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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	Docket Nos. 50-424-OLA-3
	)	50-425-OLA-3
GEORGIA POWER COMPANY	)	
et al.	)	Re: License Amendment
	)	(Transfer to Southern
Nuclear	)	
Vogtle Electric Generating Plant,	)	
Units 1 and 2)	)	ASLBP No. 93-671-01-OLA-3

REBUTTAL TESTIMONY OF

GEORGE BOCKHOLD JR.

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REBUTTAL TESTIMONY OF GEORGE BOCKHOLD JR.

Q. PLEASE STATE YOUR NAME AND POSITION.

A. My name is George Bockhold, Jr. I am employed by Southern Nuclear Operating Company, Inc., as General Manager, Nuclear Technical Services.

Q. HAVE YOU TESTIFIED PREVIOUSLY IN THIS PROCEEDING?

A. Yes. I have testified previously on two occasions. I presented prefiled testimony on April 19, 1995, on diesel generator reporting issues, and prefiled testimony on June 2, 1995, on diesel generator air quality statements. My professional qualifications were appended to my prior, prefiled testimony on diesel generator reporting issues and were admitted into evidence as GPC Exhibit II-20.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY NOW BEING PROVIDED?

A. The purpose of this rebuttal testimony is to address a number of assertions made in the Prefiled Testimony of Allen L. Mosbaugh, as well as in his cross-examination. Specifically, I address two meetings in January, 1990, which he mischaracterizes as targeted at him for raising safety concerns and several statements which he attributes to me; the actions which I took when I became aware that a Plant Review Board (PRB) alternate member felt intimidated by me (page 7); the handling of Mr. Mosbaugh's Quality Concern regarding the

FAVA microfiltration system (page 8); Mr. Mosbaugh's assignment after Mr. Greene's return to his Assistant General Manager - Plant Support position (page 12); statements which I made to the PRB in the drafting of the August 30, 1990 letter to the NRC (page 15); whether outage schedule was given priority over, or detracted from, Georgia Power's root cause evaluation of the diesel generator failures on March 20, 1990 (page 16); the completeness of the Safety System Performance Indicator (SSPI) data provided to the NRC in early April, 1990 prior to restart of Vogtle Unit 1 (page 21); my knowledge of a maximum number of "successful starts" on April 9, 1990 (page 22); and why an "air blow" was not performed on the diesel air lines to check air quality (page 24). Finally, I address Mr. Mosbaugh's speculation that Mr. Cash's typed list of starts was a back-up slide (transparency) for the April 19, 1990 NRC presentation.

Meetings and Conversations with Mr. Mosbaugh

Q. MR. MOSBAUGH TESTIFIES, ON PAGES 8 AND 65 OF HIS RETYPED PREFILED TESTIMONY, THAT ON JANUARY 19, 1990, SHORTLY AFTER HE SUBMITTED AN ALLEGATION TO THE NRC, YOU HELD A MEETING WITH HIM AND MR. KITCHENS RELATING TO "BACKSTABBING." WHAT WAS THAT MEETING ABOUT.

A. Mr. Mosbaugh's testimony relates to a meeting I held with Mr. Kitchens and Mr. Mosbaugh in January to address improving teamwork and cooperation between the Operations and the Plant

Support organizations that they headed. We had a problem in teamwork between Mr. Mosbaugh and Mr. Skip Kitchens, and between the Operations and the Plant Support organizations, and we needed to rectify the situation.

The lack of cooperation between these two organizations had been a concern for some time. It was one of the main items that the plant staff needed to work on. The situation was a problem, in part, because Mr. Mosbaugh was not working hard enough at bringing the Vogtle organizations together, to develop cooperation and synergy between the departments. He was not asking people how he could help them, how he could support them, how he could resolve problems. Mr. Kitchens was also responsible for allowing the rift between the two organizations to remain without taking action.

Mr. McCoy spoke to me around the end of 1989 or beginning of 1990 about improving teamwork at the plant. He was concerned that the plant organization was not improving and wanted this problem resolved.

Prompted by Mr. McCoy's and my concern, I had a meeting in January, 1990, between Mr. Mosbaugh, Mr. Kitchens, and me to discuss making the organization work together and to tell both Mr. Kitchens and Mr. Mosbaugh that they needed to work harder on such cooperation. This was a management improvement meeting -- a team building session. I did not single out either one of them. We discussed everybody's cooperation, and I asked both of them to talk about what they thought their

personal faults were in management style and how they might improve upon them, to discuss their perceptions, and to "let their hair down." I believe I listed my personality faults first. My objective was to encourage Mr. Kitchens and Mr. Mosbaugh to work better together and to make the Vogtle organization more effective.

Q. WHAT CONNECTION WAS THERE BETWEEN THIS MEETING AND ANY SUBMISSION BY MR. MOSBAUGH OF ALLEGATIONS TO THE NRC?

A. None, there was no connection between this meeting and Mr. Mosbaugh's submission of allegations to the NRC. At the time I did not know or suspect that Mr. Mosbaugh had sent any allegation to the NRC. I don't believe I even knew there was any NRC Office of Investigations ("OI") investigation, until the end of January, when or very shortly before OI arrived on site. Moreover, Mr. Mosbaugh did not submit a Quality Concern regarding the FAVA microfiltration system until after a Plant Review Board vote on February 8, 1990.

Q. DID YOU "CONFRONT" MR. MOSBAUGH ABOUT THE SOURCE OF THE DILUTION VALVE ALLEGATION ON JANUARY 29, 1990, WHEN OI CAME TO THE SITE, AS MR. MOSBAUGH ASSERTS ON PAGE 9 OF HIS RETYPED PREFILED TESTIMONY?

A. No. I did speak with a number of persons on my staff to try to understand what was being investigated. I learned from people that had been interviewed that there was probably an

allegation that Skip Kitchens had opened a dilution valve. I did not know who had made such an allegation. There was some speculation that the OI investigation had been initiated by somebody within the NRC. I may have discussed such matters with Mr. Mosbaugh, but I did not in that time-frame think that Mr. Mosbaugh was involved with OI at all.

Q. DO YOU RECALL STATING TO MR. MOSBAUGH THAT YOU HAD PROFESSIONAL TRAINING IN THE NAVY SAYING "YES, SIR" AND TELLING HIM "IF YOU CAN'T CONFORM AND ACCEPT, YOU NEED TO GET OUT," AS MR. MOSBAUGH ALLEGES ON PAGES 9 AND 65 OF HIS RETYPED PREFILED TESTIMONY?

A. No. I don't remember making such statements, particularly with respect to any allegations that had been made to the NRC, as Mr. Mosbaugh's testimony appears to suggest. I have reviewed the notes Mr. Mosbaugh prepared relating to the meeting at which he alleges that I made this statement. These notes indicate that it was a meeting on February 7, 1990 to discuss a Plant Vogtle reorganization and associated down-sizing. Periodically, I held meetings with all my managers to discuss personnel needs and requirements in every department. This meeting had nothing whatsoever to do with any allegation made to the NRC, any NRC inspection or investigation, or any safety concern.

Mr. Mosbaugh's notes indicate that I made the specific remarks which he attributes to me. While I do not remember

making the remarks, I may well have made some such remarks in this context of organizational change. I did not enjoy discussing the elimination of jobs, but recognized that it was a business necessity -- as did my superiors -- as the Plant moved further away from the period of start-up and a large support staff to a smaller support organization. If Mr. Mosbaugh suggested that he didn't like the reorganization philosophy or particular eliminations, I may well have told him that he needed to learn to accept upper management's directions.

Q. DO YOU RECALL STATING THAT, GIVEN THE VALUE OF GENERATION, SOMETIMES IT'S BETTER TO TAKE THE VIOLATION, AS MR. MOSBAUGH ALLEGES ON PAGE 65 OF HIS RETYPED PREFILED TESTIMONY?

A. I don't remember making such a statement. This would be inconsistent with my approach to plant operations. Such an approach would also be inconsistent with the operating policies voiced by my superiors.

Alleged Intimidation of a PRB Alternate

Q. MR. MOSBAUGH TESTIFIES, AT PAGE 9 OF HIS RETYPED PREFILED TESTIMONY, THAT YOUR ATTENDANCE AT PRB MEETINGS INTIMIDATED AT LEAST ONE MEMBER. DO YOU HAVE ANY COMMENTS ON THIS TESTIMONY?

A. Yes. It was reported to me at one time that Gus Williams, who served as an alternate member on the PRB, felt intimidated by my actions at a PRB meeting. As soon as I heard that, I took

steps to correct this situation. I met with the main PRB members and discussed with them at some length the need for every PRB member to be able to stand up and discuss nis concerns and vote his conscience. I also told them to make sure their alternates understood this responsibility and were able to vote freely, and that if any alternates were not capable of providing candid advice and recommendations, they would need to chose other alternates. I also made Mr. McCoy aware of the concern.

