brought the problems cited in the December 6, 1982, inspection report to the attention of the NRC, the fine should be reduced. That process resulted in the $20,000 penalty finally levied against the utility in March, 1983. LP&L sent a letter to the NRC asking that that penalty also be

reduced, urging that it be eliminated altogether

NRC Region IV, the region responsible for dealing with Waterford III, has been the subject of congressional investigations during the last year for allowing targets of NRC investigations to change investigatory reports before they are officially published, a practice that is in direct contradiction of NRC regulations. A staff investigator for Oversight and Investigations Subcommittee of the House Committee on Interior and Insular Affairs, the congressional committee charged with oversight of the Nuclear Regulatory Commission, told *Gambit* that LP&L's intercession to reduce the size of the penalty originally intended to be imposed against the company raises similar questions.

Quality assurance is a complex program the NRC requires all companies involved in the design, manufacture, construction or operation of nuclear power plants, fuel systems or related components to maintain in order to guarantee the safe construction and operation of the plants and protect the public against serious accidents. A study of

An inquiry, not an official investigation

the Waterford III and the surrounding area, for instance, estimated that as many as 96,000 people could die in New Orleans and the area around Waterford if an accident like the one that came within minutes of occurring at Three Mile Island in 1979 should happen at Waterford. Diablo Canyon, Zimmer and Midlands, nuclear power plants in California, Ohio and Michigan that are 100% completed as far as construction is concerned, have never been started up and many predict that they will never operate. The reason: faulty quality assurance programs implemented by the construction permit-holding utilities have raised profound questions regarding their ability to withstand accidents that could lead to substantial loss of life.

Congressional staffers are reportedly concerned that the quality assurance problems specified in the December 6, 1982, inspection report on Waterford may be indicative of far larger problems. NRC investigators have been asked to discover if the inspection report and the reduced fine of LP&L is an attempt to minimize the true proportions of the breakdown in the quality assurance program at Waterford.

Udall's staff also asked NRC investigators to obtain copies of all correspondence between LP&L, EBASCO Services, Inc. and Combustion Engineering detailing the nature of the contract dispute between LP&L and CE over the cost of CE's quality assurance program for Waterford.

Documents obtained by *Gambit* show that Combustion Engineering told LP&L that they would not maintain the NRC mandated quality assurance program for the design and manufacture of Waterford's nuclear reactor and other safety-related components for what is called the nuclear steam supply system unless LP&L met CE's demands for at least $4 million in additional payments. Although Combustion Engineering frequently claimed to be meeting the NRC QA requirements during the dispute which covered a period of at least six and a half years in the correspondence between the companies *Gambit* has obtained, the last letter in the sequence, dated September 16, 1977, tells LP&L that CE has always adhered to the QA standards agreed to between them in their original contract, standards that are far below those required by the NRC. Further adding to the doubts about the adequacy of CE's QA program for Waterford is memo from an LP&L QA auditor repo ing the discovery of serious problems CE's Waterford QA program during Dec., 1976 audit of CE's QA records their Chattanooga plant. According to t memo, Combustion Engineering personn sent to steer the LP&L/EBASCO auditir team away from "sensitive" areas durin the audit brought it to a halt when the discovered the auditors' intention to repor certain deficiencies they were finding.

Officials from both LP&L and Combus tion Engineering have denied that an serious problems ever existed in CE' Waterford QA program, but they have refused to provide requested documentation backing up their assertions as well as refusing to respond to detailed questions *Gambit* has submitted to them concerning the controversy. ■

Quality Assurance In Doubt

By RON RIDENHOUR

Serious doubts about the effectiveness of the quality assurance program under which the nuclear reactor vessel and other critical safety-related components of the Waterford III nuclear power plant were built are raised by a series of documents revealing a long-standing contract dispute between Louisiana Power and Light Company and Combustion Engineering (the company which built the reactor itself), *Gambit* has learned.