Mr. Mosbaugh apparently submitted the allegation of PRB members to the NRC in the Summer of 1990, before the August, 1990, Operational Safety Inspection. The OSI inspection report documents my March 1, 1990, efforts to assure that my presence at PRB meetings did not influence them and that alternates should be selected who would feel comfortable with this responsibility. I also addressed the difference between professional differences of opinion (which I believed was the case with the FAVA system in this instance) and safety and quality concerns (which are different methods to raise issues of concern separate from PRB discussions). Section 2.7 of the OSI Inspection Report which addresses this issue is attached hereto as Exhibit Q.

Handling of Mr. Mosbaugh's FAVA Concern

Q. MR. MOSBAUGH STATES AT PAGE 11 OF HIS RETYPED PREFILED TESTIMONY THAT YOU TOOK HIS QUALITY CONCERN (CONCERNING THE FAVA MICROFILTRATION SYSTEM) AWAY FROM THE QUALITY CONCERN COORDINATOR. HOW WAS MR. MOSBAUGH'S CONCERN HANDLED?

A. I told Bill Lyon that he had gone far enough with his review of Mr. Mosbaugh's quality concern, because the issues exceeded Mr. Lyon technical expertise and I was obtaining additional technical expertise to handle it. Also, Mr. Lyon had come to me and expressed concern that he was being asked to resolve a quality concern that was submitted by his immediate supervisor, Mr. Mosbaugh, who would prepare his annual performance review. In essence, he was being placed in a position to resolve a concern where the majority of plant managers on the PRB had already voted to activate the FAVA system, but his immediate supervisor opposed the use of the system. I discussed these matters with Mr. McCoy, and we decided not to allow the system to be placed into operation until we had further reviewed Mr. Mosbaugh's concern. We also decided to assign the matter to Paul Rushton, who at the time was Manager of Engineering and Licensing, and who was independent of the PRB's decision. Mr. Rushton also was in a position where he could readily obtain additional engineering support from the corporate office, including Southern Company Services. We also involved the NRC, who I understand reviewed Mr. Mosbaugh's Quality Concern file. A copy of my March 15,

1990, memorandum to Allen (attached hereto as Exhibit R) states that I planned to allow the FAVA system into operation after obtaining any further comments from him, Vogtle management and the NRC, and spelled out specific cautionary measures for its temporary operation (a permanent system from another vendor was already scheduled for a May, 1990 delivery). While we were unable to satisfy Mr. Mosbaugh, we did obtain the NRC's concurrence before we put the FAVA system back into service. I now know, although I didn't at the time, that Mr. Mosbaugh did not view Mr. Rushton and Mr. Mark Ajluni (who analyzed one aspect of the concern) to be independent because of other factors which were documented by Mr. Lyon in a June 20, 1990 memorandum to his file, attached hereto as Exhibit S, stating in part:

> Allen also commented about the inadequacy of an earlier study. He did not feel comfortable with it because of the lack of independence. According to Allen the original A[lternate] R[adwaste] B[uilding] study was performed by Paul Rushton and Mark Ajulina (sic). Both Paul and Mark were aided by George in their placement in SONOPCO. Their friendship goes way back and they will basically cater to Bockhold's needs. Another problem is that neither Paul or Mark have the knowledge or experience needed for Rad Waste. He did feel that Lue (sic) Long was an expert in this field, but, his assessment of the ARB is tainted because it's based on Rushton's old study.

Later in the summer, when Mr. Mosbaugh indicated that his concerns were still unresolved, we asked Lee Glenn of the Corporate Concerns program to review the concerns, again to provide another independent review of Mr. Mosbaugh's concerns. Mr. Glenn reported up to the President of Georgia Power, who was Mr. Dahlberg at the time, and outside of the nuclear

management chain. We asked Mr. Glenn to work with Mr. Mosbaugh to resolve his concerns.

On June 21, 1990, Mr. Glenn and I together met with Mr. Mosbaugh and explained this independent review effort. I told Mr. Mosbaugh that we wanted him to basically work full-time on this concern, giving it his highest priority of writing down and identifying his concerns. I explained that Mr. Glenn would work with Allen to understand the concerns and, then, would attempt to address each one. Mr. Glenn would be the primary concern contact person, I explained, instead of Mr. Lyon which would give some independence to the process. Mr. Glenn explained that Mr. Lyon efforts to that point, including supplemental information, would be reviewed and that the NRC Resident Inspector, Mr. John Rogge, would be contacted to determine whether the NRC wanted to participate in the review of the concerns.

On June 22, 1990, at a meeting which I did not attend, Mr. Mosbaugh was told by Mr. Glenn that Mr. Glenn served as an independent, third party reviewer of Mr. Mosbaugh's concerns, outside of the plant chain of command and even outside the nuclear organization. A transcript of the relevant portion of their conversation is attached as Exhibit T.

I followed up on Mr. Glenn's efforts to assure that issues potentially adverse to safety were being pursued. On July 2, 1990, I asked Mr. Mosbaugh about where he stood with identification of his concerns. He told me that Mr. Glenn was

coming to the plant the next day, and that he was planning to provide him any additional technical concerns. I requested that Mr. Mosbaugh develop a schedule for completing the submission of his concerns and the assignments which he had assumed while reporting directly to me; I explained that we were still working on Manager-In-Training and related assignments.

Mr. Glenn worked on Mr. Mosbaugh's concerns, until Mr. Mosbaugh decided in early July that he wished to pursue the remaining issues only with the NRC. On July 3, 1990, Mr. Mosbaugh indicated a reluctance or hesitancy in identifying his additional concerns to Mr. Glenn; on July 6, therefore, I directed him to notify the NRC of any concerns which he was withholding. I had already discussed with the NRC Residents the fact that he had concerns which he would only discuss with them, attached hereto as Exhibit U. In response, Mr. Mosbaugh wrote me a memorandum on July 13, 1990 in which he stated his conclusion that "internal processes" were not effective and that, henceforth, he would take his concerns to the NRC. "I think it appropriate that I continue to take direction from the NRC as how to best resolve my safety concerns," Mr. Mosbaugh wrote. Mr. Mosbaugh's memorandum has been admitted into the record as Intervenor's Exhibit II-179.

Mr. Mosbaugh's Assignments After Mr. Greene's Return

Q. MR. MOSBAUGH STATES, ON PAGE 38 OF HIS RETYPED PREFILED

TESTIMONY, THAT DURING A FEBRUARY 23, 1990 MEETING TO DISCUSS HIS ANNUAL REVIEW, YOU TOLD HIM THAT IT MADE NO SENSE SENDING HIM TO SENIOR REACTOR OPERATOR (SRO) TRAINING. DO YOU RECALL THIS CONVERSATION?

A. Yes. Mr. Mosbaugh had previously mentioned to me that he planned to retire shortly. During his annual review, we discussed his plans, and he again told me he intended to retire early. I told him that if this were the case, sending him to SRO school might not make sense. SRO school involved a considerable investment of time and money, and I was concerned we might lose this investment if he went to SRO school and then retired shortly thereafter. I subsequently raised this matter with Mr. McCoy.

Several months later Mr. Mosbaugh expressed interest in SRO school as his first preference for positions. Thereafter his first preference was granted when he gave Mr. McCoy assurances that he would stay with Georgia Power for several years after completing the SRO training.

Q. MR. MOSBAUGH ALSO TESTIFIES ON PAGE 38 OF HIS PREFILED TESTIMONY THAT HE RECEIVED A LETTER FROM YOU ON MAY 10, 1990, REMOVING HIM FROM THE PRB. WOULD YOU PLEASE EXPLAIN THAT ACTION.

A. I had reconfigured the PRB in 1989 so that it consisted of the line managers, because from a management perspective these were the individuals I wanted involved. My selection of

individuals was consistent with plant procedures as well as our commitments to the NRC. I had made Mr. Mosbaugh the Vice Chairman and a member of the PRB during Mr. Greene's absence because Mr. Mosbaugh was acting as such a line manager, i.e., he was the acting Assistant General Manager -- Plant Support. When Tom Greene returned to duty from SRO school and reassumed his position as Assistant General Manager -- Plant Support, I had him assume the Vice Chairman position on the PRB, because he was now in this senior line management position. I never considered creating any special PRB position so that Mr. Mosbaugh could remain on the Board after Mr. Greene's return. My decision was based solely on maintaining what I considered as the proper composition of the PRB.

Q. MR. MOSBAUGH ALSO TESTIFIES THAT YOU RELIEVED HIM IN ALL CAPACITIES FROM HIS JOB AND DID NOT RETURN HIM TO THE ENGINEERING MANAGER POSITION HE HAD HELD IMMEDIATELY PRIOR TO BEING MADE ACTING ASSISTANT GENERAL MANAGER -- PLANT SUPPORT. WHY DIDN'T YOU MAKE MR. MOSBAUGH THE ENGINEERING MANAGER WHEN MR. GREENE RETURNED?

A. Shortly before Mr. Greene returned to duty, near the end of April, 1990, I asked Mr. Mosbaugh what job he wanted. On or about April 30, 1990, Mr. Mosbaugh gave me a handwritten memorandum listing his job preferences, with SRO training at the top. He stated in his memorandum that he did not prefer to move backwards in scope of responsibility or level. A copy

of this memorandum is attached as Exhibit V.