The dispute peaked during a nine-month period in 1976-77 when LP&L tried repeatedly and unsuccessfully to get Combustion Engineering to certify that its quality assurance programs met existing standards of the Nuclear Regulatory Commission. CE refused to give that certification because, they claimed, their contract with LP&L, originally signed as early as 1970, was keyed to lower QA standards. CE wanted LP&L to pay for increased QA supervision, in an amount apparently between $2 million and $4 million.

Officials of both LP&L and CE say that the disagreement was purely one over money, and that both sides were playing "hardball" over contract differences, but that it made no difference in the actual QA program, which both companies insist was always up to NRC standards. Some of the documents in the contract dispute seem to support those claims, while others suggest that there is doubt about what actually happened.

A memorandum issued by an LP&L Quality Assurance auditor late in 1976 came to the alarming conclusion that "there exists a real possibility of a crippled and/or ineffective Quality Assurance program within CE and its fabrication subsidiaries which are providing safety-related items for the Waterford III project. I also believe that there is a potential significant

[Nuclear Steam Supply System]. Finally, I believe that there are ample indications that CE management has directed CE personnel [including QA personnel] to administer, enforce, and/or negotiate the contract and supplements even at the expense of Quality Assurance and/or Design Engineering."

The language of the memorandum is important because under law the utility is required to report any potentially significant deficiency in design or construction to the Nuclear Regulatory Commission, including any breakdown of Quality Assurance. As far as we can determine, no such report was made to the NRC, although it is impossible to reconstruct a full record of events because LP&L officials have refused to provide relevant documents or to answer any of *Gambit's* questions regarding the incidents.

The contract dispute may have existed long before the end of 1976, but it apparently came to a head when LP&L asked CE to provide documentation of its Quality Assurance program for inclusion in an NRC-required Final Safety Analysis Report (FSAR). CE refused, citing the disagreement over the contract, and for almost a year the two companies fenced back and forth over whether CE would certify its QA program and whether LP&L would pay extra for that certification.

We have been unable to determine just how far back the dispute with CE went, but LP&L officials have produced copies of an audit report from 1974 citing CE for failure to acknowledge changing regulatory requirements. That audit, according to LP&L's records, was resolved when CE agreed in 1974 to accept the new standards, even though they were not as yet reflected in the contract between LP&L and CE.

FINAL SAFETY REPORT PROBLEMS

LP&L asked Combustion Engineering, a November 2, 1976, letter to submit a ...t draft of CE's quality assurance pro-...am for Waterford by December 1, 1976, ...inclusion in LP&L's FSAR to the NRC, ...comprehensive document detailing all the ...ograms and procedures undertaken by a ...clear power plant license holder to en-...re safe construction and operation of the ...nt in accordance with NRC guidelines. ...he reactor manufacturer responded to ...at request with a December 7, 1976 letter ...hich said in part: "we are unable to take ...dit at this time for a quality assurance ...ogram which is responsive" to the NRC-...ndated quality assurance programs ...'&L was already committed to imple-...nt under the terms of its NRC-issued ...nstruction permit. Combustion Engi-...ering had been working on Waterford's ...mponents for several years at the time, ...hough how much work was done and ...ich components are involved remains ...lear at this time.

Combustion Engineering's Waterford ...oject Manager, W.D. Mawhinney insists ...another section of the December 7 letter ...d in other communications between the ...ee companies that CE has in fact lived ... to the NRC quality assurance require-...nts, which increased substantially be-...en the 1970 signing of the original con-...ct between LP&L and CE and the 1976 ... period during which these negotiations ...curred. If LP&L wants to take credit for ...at CE effort, Mawhinney writes, then ...ey will have to amend the original con-...ct or suffer the consequences."

LP&L's contract dispute with Combus-...n Engineering concerning quality ...urance revolved around the critical ...estion of who would pay additional costs ...ated by growing Nuclear Regulatory ...mmission QA requirements that came ...o effect between the 1970 signing of the ...iginal contract between LP&L and Com-...stion Engineering and the nine month ...iod of negotiation during 1976 and 1977 ...tlined by the documents now in *...mbit's* possession.

Precisely how much money was at stake ...the time and how it may eventually affect ...e safety and operation of the Waterford ...nuclear power plant remains unclear. ...gures in the LP&L documents, which ...nsists of memoranda and letters ex-...anged within and between Combustion ...gineering, LP&L and EBASCO Serv-...es, Inc., LP&L's prime contractor for ...aterford, suggest that the dollar figure ...ns between $2 million and $4 million.

NO PROBLEMS, SAY COMPANY OFFICIALS

Spokesmen for both LP&L and Combustion Engineering deny that CE's quality assurance program for Waterford ever fell below NRC-mandated QA standards. "We're prepared to say," Kevin Pilon of Combustion Engineering's Connecticut-based public affairs office told *Gambit* last week, "that in all of our work for the Waterford III plant we carried out a quality assurance program that met or exceeded applicable NRC regulations and industry standards."

Both Pilon and LP&L spokesman Jim Fort characterized the sometimes caustic comments exchanged by the Waterford Project Managers for both EBASCO and Combustion Engineering, including threats issued by CE's Mawhinney to abandon the NRC-mandated QA standards altogether if LP&L refused to meet CE's contract demands, as simply "hardball negotiations" between contending parties in a contract dispute.

Precisely how much money was at stake, and how it affects Waterford, remains unclear

"In our view," CE's Pilon told *Gambit*, "it's part of a contract discussion about money owed for services rendered."

LP&L's Fort offered a similar view, saying that "the CE Project Manager — a very capable and competent manager — was, in effect, saying: 'Look, LP&L, you're trying to get more now than was originally contracted for. The contract called for the level of QA which existed at the time of the original agreement. It's unfortunate for you that the QA requirements have been increased by the NRC, but that is not the contractual responsibility of CE. If LP&L wants CE to do more than was contracted for, LP&L will have to pay the extra cost.'"

Fort adds that "the basic reason for the strong stance by CE was that LP&L (through EBASCO) had assumed a very tough posture in assuring (for the protection of the company and its customers) that CE not be overcompensated for meeting new NRC requirements over and above those of the original agreement."

While the contentions of Fort and Pilon that CE's tough talk is a response to LP&L's refusal to ante up for additional QA costs are supported by the documents *Gambit* has seen, their claim that CE met the NRC-mandated QA requirements throughout the period of design and fabrication of Waterford's reactor components is open to question.

NRC STANDARDS

In June, 1970, the NRC first published what has since become the nuclear power industry's bible on quality assurance, a list of 18 quality assurance criteria for nuclear power plants known as 10CFR50, Appendix B. "Quality assurance," according to Appendix B, "comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, components, or system which provides a means to control the quality of the material, structure, component, or system to predetermined requirements." Appendix B's 18 criteria cover detailed definitions of what a quality assurance program is, what design control means, document control, inspections, test controls, audits, etc.

In preparation for applying to the NRC for an operating permit for Waterford, LP&L was required to file their final safety analysis report with the NRC, the comprehensive documentation the NRC requires nuclear power plant owners to submit as evidence that they have complied with all relevant NRC regulations for the construction and operation of the plant. While NRC regulations allow utilities like LP&L to delegate the meeting of these various regulations to the family of contractors who actually design, engineer, fabricate and construct a plant like Waterford, the utility itself is ultimately held responsible to ensure that all federal guidelines are actually fulfilled.

The proof of that complex regulatory process is the final safety analysis report and the quality assurance programs which are designed to ensure compliance with the regulations and the FSAR. The nuclear power industry's most famous bad cases, plants like Diablo Canyon in California and Zimmer in Ohio, plants which will probably never operate even though they are 100 percent complete, are disasters which have been laid directly at the feet of botched quality assurance programs and the failure of the license-holding utility company to adequately oversee them.

CE REFUSES TO CERTIFY QA

Combustion Engineering apparently seized on LP&L's need to submit their Waterford III FSAR to the NRC as the opportunity to resolve what appears to be a

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long-standing contract argument. Although the record represented by the documents *Gambit* has is incomplete, they disclose a nine month running fight between the two companies in which neither the issue of a contract amendment for the added QA costs, nor the issue of which QA standards CE has followed on the Waterford project are resolved.