After Mr. Greene returned from SRO school, I assigned Mr. Mosbaugh to work on several special projects while we going through the selection process for the next session of SRO training. I wanted to finish the SRO selection process before I made decisions about new jobs. These projects that I assigned to Mr. Mosbaugh during this period were important to me. In addition, I solicited his selection of specific tasks which had been identified as nagging problems; this was an opportunity for Mr. Mosbaugh to show his leadership in resolving problems, it was not a "make-work" position. I thought at the time that giving Mr. Mosbaugh these assignments while final decisions on SRO school were being made was consistent with his wishes, as expressed in his April 30, 1990 memorandum, not to move backward in level. Also, the Engineering Support Manager position was already held by Mr. Michael Horton.

Drafting the August 30, 1990 Letter

Q. ON PAGE 60 OF HIS RETYPED PREFILED TESTIMONY, MR. MOSBAUGH STATES THAT ON TAPE 184 YOU TOLD THE PLANT REVIEW BOARD TO LEAVE PARTS OF THE AUGUST 30, 1990 LETTER TO THE NRC THE WAY THEY WERE WRITTEN IN BIRMINGHAM. WHAT DID YOU TELL THE PRB??

A. What I said during that meeting, on pages 3 and 10 of Tape 184 (Intervenor's Exhibit II-68), was in the context of drafting the August 30, 1990 letter to the NRC. My statement in 1990

was the following:

> You know, the standard English context of writing a good letter is you put the purpose in paragraph one, then you put the facts, and then you put the summary in the last paragraph. That's you know, 101 standard best way to write a letter. And yeah, we can restart, rewrite this letter from scratch if you want. But I don't believe that has anything to do upon the goodness or badness of this letter, or whether it's factually correct or not. . . That was my side comment, and if Birmingham likes this letter written this way, I don't -- that's what we should do.

Q. WHAT DID YOU MEAN BY THESE REMARKS?

A. I meant that I didn't think that we should rewrite the letter just to improve the style. I felt we should make any changes needed to make the letter accurate and materially complete, but I wasn't interested in rewriting the entire letter just because someone didn't like its organization or thought they could improve its writing style.

Q. DID YOU MAKE ANY OTHER COMMENTS ABOUT STYLE?

A. Yes, I stated:

> I mean, English-wise, it's better to mix up the words, than (sic) to be technically correct. Say you're an engineer and you use the same term over again. Good thing you're an engineer and not an English major . . .

See Staff Exhibit 19; Intervenor Exhibit II-68, Tr. 3.

Q. WHAT DID YOU MEAN BY THIS STATEMENT?

A. Someone had commented that we used the word "confusion" twice in the same paragraph. I responded and, with my statement,

meant that if one were an English major, it might be preferable to avoid using the same word twice; but since we were engineers, we should not elevate style over accuracy. In other words, English majors are expected to use synonyms to avoid repeating words, while engineers are expected to be technically correct and the use of the same word multiple times is fully acceptable. I was not suggesting that something less than accuracy was acceptable in this correspondence.

Alleged Push to Restart Plant Vogtle

Q. ON PAGE 27 OF MR. MOSBAUGH'S RETYPED PREFILED TESTIMONY, HE ASSERTS THAT GEORGIA POWER MANAGEMENT AND OUTAGE PERSONNEL PUSHED THE SCHEDULE TO RESTART PLANT VOGTLE. AS A RESULT, HE ALLEGES, ROOT CAUSE TESTING AND ANALYSIS DID NOT GET SUPPORT BECAUSE OUTAGE ACTIVITIES WERE GIVEN TOP PRIORITY. IS THIS ACCURATE?

A. No, it is not. At the time of the Site Area Emergency Unit 1 was in an outage. As would be expected after this event, outage personnel, factoring in appropriate diesel generator testing and analysis activities, developed a "recovery" or "restart" schedule. I did not "push" the restart schedule at the expense of root cause testing and analysis. What I wanted was a purposeful review and specific, thought-out plan to address the many activities which had to be addressed in a logical, orderly manner. This sort of schedule is exactly the

kind of effort which is expected in such a situation -- the absence of a recovery schedule would have been imprudent.

With respect to diesel generator testing, the personnel who were working on the diesels had all of the resources necessary or desired at their disposal to determine the root cause of the March 20, 1990, diesel failures. This included vendor representative support, corporate technical support, and whatever overtime efforts they considered prudent. Mr. Mosbaugh simply is incorrect in asserting, on page 28 of his testimony, that schedule pressure affected the determination of the root cause of the March 1990 event and the corrective actions taken. Had more time been required to address the diesel generator issues, we would have spent it. But the on-site technical review went as far as it logically and reasonably could have gone: the component (jacket water temperature sensors) which failed had been identified; the component had been recalibrated, re-installed or replaced, and tested; and special test starts had reproduced alarm conditions which were very similar to those experienced on March 20. Although the identification of the specific failure mechanism would have to await the disassembly and inspection and testing of Calcon sensors at the independent Wyle test lab, there was no reasonable basis for not returning Unit 1 to operation based on the knowledge which we had at the time.

In support of Mr. Mosbaugh's idea that Georgia Power did not have a legitimate, good-faith probable cause of the diesel

generator trips, Mr. Mosbaugh argues on page 27 of his retyped prefiled testimony that as of April 7, 1990 - more than two weeks after the Site Area Emergency - that "it was pure speculation" that two of three jacket water temperature (Calcon) sensors would have "misoperated" on March 20, 1990. What he ignores is the testing and analysis between March 20 and April 7. For example, on April 5, 1990, in a conversation with the IIT in which Mr. Mosbaugh and other Vogtle representatives participated, I explained that, based on some Instrumentation and Control manipulations, only a slight downward shift of sensor trip setpoint resulted from an increasing rate of temperature rise in the sensed water media. IIT Document 200, pages 14-18, attached hereto as Exhibit W. At the same time, the actual jacket water temperature changes, over time, were being monitored to determine if a "hot spot" of hot water could have been sensed. Mr. Mosbaugh observed, and commented to the NRC, that actual temperatures in the jacket water were fairly homogeneous, with a variation of only seven to ten degrees (page 19); the "slug of water" theory did not seem credible (page 27). As he stated:

> We are not seeing substantial shifts of the temperature probe with rates of change in temperature and then it's tripping in the 190 type temperature range, and our observations that the system is barely (sic) homogeneous and that the hot spots are in the 170 degrees range, we think those are sufficiently far apart that right now it doesn't look like the slug of water theory is what is causing any tripping (IIT 200 at 27.)

Because the site had already conducted "simulated trip" testing on high jacket water temperature sensors which

reproduced the annunciations of the second 1A diesel trip on March 20, we informed the IIT that we proposed to have an independent lab test the quarantined sensors which had been on the 1A diesel when the event occurred. Lewis Ward, in the Birmingham corporate office, would have the lead and the IIT could contact him directly (page 30). The IIT team leader felt that this testing approach "sounded good" to him, and the NRC Region II representative stated that the Region was "fully onboard" with this approach (pages 33-34). The next day, April 6th, the NRC, after discussing the 1A diesel jacket water testing and scheduled functional test (See IIT Document 203 at pages 24-25, 31 attached hereto as Exhibit X), observed that the specific failure mode of the switches was not due to the rate of temperature change during calibration, that some particulates in the sensors could impact their operation and that setpoint drift was a possibility (page 31). "How the sensors are calibrated" might also lead an understanding of the causal mechanism, the IIT team leader suggested; Georgia Power was to determine the specific test program for seeking this mechanism. (IIT Document 203 at pages 32-33.)

Mr. Mosbaugh, then, is overly selective in stating that "actual jacket water temperatures and the sensor 'as found' calibration checks did not support this speculation." Mosbaugh Prefiled at 27. By April 7, actual jacket water temperature measurements had demonstrated that the March 20 trip was not associated with true high temperatures. And we

had much more information than the calibration checks, which were made using Georgia Power's existing calibration procedures. By April 7 the 'as found' calibration checks didn't point to the probable cause of the event as much as other observations made on the 1A switches such as reflected in Mark Briney's April 3rd memo (GPC Exhibit II- 76, Bockhold Exhibit L) and the alarm annunciations replicated during diesel trip testing when the engine was started with two sensors purposefully venting (See IIT Document 205, page 6-8, attached hereto as Exhibit Y). Through our efforts, we had narrowed the focus to a particular component, and we thought the Wyle testing would pin down a specific causal mechanism. We had recalibrated all the sensors, returned the diesel generators to operable status, and shown that we were ready to return Unit 1 to operation.

Safety System Performance Indicator Data

Q. ON PAGES 100-101 OF MR. MOSBAUGH'S RETYPED PREFILED TESTIMONY, HE STATES THAT THE SAFETY SYSTEM PERFORMANCE INDICATOR ("SSPI") DATA FOR THE VOGTLE DIESELS WAS OMITTED FROM THE DOCUMENT PRESENTED TO THE IIT ON APRIL 2, 1990. HE ALSO SAYS ON PAGE 103 THAT YOU WERE AWARE OF THE 1990 SSPI DATA AT THAT TIME. DO YOU HAVE ANY COMMENT ON THIS TESTIMONY?

A. Yes, I do not remember whether Gus Williams, who collected the SSPI data, showed me the 1990 SSPI data, told me about the data, or simply indicated that it was not useful. Therefore,

I do not recall whether I, Mr. Williams or others omitted the 1990 data. However, if I had been aware of that specific data, I do not believe I would have felt it appropriate to present that data to the NRC. First, it would have only covered two months in 1990. Two months of data would not have been meaningful, and there would not have been any corresponding industry average for this period to compare it against. If I had tried to use the specific data, probably the most appropriate way to have presented it would have been to prepare a rolling 12-month average. Again, however, we would not have had comparative industry data for the same period. Second, my purpose in presenting the SSPI data for 1987-1989 was to show that, historically, the Vogtle diesels had been fairly reliable when compared to industry experience. The 1987-1989 data were sufficient for that purpose.

Third, the SSPI data is a general measure of overall diesel reliability, and not informative of the specific problems which have affected reliability. Additional review of the data behind the indicator would be necessary for that insight. By April 2, the NRC had been on the Vogtle site for more than a week after the Site Area Emergency and knew about the specific 1990 diesel generator activities, including problems observed in starting or running the engines. A two-month calculated indicator would be of little relative meaning as compared to this more specific, detailed information.

Further, by April 2 the reliability problems associated with the diesels was viewed as specific to the Calcon sensors. I expressed this when, on April 2, the IIT team leader's questioned "...is there anybody here that can describe the [sensor] history and what it sort of tends to suggest about reliability or what might have gone wrong with these sensors?" I responded:

> Well the way we summarize it was, you know, we have problems, have had problems associated with these sensors during initial startup phases of the engine and during overhaul times, and we have not had problems in between overhaul periods of time. You know, we've had reliable starts on the engines in between those periods of time. So that's a general summary. (See, IIT Document 168-2, pages 14-15). Bockhold M, GPC Exhibit II-77.

The team leader stated that he was "getting the impression that the jacket water temperature switches are not that reliable and I'm surprised you haven't seen that in some of your monthly [surveillance] testing." I repeated my observation of the timing of sensor problems and the reliability between overhaul periods:

> . . . when we've come out of overhauls basically associated with engine runs around overhauls, we've had problems and we've replaced switches and we've gotten good switches in that have run until the next overhaul . . . (IIT Document 168-2, page 18)

Several days later, on April 4, I once again acknowledged that we had trouble during overhaul times, but during normal plant operation and in between overhaul times, the switches have been reliable. (See, IIT Document No. 168-1, page 60, Bockhold O, GPC Exhibit II-79). Consequently, the NRC was aware of sensor problems outside of operational periods (i.e.,

while the diesels were in overhaul).

Knowledge of a Specific Count Number

Q. ON PAGE 44 OF HIS RETYPED, PREFILED TESTIMONY, AND ON AUGUST 8, 1995 (T. 10407-8) MR. MOSBAUGH STATES THAT, BASED ON A DISCUSSION IN WHICH YOU PARTICIPATED ON APRIL 2, YOU KNEW OR SHOULD HAVE KNOWN ON APRIL 9 THAT THE MAXIMUM "SUCCESSFUL" START COUNT WHICH YOU COULD CLAIM FOR DG1A WAS 12. HOW DO YOU RESPOND TO THIS POSITION?

A. Mr. Mosbaugh is wrong. His basis is one of his tape recordings which does not reflect the entire relevant conversation. The NRC had an official court reporter attend the meeting which Mr. Mosbaugh taped, and IIT Document 168-2 (Bockhold Exhibit M, GPC Exhibit II-77, dated April 2, 1990) reflects the transcription of the entire meeting. Intervenor's Exhibit II-45 (Tape 27, Segment #3) corresponds to IIT Document 168-2, page 47, line 12 through page 48, line 3. A comparison of the two demonstrates that, contrary to Mr. Mosbaugh's version of events, Mr. Stokes first suggested he was "not sure precisely" of the number. He then confirmed that the diesel had been successfully started "maybe eight times" while the Cooper vendor representative, Mr. Owyoung, was there. In addition, Mr. Owyoung stated that he knew of "at least six times" when "we" witnessed the diesel testing. Mr. Mosbaugh incorrectly identifies Mr. Holmes as the person making this statement (Compare IIT Document 168-2, page 47,

lines 19-20 with Intervenor Exhibit II-45). Moreover, Mr. Mosbaugh's transcript is materially incomplete. My knowledge of the number of 1A diesel starts after replacement of the sensors at the time is reflected on pages 43 and 44 of the IIT Document, when Mr. Owyoung and Mr. Stokes answered my question of "how many starts did we do on the A diesel after" the sensors were changed out. Both confirmed a number of successful starts on the order of a dozen, successful starts on April 2 (i.e., "about a dozen" - Mr. Owyoung and 14, 15 "something like that - Mr. Stokes"). In addition I was aware that the 1A diesel was started several times after April 2. For example, as reflected in IIT Document 203, pages 23-25 (Exhibit X), I discussed with the IIT members a planned jacket water test start and a functional test start on the 1A diesel for April 6. On April 7, the IIT team discussed with us a total of three (3) jacket water test starts (IIT Document 205, pages 3-4, Exhibit Y). Given these additional start activities, I reasonably believed the "successful start" count of 18 for the 1A diesel.

Air Blow of the Diesel Generator Air Lines

Q. WHO MADE THE DECISION TO NOT "AIR BLOW" THE DIESEL AIR LINES?

A. I do not specifically recall. I do know that, at the time the suggestion to air blow the air lines was made on April 4, both of the Unit 1 diesels had been declared operable, and our focus was on the Calcon sensors as the probable cause of the

March 20th diesel generator trip.

Q. MR. MOSBAUGH TESTIFIED THAT IN YOUR CONVERSATIONS WITH MR. McCOY AND OTHERS ON APRIL 4, YOU HAD ADDITIONAL INFORMATION ABOUT WHAT THE ROOT CAUSE OF THE DIESEL TRIP WAS, BUT DIDN'T WANT TO SHARE IT AND THAT YOU MOVED THE CONVERSATION ELSEWHERE, AWAY FROM THE AIR BLOW SUGGESTION. TR. 9601-03. DO YOU HAVE ANY COMMENTS ON HIS TESTIMONY?

A. Yes, this is nonsense. I am aware that Mr. Mosbaugh makes these "inferences" based upon a small portion of one of his tape recordings (Tape 34, Intervenor Exhibit 110A). The conversation on April 4, 1990 occurred prior to the development of a specific plan to inspect and test the Calcon sensors which were in quarantine. In the portion of the transcript submitted by Intervenor, Mr. Kochery and Mr. Burr indicated that if debris was in the sensors and that affected the sensors operation, it would be readily observable. Mr. Mosbaugh suggested an "air blow" of the lines, apparently to eliminate air quality particles as a potential cause.

Mr. Mosbaugh is incorrect in his inference that I "moved the conversation elsewhere" to avoid discussing the proposed air blow. As the further tape-recorded conversation reveals, different people were proposing different test methodologies to pursue various root cause theories and I was concerned about the organization of the various planned

activities and our resources, I said:

> The problem is we have different types of people doing different types of tests and . . . and . . . their perception of the correct test methodology of what they are used to and what their experience is different. And we have been doing a lot of this in parallel to bring the engines to an operable state. And now we have these quarantine switches that we want to go ahead and do a very rigorous . . . all of us want to do a very rigorous test methodology. And we can't do it with the same people we got still working on the diesels. Well, we can but it all will be four days from now . . . . And that's the organization I need to talk you [Ken McCoy] about.

Tape 34 (Tr. 11-14), Bockhold Exhibit Z. "The organization" which I needed to talk to Mr. McCoy about was the structuring of the activities, including the assignment of the right people to develop the test methodology. This was not an avoidance of Mr. Mosbaugh's suggestion; Mr. Mosbaugh could have directed that the "air blow" be included in the testing activities.

Later, on April 11th, the test methodology on the quarantined sensors was developed and provided to the NRC (See, IIT Document 209, Bockhold Ex. AA, GPC Exhibit II-___). Before April 11th, the air receiver of one of the engines had been visually inspected and it was reported that the air filter on the airline supply was "like new" when changed out. Therefore, although I do not recall a specific decision not to perform an "air blow," additional information indicated that particulates were not being introduced through the air lines into the sensors.

MR. CASH'S TYPED LIST

Q. MR. MOSBAUGH SUGGESTS THAT THE "CASH LIST" WAS MADE INTO A

SLIDE (TRANSPARENCY) OR USED AS A BACK-UP SLIDE FOR THE PRESENTATION ON APRIL 9. (TR. 10400). WAS IT?

A. No, not to my knowledge. The transparencies made for the presentation were retrieved by my former secretary, Gloria Walker, when I was temporarily assigned to a position at EPRI in Palo Alto, California. Those files did not include the "Cash list" or transparencies of the "Cash list."