During the course of the nine month running battle Combustion Engineering takes a number of positions, all of which seem indeed designed to force LP&L to settle their joint contract dispute on terms favorable to CE. Although CE frequently asserts in strong language that they have in fact met the NRC-mandated QA guidelines, they also suggest the contrary position on several occasions. Information contained in the documents *Gambit* has seen states that Combustion Engineering adhered to the quality assurance program "which was implemented under the terms" of the original contract between CE and LP&L, that is to say, CE may have followed a QA program for Waterford that does not meet NRC standards.

The record we have shows the following sequence of events.

THE DISPUTE BEGINS

November 2, 1976. LP&L asks CE to submit documentation of its QA program for inclusion in LP&L's FSAR.

November 10, 1976. CE's Mawhinney writes EBASCO's Waterford III Project Manager, R.K. Stampley, making, according to Stampley, "the serious charge of bad faith on the part of LP&L" over the utility's failure to settle a number of outstanding contract disputes, including the QA issue.

December 7, 1976. CE's Mawhinney writes Stampley, refusing to supply documentation that CE's QA program for Waterford has met NRC guidelines. "LP&L has not expressed to us their intention of amending the contract" to include the upgraded NRC QA requirements, Mawhinney says, "consequently, we are unable to take credit at this time for a quality assurance program which is responsive to" them. He asserts, however, that CE has made a "substantial effort" to develop and implement programs which meet the NRC QA standards.

PROJECT IN JEOPARDY

December 13, 1976. EBASCO's Stampley responds to Mawhinney's November 10 letter, saying that it "jeopardizes the relationship necessary for the successful completion of this project." Stampley goes on to attack CE's claims on a point-by-point basis, shredding most of Mawhinney's claims on the grounds that they are so poorly documented that LP&L/EBASCO has little basis for evaluating them. On the subject of CE's claims for additional compensation for the upgraded QA program, which is only one item raised in the November 10 letter, Stampley again attacks CE's assertions.

"You identify corporate (presumably generic)" [meaning systemwide, *ed.*] "commitments to increased QA requirements made by CE," Stampley chides Mawhinney, "yet state that 'CE is committed to comply to increased quality assurance requirements only where EBASCO or LP&L has directed compliance.' Under these circumstances," Stampley continues, "we must question whether your generic commitments are... relevant to Waterford III... the extent to which CE has adopted escalating Quality Assurance (or Quality Control) requirements in performance of its contract for Waterford III remains unclear and must be substantiated by CE."

The present head of LP&L's quality assurance program said that if he encountered a situationlike the ones described by the auditors he would think in terms of citing the company in an audit report

CONTRACT DISPUTE DISRUPTS AUDIT

December 15-17, 1976. Quality assurance auditors Ed Maloney of EBASCO and R.E. Hastings of LP&L arrive at Combustion Engineering's Chattanooga works to substantiate CE's QA claims. They are met there by John Solury of CE's Windsor, Connecticut, QA office, and Harry Mulliken of CE's Windsor Project Management office. On December 16 the audit was halted when Solury told Mulliken and Hastings that they could not "write up" a discovery of QA program shortcomings in the CE records vault "because it is not covered by an LP&L/EBASCO contract."

During the discussion that followed, according to the memorandum Hastings wrote on December 28 for his LP&L supervisor, A.E. Henderson, it became clear that Solury and Mulliken "were sent from Windsor as ...escorts to 'guide and direct the auditors' and to prevent the auditors from writing up 'sensitive' findings which might eventually get into the public document room.

"Solury, in addition to his QA duties, has contract administration responsibilities (not defined) which appear to be in conflict with his QA responsibilities. (He appeared to be more interested in protecting CE contractually than in providing evidence that LP&L records are being adequately retained.)

"CE's position was that we could not audit to (the latest NRC QA standards) because the requirements addressed there are over and above contractual quality assurance requirements.

"Harry Mulliken stated: 'We are not sure to what extent we can allow you (LP&L) to take credit for meeting requirements if you do not pay for it.'

"CE management does not believe that CE is responsible for CE statements, commitments and/or responses to AEC (now NRC) questions in the Waterford III PSAR [preliminary safety analysis report —*ed.*] unless CE was issued a contract supplement which affords compensation to CE for implementing the requirements and/or addressing the commitments.

"Some CE PSAR commitments (not specifically defined) may not have been 'worked on' or addressed during design, or if they were addressed, CE will not give details to EBASCO/LP&L for credit in the FSAR prior to resolution of the contract disputes. (Some engineering design and/or calculations may have been indefinitely postponed awaiting supplements to the contract. There was also some indication that CE may decline to defend, at NRC hearings, areas of contract disputes.)"

Hastings "acquired the impression that LP&L and EBASCO management and project personnel were fully aware of the specific areas of contract disputes.

"LP&L may not have been adequately protected in the CE-Chattanooga works contract because:

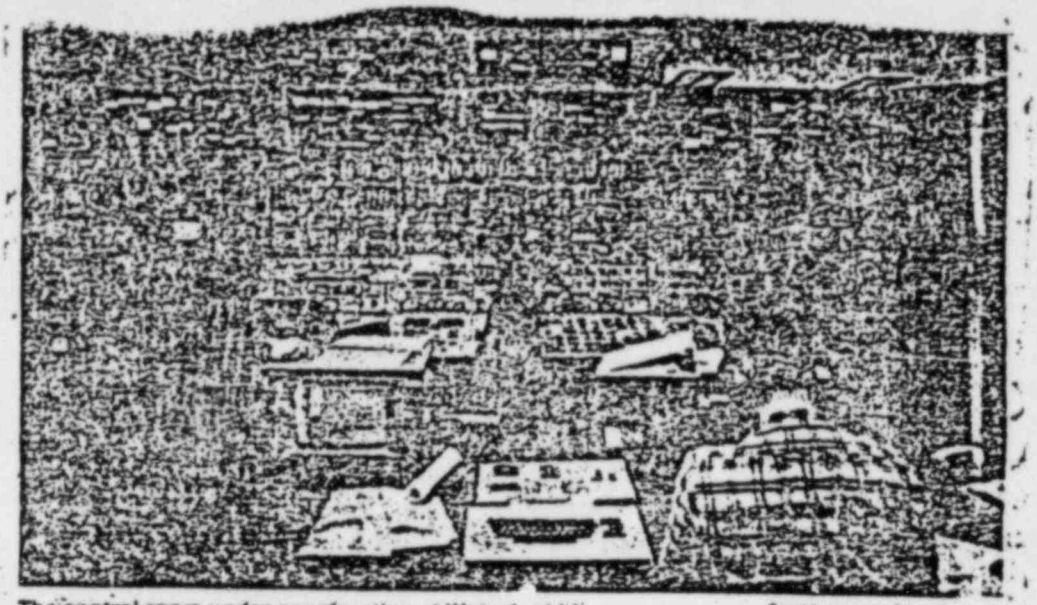
"a. CE-Windsor issued and administered the contract.

"b. The contract between CE and its subsidiary supplier may not detail which 'unsatisfactory items' are to be reported to the customer (LP&L/EBASCO).

"c. LP&L has not examined audits by CE-Windsor of CE subsidiary suppliers.

"No one other than the project manager at Windsor was permitted to tell the auditors which records will actually be retained at Chattanooga for LP&L. (He, of course, was not available during the audit.)

"LP&L/EBASCO personnel on audits at Chattanooga works are not allowed to read/review CE fabrication procedures. (We were also not shown welder qualifications, even after repeated requests...)"



The control room under construction at Waterford III — Gambit photo by David Hammond

The present head of LP&L's quality assurance program, Tom Gerrets, told *Gambit* that if he encountered a situation like the one described by the auditors who went to CE in December of 1976, he would think in terms of citing the company in an audit report and even issuing a stop work order. But he pointed out that in the December 1976 audit LP&L was not the primary auditor. Instead the lead auditor was EBASCO, LP&L's prime contractor, and they did issue an audit report which cited certain specific violations of the "standards for records management. LP&L records do not show whether or not those audit citations were ever resolved, and EBASCO's audit apparently did not mention the questions about quality assurance in general raised by the LP&L auditor's memorandum.