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

In the Matter of GEORGIA POWER COMPANY, et al.	)	Docket Nos. 50-424-OLA-3 50-425-OLA-3
(Vogtle Electric Generating Plant, Units 1 and 2)	)	Re: License Amendment (Transfer to Southern Nuclear)
	)	ASLBP No. 93-671-01-OLA-3

SERVICE LIST

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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Administrative Judge
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Atomic Safety and Licensing Board
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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	Docket Nos. 50-424-OLA-3
	)	50-425-OLA-3
GEORGIA POWER COMPANY, et al.	)	Re: License Amendment (Transfer to Southern Nuclear)
(Vogtle Electric Generating Plant, Units 1 and 2)	)	ASLBP No. 93-671-01-OLA-3

CERTIFICATE OF SERVICE

I hereby certify that copies of Rebuttal Testimony of George Bockhold, Jr., dated August 21, 1995 were served on all those listed on the attached service list by hand delivery or, where indicated with an asterisk, by express mail this 21st day of August, 1995.

John Lamberski

GPC EXHIBIT II-____
BOCKHOLD EX. R

Interoffice Correspondence

Georgia Power

DATE: March 15, 1990

RE: **FAVA Microfiltration System**
Log: NOV-00424

FROM: George Bockhold, Jr.

TO: W. F. Kitchens
A. L. Mosbaugh

Today, I received concurrence from the NRC (Ken Brockman) via telecon to place the FAVA system in operation. The hold tag isolating the system may be released after Operations verifies the following:

1. Procedures for operating FAVA require an operator to be in attendance for the entire duration of system operation.

2. All hoses going to and from the system have been checked and meet requirements of Regulatory Guide 1.143.

3. The cover over the unit is securely fastened when FAVA is in operation to ensure that if a spraying leak develops, it will be contained in the concrete vault.

The NRC asked us to consider the design of the ARB walls and whether or not a design modification should be made to reduce the potential of wall leakage in the event that a hose leak developed and sprayed the walls? Engineering is assigned this action item and a REA to Corporate may be appropriate.

J Bockhold

GB/gww

xc: C. K. McCoy
NORMS

GPC EXHIBIT II-____
BOCKHOLD EX. Q

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

NOV 0 1 1991

Docket Nos. 50-424, 50-425
License Nos. NPF-68, NPF-81

Georgia Power Company
ATTN: Mr. W.G. Hairston, III
Senior Vice President -
Nuclear Operations
P. O. Box 1295
Birmingham, AL 35201

Gentlemen:

SUBJECT: VOGTLE SPECIAL TEAM INSPECTION REPORT NOS. 50-424,425/90-19
SUPPLEMENT 1

This refers to the inspection conducted by a Special Inspection Team on August 6 through 17, 1990. Previous correspondence associated with this inspection was transmitted to you on January 11, 1991. As discussed in the Inspection Summary of that document, the results of the allegation followup team would be the subject of separate correspondence. This report includes, in part, the results of that followup team. The inspection included a review of activities authorized for your Vogtle facility. At the conclusion of the inspection, these findings were discussed with those members of your staff identified in the enclosed inspection report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

The inspection teams' review of the allegations identified several additional weaknesses in operational polices and practices. These are identified in the inspection summary of the enclosed inspection report.

The inspection findings indicate that certain activities appeared to violate NRC requirements. The apparent violation associated with failure to provide accurate information to the NRC during the inspection is under consideration for escalated enforcement action. Accordingly, a Notice of Violation for this issue is not being issued at this time, and a response to this subject is not required. However, please be advised that the number and characterization of violations described in the enclosed Inspection Report associated with this subject may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter. We will contact you at a later date to arrange an enforcement conference to discuss this issue.

The additional violation described in this report, references to pertinent requirements, and elements to be included in your response are described in the Notice of Violation.

You are required to respond to this letter and Notice and should follow the instructions specified in the enclosed Notice when preparing your response to the violations. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence. After reviewing your response to this Notice, including your proposed corrective actions and the results of future inspections, the NRC will determine whether further NRC enforcement action is necessary to ensure compliance with NRC regulatory requirements.

In accordance with 10 CFR 2.790(a), a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

The responses directed by this letter and the enclosed Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, Pub. L. No. 96.511.

Should you have any questions concerning this letter, please contact us.

Sincerely,

Ellis W. Merschoff, Acting Director
Division of Reactor Projects

Enclosures:
1. Notice of Violation
2. NRC Inspection Report
   50-424,425/90-19,
   Supplement 1

cc w/encls:
R. P. McDonald
Executive Vice President-Nuclear
Operations
Georgia Power Company
P. O. Box 1295
Birmingham, AL 35201

C. K. McCoy
Vice President-Nuclear
Georgia Power Company
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W. B. Shipman
General Manager, Nuclear Operations
Georgia Power Company
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Waynesboro, GA 30830

(cc w/encls cont'd - see page 3)

cc w/encls: (Continued)
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ENCLOSURE 2

Report Nos.: 50-424,425/90-19, Supplement 1

Licensee: Georgia Power Company
P.O. Box 1295
Birmingham, AL 35201

Docket Nos.: 50-424 and 50-425 License Nos.: NPF-68 and NPF-81

Facility Name: Vogtle Electric Generating Plant, Units 1 and 2

Inspection Conducted: August 6-17, 1990

Team Leader: Chris A. VanDenburgh, Section Chief,
Division of Reactor Inspections and
Safeguards, Office of Nuclear Reactor
Regulation

Team Members: Ron Aiello - Resident Inspector, Vogtle
Morris Branch - Senior Resident Inspector, Watts Barr
Robert E. Carroll, Jr. - Project Engineer, DRP, Region II
Larry Garner - Senior Resident Inspector, Robinson
Neal K. Hunemuller - Licensing Examiner, NRR
Larry L. Robinson - Investigator, OI, Region II
Robert D. Starkey - Resident Inspector, Vogtle
Craig T. Tate - Investigator, OI, Region II
Peter A. Taylor - Reactor Inspector, DRS, Region II
McKenzie Thomas - Reactor Inspector, DRS, Region II
John D. Wilcox, Jr. - Operations Engineer, NRR

Submitted by: Pierce H. Skinner — Oct. 7, 1991
Pierce H. Skinner, Section Chief 3B — Date Signed
Region II, Division of Reactor Projects

Approved by: Alan R Herdt — Oct 3 1991
A. R. Herdt, Chief, Branch 3 — Date Signed
Region II, Division of Reactor Projects

that GPC did not have a basis for their statements and misrepresented the air quality in the licensees written response to the CAL, was not confirmed.

2.6 Reportability of Previous System Outages

An allegation indicated that VEGP failed to immediately notify the NRC as required by 10 CFR 50.72 when VEGP identified that both trains of the containment fan coolers (CFCs) had been previously inoperable at the same time on Unit 1.

Discussion

The inspection team's review of plant records indicated that this condition occurred when EDG #1A was declared inoperable when tape (used when the EDG was being painted) was found on the EDG fuel rack. The tape kept the fuel injector piston from moving and injecting fuel into the EDG. With EDG #1A inoperable, the equipment associated with the Train A was also inoperable. In the process of investigating the installation of the tape, VEGP identified that this condition existed during a period when the Train B containment fan coolers were also in a degraded condition for maintenance.

During the performance of Surveillance Procedure 14623-1, Train B containment fan cooler (CFC) 1-1501-A7-003 failed to start in slow speed. LCO 1-90-560 was initiated at 1:15 a.m. on June 19, 1990, and maintenance on the CFC was initiated. The CFC was returned to operable status on June 19, 1990, at 2:15 p.m. Approximately 9 hours later [on June 19, 1990, at 11:59 p.m. (LCO 1-90-562)], EDG #1A was determined to be inoperable because the tape had been installed on the fuel rack. On July 17, 1990, VEGP issued LER 90-014 to identify the previously unrecognized violation of the LCO in accordance with 10 CFR 50.73.

Conclusion

Based upon the fact that VEGP did not become aware that both trains of CFCs were simultaneously inoperable until after the Train B CFC fan had been returned to service, the immediate notification requirements of 10 CFR 50.72 were not applicable. The allegation that VEGP failed to immediately notify the NRC upon discovery of the previously degraded condition of the CFCs was not confirmed.

2.7 Intimidation of Plant Review Board Members

An allegation indicated that PRB members were allegedly intimidated and pressured by the general manager in a PRB meeting. The meeting occurred in February 1990, to determine the acceptability of the safety analysis for the installation of the FAVA microfiltration system.

Discussion

As discussed in Section 2.1 of this inspection report, several safety evaluations were performed for the installation of a temporary modification which installed the FAVA microfiltration system. Discussions with PRB members indicated that during the review of these safety evaluations, various PRB members had expressed reservations on several occasions concerning the acceptability of the installation of the FAVA system.

Despite these reservations, the inspection team's review of the PRB Meeting minutes associated with this temporary modification identified few instances of the PRB members documenting their dissenting opinions. Specifically, PRB meeting 90-15 (dated February 8, 1990) documented one PRB member's negative vote and dissenting opinions regarding the acceptability of exempting the temporary modification from regulatory requirements and the adequacy of the system's safety evaluation. PRB Meeting 90-28 (dated March 1, 1990) indicated that information and issues regarding the FAVA system's safety analysis were presented to the PRB and that the general manager solicited written comments and questions from other members for resolution. The only other example was in PRB meeting 90-32 (dated March 6, 1990) which identified a dissenting opinion related to the acceptability of voting on the FAVA system installation when the PRB member who raised the initial questions and concerns on the operation of the FAVA system was not present.

Discussions with the PRB members indicated that during the various PRB meetings concerning the installation of the FAVA system, the PRB members felt intimidated and pressured by the presence of the general manager at the PRB meeting. The sworn testimony confirmed that on one occasion an alternate voting member felt intimidated and feared retribution or retaliation because the general manager was present at the meeting and the PRB member knew the general manager wanted to have the temporary modification approved. However, the testimony also indicated that the PRB member did not alter his vote and felt comfortable with how he had voted. In addition, the PRB member was not aware of any occasions on which he or any other PRB member had succumbed to intimidation or feared retribution.

The inspection team verified that the general manager was informed following this meeting that several PRB members viewed his presence as intimidating. As a result, on March 1, 1990, the general manager met with all PRB members to reiterate the member's duties and responsibilities. He specifically told the members that his presence at PRB meetings must not influence them and that alternates should be selected who would feel comfortable with this responsibility. He also addressed the difference between professional differences of opinion and safety or quality concerns, and their respective methods for resolution.

Conclusion

The inspection team concluded that in one case a PRB voting member felt intimidated and feared retribution because the general manager was present at the PRB meeting. However, this member stated that he did not change his vote in response to this pressure and the general manager met with the PRB to allay fears. Based on the testimony, the inspection team concluded that retribution did not occur. Nevertheless, this confirmed event and the absence of dissenting opinions in the PRB meeting minutes indicate that there was a potential for an adverse affect on open discussions at the meeting. The licensee needs to ensure that PRB members freely and openly express their technical opinions and safety concerns.

2.8 Personnel Accountability

As a result of several comments and questions by the licensed operators to the inspection team, the team reviewed the method used to rate the performance of the shift superintendents (SS) and unit shift supervisors.

Discussion

The operations manager stated that the SS reported directly to the operations manager and that he personally prepared their performance appraisals. The inspection identified that the SS reported to the Unit Superintendent (US), and that the US personally prepared the performance appraisals of the SS.

The personnel accountability system, first used in 1989, was a pay-for-performance methodology. Annual pay increases and a percentage of the Operations Department bonus were dependent on their ratings in accountability categories. Each accountability category was subdivided into performance categories. Most of the performance categories were based upon group performance. Once these are eliminated, any differential in pay will result from eight performance categories. Implementation of the plan in 1989 could result in up to an $8,000-a-year difference in bonus pay to a SS. The performance categories and their relative weights are:

— Personnel safety	4.1%
— Regulatory compliance	10.2%
— ESFAS actuation	12.2%
— Reactor trips	10.2%
— M&O performance	4.1%
— Special projects	8.2%
— Personnel development	30.6%
— Training	20.4%

Therefore, 51 percent will be associated with personnel development and training and 32.6 percent will be associated with the number of LERs, and violations [i.e., regulatory compliance (10.2 percent), ESFAS actuation (12.2 percent) and reactor trips (10.2 percent)].

June 22, [illegible]

Transcript of audiotape No. 179, transcribed by Kara K. Lucas, Certified Court Reporter and Notary Public.

BROWN REPORTING, INC.
1100 SPRING STREET, SUITE 750
ATLANTA, GEORGIA 30309
(404) 876-8979.

been in contact with one another. I'm not sure about that. And that may be in that context (inaudible). But I'm sure if your attorney is telling you not to discuss those issues, he's probably telling our attorney that you've been told not to discuss those issues.

MOSBAUGH: I think that's true.

LEE GLENN: Which means the reason we wouldn't do it the way we want to do it.

MOSBAUGH: Yeah.

LEE GLENN: Our attorney's over here and then there and wherever else (inaudible).

MOSBAUGH: I -- I had one other question about, you know, about your -- your coming down here in general. Can you -- can you tell me the background, you know, on that? How did this -- how did this all get initiated?

LEE GLENN: I can tell you the part I'm aware of --

MOSBAUGH: Okay.

LEE GLENN: -- or (inaudible) the realm, the legal realm of hearsay, what I've been told took place. Certainly we -- the DOL complaint came in and identified that -- that you felt like you'd been (inaudible) identified basic concerns (inaudible)

conversation you had with George and John Rogge Tuesday in which you indicated there were some -- there may be continuing and additional concerns which you hadn't identified (inaudible). Is that coming out? George -- it was my understanding -- talked to Ken McCoy about it. How do we want to address it? I cannot tell you whether they talked to Atlanta management before or after or somewhere in the process. Bill Welders also talked (inaudible) Chuck Whitney discussed with it, and I know Troutman Sanders has discussed it probably with an attorney at Troutman Sanders what the situation was and seeing (inaudible) George related. That group ultimately made the decision it would be appropriate to give an independent third party to someone outside of -- of -- certainly outside of the plant chain of command, who Bill Lyon would be, and even outside of SONOPCO. I'm not sure if that desire would be outside of (inaudible) or whatever else may have (inaudible) have some concept of what's going on. I received a call from (inaudible) basically the (inaudible) situation. The DOL complaint, the technical concerns, the possibility there were additional technical concerns (inaudible).

GPC EXHIBIT II-____
BOCKHOLD EX. S

June 20, 1990

This morning I was visited by Allen Mosbaugh. The following summarizes our discussion.

Allen first inquired into Legal Councils involvement. He opened by stating, that in earlier times with the Quality Concern Program Legal Council was involved in the Steering Committee, but this had been discontinued; why then were they looking at his issue! I told Allen that Legal Council had not been totally removed and the option for their use is still in the QCP procedure, that they periodically review concerns. As an example I told him that although we have closed our investigation, that many cases were still being fought through the courts system and because of this Troutman - Sanders will periodically want a file. Also as with his case we both know that the NRC are involved and it's normal for Troutman - Sanders to also get involved, such may be the case with his.

He also wanted to know if there was any new developments with his concern. I told him that the only things I was aware of was, his June memos and George Bockhold request for me to follow-up on his March 15, 1990 commitments, of which I was currently in the process of doing.

Allen stated that as far as he knew, no one ever wrote the REA for an adequate safety evaluation on the ARB. I told him that this wasn't completely true. In discussions with Cliff Miller and John Quinn some study work has been done, but he was right and there was no REA. Allen said that he was surprised by this because George had committed to the NRC to perform the study. He said that Corporate took on this responsibility. The NRC like himself were concerned about the design of the ARB.

Allen also commented about the inadequacy of an earlier study. He did not feel comfortable with it because of the lack of independence. According to Allen the original ARB study was performed by Paul Rushton and Mark Ajulina. Both Paul and Mark were aided by George in their placement in SONOPCO. Their friendship goes way back and they will basically cater to Bockholds needs. Another problem is that neither Paul or Mark have the knowledge or experience needed for Rad Waste. He did feel that Lue Long was an expert in this field, but, his assessment of the ARB is tainted because it's based on Rushtons old study.

Allen concluded by saying that he feels that he's having no success in getting this issue resolved; it's as if they (Bockhold) have committed to something and can't turn around.

W. C. Lyon III

GPC EXHIBIT II-____
BOCKHOLD EX. U

Interoffice Correspondence

Georgia Power

DATE: July 6, 1990

RE: Quality Concerns

FROM: George Bockhold, Jr.

TO: A. L. Mosbaugh

On July 3, 1990, you completed identifying your quality concerns to Lee Glenn, but you stated that you had other concerns that you would only identify to the NRC. Georgia Power Company considers the safety of its nuclear plants as it's highest priority. If any individual has any legitimate concerns regarding safety, we require that this concern be immediately identified in order to permit appropriate and timely corrective action. If you choose not to report them to management or the Quality Concern Program, they must be reported to the NRC. Consistent with this policy (which you acknowledged understanding of on Aug. 1, 1984), we require that you immediately notify the NRC of any legitimate concern that you may not have identified to us.

With NRC residents, I have discussed the fact that you have concerns that you are only willing to discuss with them. NRC residents have always been willing to immediately address legitimate safety concerns with any member of our staff. Please immediately address your concerns to the NRC. I expect this assignment to receive your immediate and highest attention. Please let me know your progress, including your completion of this task.

J Bockhold

GB:gww

xc: C. K. McCoy
Ron Aiello
Doug Starkey
Lee Glenn

GPC EXHIBIT II-____
BOCKHOLD EX. V

George Bockhold

4-30-90

Since October 1986 I was promoted to Assistant Plant Support Manager, I was ask to manage several departments including Engineering, QC, Administration and Security. Later NSAC Training & EP were added

Now you ask me which job or department I would prefer. First, let me say again that I do not prefer to move backwards in scope of responsibility or level. I believe that I am qualified by education and experience for most any Vogtle job not requiring a Vogtle SRO.