A SERIES OF MEETINGS

April 19, 1977. Stampley and Mawhinney meet to discuss CE's claims for further compensation "for additional quality requirements which have been imposed on CE in performance of the Waterford project which are in excess of contract requirements."

May 31, 1977. CE's Mawhinney writes to EBASCO's Stampley complaining about the burden of the NRC QA standards. "When this contract was signed," he claims, "CE was almost the sole judge of what constituted an adequate quality program. CE believes that the products and systems we delivered at that time indicated that our judgment was adequate..." The letter includes two enclosures, the first of which shows "in table form the original contract quality requirements and compares them to the requirements we are currently meeting in fulfillment of Waterford PSAR commitments." The second enclosure lists in the briefest manner CE's claims for an additional $4 million in quality assurance program claims. The letter also gives LP&L a deadline for agreeing to CE's contract claims. If LP&L does not agree to CE's terms, Mawhinney writes, "CE is willing to and will return to the contractual quality requirements on June 30, 1977. We believe that by doing so, we can curtail a considerable amount of the quality assurance effort for engineering which has not yet been completed. This will decrease CE's costs for programs which LP&L believes to be unnecessary."

June 29, 1977. As Combustion Engineering's deadline approaches, R.K. Stampley of EBASCO hurriedly attempts to arrange a series of meetings between CE, EBASCO and LP&L executives and quality assurance personnel to iron out their problems. He schedules an August 4, 1977 meeting in Windsor, Connecticut between A.E. Henderson, LP&L's Manager of QA, B.R. Mazo, EBASCO's Chief QA Engineer, D.A. Galligan, Waterford III Project QA Engineer for EBASCO, and "top CE QA personnel." Another meeting is scheduled a day earlier, August 3, 1977, so that EBASCO and LP&L QA representatives were to "finalize their identification of QA requirements beyond the scope of the CE-contract." Stampley also promised to issue a "recommendation letter to LP&L with respect to QA claims by July 8, 1977."

CONFLICT UNRESOLVED

September 16, 1977. Efforts of all parties to resolve the dispute have apparently failed as of this date. In a letter written by Mawhinney to Stampley 10 weeks after the passage of CE's June 30, 1977 deadline for LP&L's compliance to CE's contract demands, Mawhinney apparently surrenders the long-held claim that CE has been in compliance with the NRC QA requirements all along. Referring to a 1977 EBASCO letter which states that EBASCO/LP&L has still not received "the input for Chapter 17 (Quality Assurance)" from CE, Mawhinney refers Stampley to his December 7, 1976 letter "which forwarded a description of the Quality Assurance program for Waterford III which was *implemented under the terms of the contract between Combustion Engineering and Louisiana Power and Light*. We remind you that LP&L has not indicated to CE any intention of amending the contract to include" the upgraded NRC quality assurance requirements, "although specific commitments were made by LP&L in the PSAR to implement" them. [emphasis added].

According to LP&L's vice president for nuclear power, Lee Maurin, the utility has now devised a method for dealing with contract disputes of this kind. To avoid what he called "blackmail" by subcontractors, Maurin says the company now pays such demands on invoice, but expressly reserves the rights to recover money through legal recourse. That method, Maurin says, was develped after the dispute with CE was resolved.

Although the record represented by these documents is clearly incomplete, LP&L has refused to respond to a detailed list of questions *Gambit* has submitted to them. LP&L, for instance, has refused to discuss whether or not they ever filed a significant deficiency report with the NRC concerning Combustion Engineering's apparent failure to implement the NRC required quality assurance program; how this issue was finally resolved, if it in fact ever was; if it was finally resolved, how much extra LP&L finally paid CE for the increased QA program; if they in fact did finally accede to CE's contract demands, how CE was able, if they in fact were able, to prove that the CE-administered QA program in fact met the NRC requirements throughout the course of the design and fabrication of the Waterford reactor and its related components.

Is there any danger to the integrity of Waterford's critical safety-related components caused by the contract fight between CE and LP&L and CE's possible failure to implement the required QA program? Is there any danger to the public? These are clearly the major questions, unanswered at this time. ■