Given that you desire to utilize my capabilities in another way and that certain positions are obviously filled, the following sequence would be my preference for site jobs:

1. SRO Training
2. Engineering Support
3. Technical Support

DEFENDANT'S EXHIBIT 82

Allen L. Mahaney

00369

05-200-E-9L

GPC EXHIBIT II-____
BOCKHOLD EX. W

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Telephone Conference: IIT, Licensee, Region II (CLOSED)

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, April 5, 1990 PAGES: 1 - 37

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(202) 293-3950

92 PROJECT
035280

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

- - - - - - - - - - - - - - - - - -X

In the Matter of: :

INVESTIGATIVE INTERVIEW :

Telephone Conference: IIT, :

Licensee, Region II :

(CLOSED) :

- - - - - - - - - - - - - - - - - -X

Nuclear Regulatory Commission

Operations Center

7735 Old Georgetown Road

Bethesda, Maryland

Thursday, April 5, 1990

The above-entitled matter commenced at 10:03 o'clock a.m., when were present:

Alfred Chaffee, IIT Leader

Ken Brochman, NRC Region II

Rick Kendall, NRC

Nuclear Regulatory Commission

Ken Burr, Vogtle

Mike Horton, Vogtle

John Auftenkampe, Vogtle

Paul Kochery, Vogtle

Alan Mosba

PROCEEDINGS

[10:03 a.m.]

MR. CHAFFEE: Mr. Sheibani.

MR. SHEIBANI: My name is Mehdi, M-E-H-D-I, Sheibani, S-H-E-I-B-A-N-I.

MR. CHAFFEE: Mr. Sheibani, just a couple minutes here before we go into the diesel thing. This morning we sat down in our group there -- Region II, did you just get on the line?

MR. BROCHMAN: This is Ken Brochman.

MR. CHAFFEE: This is Al Chaffee. We have a number of people from the licensee. Why don't the licensee people, why don't you run through again who all is there so that Ken can hear that.

MR. AUFTENKAMPE: This is John Auftenkampe. There may be some other people that come in as we go on with this.

MR. CHAFFEE: Before we start talking about the diesels, I had an administrative thing which is really for Mehdi Sheibani. That is, we went through this morning a listing of the documents we have asked for and where we think we are in terms of getting them. We are going to look at it a little more closely so that tomorrow in the 10:00 o'clock call we can also help focus on those documents that we haven't yet received that we have the highest priority on.

What we did this morning, one of the documents that we are eager to get our hands on is the printout, the traces from the ERF database where you were going to provide us with plots as a function of time for key parameters. Last week, I believe it was on Thursday, we had provided you a list that had been highlighted in red -- I think red dots -- I don't know what it was -- a dozen parameters that we wanted to get the plots on. On Thursday you guys were going to try to get them to us on Friday.

It is my understanding and we may be wrong, but we haven't yet received those. I just want to reemphasize that we are eager to get our hands on those. If you could talk to the people involved, and assuming that you have not yet sent them to us, escalate that to a highest priority in terms of getting that to us. We would appreciate that.

MR. HORTON: We do understand that you need those, and that has taken an incredible amount of effort to generate. We have had to dedicate a number of engineers and computer time to get those things printed out. They are very slow to print out.

MR. CHAFFEE: I didn't realize that. I thank you for telling me. We sometimes don't understand the impact these requests make, and I appreciate your bearing with us. We try not to be too pushy on them.

MR. HORTON: We generate those a sheet at a time,

and we also underestimated the volume of data here. There are probably several hundred sheets involved here.

MR. CHAFFEE: Right now what we are interested in, I think it's only -- I want to say a dozen different parameters, the ones that we would like to get the first wave. Are you telling me that there's a large number of sheets for just one parameter? Wait a second. Is this a deal -- let's take for example a breaker that trips open or trips shut; do you get a separate sheet for each stage of the breaker?

MR. HORTON: I don't know.

MR. CHAFFEE: What I am saying is, I understand what you are saying that it's a big effort. What we were trying to do is, say that we think it is important for us to get it. We are also trying to say that narrowing it down to a small subset of all the parameters that are in that database in the hope of being able to allow at least that portion of it to be done on a more quick time basis.

MR. HORTON: We are about one-half way done, and we will send you what we have.

MR. CHAFFEE: Okay. Tomorrow, after having gone through the list here and what we have received, we will try to focus you guys in on those documents that in terms of time marches on that are of key interest to us, so we can help prioritize the effort where that is possible.

Why don't we shift then to the diesel generator work. To the best of my knowledge -- let me just ask you guys. Where do you stand in terms of preparing for the test that you are working on?

MR. HORTON: Assuming you are talking about the 1-A temperature monitoring test; is that correct?

MR. CHAFFEE: That's correct.

MR. HORTON: The test was set up last night. As you are all probably aware, the first few hours involves standby mode, simply monitoring --

MR. CHAFFEE: We haven't seen the procedure yet.

MR. HORTON: -- the heater.

MR. CHAFFEE: We haven't gotten the procedure yet.

MR. HORTON: Okay. At your request yesterday, we added a current monitoring on the jacket water heater, and we are monitoring that and one of the thermal wells that the high temperature sensor sits in. So, you have two parameters there. That was initiated this morning at approximately 7:00 o'clock Eastern time. It has been running for basically three hours.

MR. CHAFFEE: Mehdi Sheibani, are you guys in the processing of faxing us the test procedure for this? I assume you must have it.

MR. SHEIBANI: It was faxed to you about five minutes ago.

MR. CHAFFEE: Okay.

MR. HORTON: If you would like, Al, I could tell you the results of the first three hours.

MR. CHAFFEE: Great.

MR. HORTON: The first three hours show a steady state temperature of 163, and a frequency on the jacket water heater of approximately one hour and one-half with it being on for most of that duration and only being off for between five and eight minutes each hour and one-half. That's all we know so far.

MR. CHAFFEE: Basically, you haven't seen any fluctuation in temperature? That 163 degrees is basically constant?

MR. HORTON: Right.

MR. CHAFFEE: No variation at all?

MR. HORTON: Correct.

MR. CHAFFEE: That's interesting.

MR. KENDALL: The heater is only off for about eight minutes for every one and one-half hour span?

MR. HORTON: Correct.

MR. CHAFFEE: With it in that configuration you have the standard jacket warming pump operating; is that right?

MR. SHEIBANI: Correct.

MR. CHAFFEE: Do you happen to know what the flow

rate of that pump is and what the volume of the jacket water temperature system is -- the jacket water cooling system is?

MR. HORTON: The flow is a little under 100 gpm, 60 to 90 somewhere, and we don't have the total volume handy. A rough estimate might be something like 1,500 for the total. We think it may be like 600 and the rest of the system volume might bring that up to a rough total of 1,500. That is just rough.

MR. CHAFFEE: That may mean that you are getting turnaround of the system -- what would that be, once every six to ten minutes type of thing?

MR. BURR: Once every 15 minutes.

MR. CHAFFEE: Okay. Is the piping from the tank to the pump and stuff, is that six inch piping?

MR. SHEIBANI: Which pump?

MR. CHAFFEE: The standpipe. The pump takes the suction on the standpipe, the piping of the standpipe to the pump. What size piping is that roughly?

MR. SHEIBANI: One and one-half inches.

MR. CHAFFEE: Just one and one-half inches. That gives me a picture then. I take one and one-half inch pipe --

MR. SHEIBANI: One and one-half suction and one and one-quarter inch.

MR. KENDALL: That is just for the keep warm pump,

right?

MR. CHAFFEE: I see. The regular pump for the jacket water temperature system, what is the suction pipe size in that?

MR. SHEIBANI: Ten inch suction and eight inch.

MR. CHAFFEE: That makes more sense to me. Do we have a drawing that shows the jacket water?

MR. KENDALL: We have an eight and one-half by 11 one that is kind of difficult to read. We requested a big one yesterday and they are going to get it and send it out.

MR. CHAFFEE: It is a one line diagram, or do we have one that shows a picture -- a pictorial picture.

MR. KENDALL: It's a P&ID. It shows the flow diagram.

MR. CHAFFEE: It shows the different type pipes?

MR. KENDALL: It shows it but it is very difficult to read. We are going to get one in that's more readable.

MR. CHAFFEE: You guys don't have an equivalent to an isometric for the jacket water system, do you?

MR. BURR: No, we do not.

MR. KENDALL: I want to make sure that I understand all the points that are being monitored. You are just monitoring jacket water -- I guess we will call it header temperature up --

MR. HORTON: You guys are cutting in and out.

MR. CHAFFEE: Just a second. Can you hear me?

MR. HORTON: It sounds like an amplifier problem on the bridge.

MR. KENDALL: Is this any better?

MR. HORTON: You are still fading in and out on a cyclic basis. It's the bridge.

MR. CHAFFEE: Can you hear me?

MR. HORTON: I can hear you.

MR. KENDALL: I just wanted to make sure that I understood all the points that are being monitored for this. There is only two; there's the jacket --

MR. BURR: You are still fading in and out on us.

MR. KENDALL: I will try it again. I want to make sure that I understand the points that are being monitored. As I understand it, there's only two. One is the jacket water temperature at the top of the diesel where the two lines meet for the return where the three temperature switches are mounted.

MR. SHEIBANI: That's right.

MR. KENDALL: The other thing that is being monitored is heater current, so you know when the heater cuts on and cuts off.

MR. SHEIBANI: Correct.

MR. KENDALL: There is no actual monitoring of temperature in the tank.

MR. CHAFFEE: I thought they said they were measuring the current for the heater and they put a thermal couple and measured the temperature at a high point just above the heater.

MR. BURR: No. We removed one of the temperature switches and have a thermal couple in there, RTD, I should say.

MR. CHAFFEE: Okay, I understand. Basically we have a --

MR. KENDALL: Did you go back and calibrate the heater, or do you know if the heater is actually cutting on and cutting off, what those temperatures are? I guess the heater is always on.

MR. BURR: It's always on, except for about five or eight minutes it's off. So, we are drawing a straight line.

MR. CHAFFEE: It sounds like that heater is made basically just to be able to keep up with the ambient losses.

MR. BURR: It looks like that.

MR. CHAFFEE: I guess basically it sounds like the flow you got is just enough to keep things -- I am going to get this mental picture that the flows that exist in the warmup system is intended to be sufficient to keep the water fairly evenly mixed and fairly evenly distributed in

temperature throughout the jacket water system.

MR. BURR: It appears that way.

MR. CHAFFEE: What that tends to suggest then is, when the diesel gets called upon to start up, unless somehow this warmup system is leaving some cold pockets someplace --

MR. BURR: I believe we have one hot pocket in the heat exchanger. We are measuring a higher temperature there.

MR. CHAFFEE: How did you discover that? Did you put some different sensors --

MR. BURR: Surface thermometers, and we also have some local sensor gages. We are reading about 170 degrees at that water heating tank.

MR. CHAFFEE: In addition to these sensors that we just talked about, you are basically using whatever sensors you can find to get whatever measurements you can on this system over this 24 hour period?

MR. BURR: It's a survey, we just went out and looked.

MR. CHAFFEE: Good move. We have 170 degrees in the lube oil cooler area.

MR. KENDALL: Ken.

MR. BURR: Yes.

MR. KENDALL: Did you check all the other places too, in the jacket water system?

MR. BURR: The lube oil jacket was the highest temperature we could find.

MR. KENDALL: What was the lowest temperature that you could find?

MR. CHAFFEE: Would you guys please state your name before you speak. Let me ask a question.

MR. KENDALL: Where is the lowest temperature that you found?

MR. BURR: I believe the lowest temperature we found was the one where the sensors are at.

MR. CHAFFEE: Who just said that?

MR. BURR: Burr.

MR. KENDALL: The lowest temperature you are seeing is up at the high point there, and that was 163?

MR. BURR: We are using surface thermometers, so those are not that accurate.

MR. KENDALL: Understand.

MR. CHAFFEE: Do you have an explanation for why the temperature is higher, the lube oil cooler?

MR. BURR: We are probably not getting as much flow through the lube oil heat exchanger. Of course, we also have to heat the oil.

MR. CHAFFEE: That's what I was leading to. You do have a warmup system for the oil. Do you happen to know whether or not that warmup system for the oil tries to keep

the oil at a temperature different than what the jacket water system heater is trying to do?

MR. BURR: It doesn't appear to be right now.

MR. CHAFFEE: You must have a heater also, right. Does the heater trip set points; does it go off at the same value that the jacket water goes off, or is it a different value?

MR. BURR: I have not made that survey, so I do not know.

MR. CHAFFEE: That's interesting though, that the water in the lube oil is higher. That may be the hot pocket. If the lube oil system actually shoots for an even higher temperature, that might where the hot water slug is coming from. You guys probably ought to take a look at that and see what the lube oil warmup system is trying to do. Maybe it is creating the hot pocket. Maybe the thing that is creating this hot pocket is not this jacket water heater but the lube oil system that is creating the hot pocket, which then is induced in the jacket water system.

MR. BOCKHOLD: This is George Bockhold. I had to come in late because of some discussions I had to have with corporate, some information that Region II wanted. Let me give you another piece of information.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: Last night I had my I&C folks take

a brand new switch out of the warehouse, jacket water temperature switch.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: I did a little experiment. We took it as it was calibrated from Calcon, and really didn't do anything with its calibration. We put it in a temperature bath and we basically found out where it tripped. What we used was, we used one degree per minute temperature rise and it first tripped at 196.8. We did a two degree per minute temperature rise, and it tripped at 195.4. Then we did a three degree per minute temperature rise. It tripped at 195.6. Then we did a four degree a minute temperature rise, and it tripped at 195.3.

Basically that test -- that was the fastest that we could do in a controlled fashion.

MR. CHAFFEE: That test suggests that the rate of temperature change has no impact on the switch.

MR. BOCKHOLD: On the switch. Then we took the switch and we put it in a 160 degree bath. After that got stable, we quickly picked it up to a 200 degree bath. It took the switch three minutes and 54 seconds to trip.

MR. CHAFFEE: You put it at what temperature bath?

MR. BOCKHOLD: Can't tell, because we don't have the ability to homogeneously change the mixture.

MR. CHAFFEE: I just didn't hear part of what you

said. You said you took it out and you did a step change in temperature to it. What was the step change from to?

MR. BOCKHOLD: One-sixty to 200 degrees.

MR. CHAFFEE: One-sixty to 200 degrees, and it took it three minutes and 54 seconds to trip?

MR. BOCKHOLD: Three minutes and 54 seconds. We tried to keep the temperature bath at approximately 200 degrees.

MR. CHAFFEE: And it took three minutes and 54 seconds to trip?

MR. BOCKHOLD: That information tends to say that the tests were running on a diesel will not show anything, but we are going to go ahead with it.

MR. CHAFFEE: Why would it take so long for it to trip? I guess the reason it took the three minutes and 54 seconds to trip is because --

MR. BOCKHOLD: The thermal well was at 160 degrees, and we took the thermal well and the switch and moved it to the next. The last test, of course, was not a controlled experiment. The temperature rise was about four degrees a minute under a controlled type test.

MR. CHAFFEE: Then you took it from 160 degrees and put it in a bath of 200 degrees, and it took three minutes and 54 seconds for it to trip from the time you put it in the bath of 200 degrees?

MR. BOCKHOLD: That's right. The thing that we were trying to verify was, we were trying to find out if the set point went down significantly as we increased the rate of rise of temperature.

MR. CHAFFEE: Right, I understand that.

MR. BOCKHOLD: We were just trying to prove or disprove what the Calcon man said about that. The last test was let's try to get a step change in temperature, and see if the set point changed. You know, the last test was gee, let's try something else because the fastest that we could go in a controlled fashion was four degrees a minute.

MR. MOSBA: This is Alan Mosba. What that last test tells me is, we couldn't come up with a specific temperature at which the switch tripped. That tells me that because of the long time that it took to trip, that it tripped a temperature fairly close to the 200 degree point. If there had been a significant downward set point shift due to a rapid increase in temperature, it would have tripped a whole lot sooner.

We were coming up on the equilibrium temperature of the new fluid that you immersed it in, and it took three minutes and so many seconds to reach that. It means that there was not a significant set point shift, even under a very rapid rate of change of temperature.

MR. CHAFFEE: Right. What's true is that -- I

would assume that they built the RTD well and sensor such that time constant for it coming up to temperature should be fairly quick.

MR. MOSBA: I would agree.

MR. CHAFFEE: I agree with you. When you put it in the 200 degree bath, was the temperature of it being monitored? Did you see any change in it? Did it stay basically at the 200 degrees?

MR. MOSBA: George will have to answer that.

MR. BOCKHOLD: The people who did that were on night shift, so we would have to kind of talk to them about it. But I believe they were trying to maintain it relatively constant at 200 degrees. We will check and see how big the bath was and what the thermal inertia of the bath was that it didn't get drug down any.

MR. CHAFFEE: I would like to know that. From what you have told us, it sounds like the rate of temperature change really has very minor impact on the set point.

MR. BOCKHOLD: I think that's what those tests show.

MR. CHAFFEE: If that's the case and if that goes away -- also what we have been told just before you walked in George, is that at least the temperature out by the sensors seems to remain very steady and constant at 163

degrees for the first three hours of your test. The other thing that we were told was that the high point in temperature seems to be adjacent to the lube oil cooler which was, I guess, at 170 degrees.

We were just pursuing a line of discussion saying, well, why is it hotter there. Is it by chance a situation where a differential temperature that the sensor sees is more becoming a function of what the lube oil warmup system is doing. We were just getting into that kind of discussion.

MR. MOSBA: I think what we are seeing, given the temperature information that we have around the lube and the flow rates that we and the cycle, the turnover time is, we have a fairly homogeneous distribution of temperatures. The coolest point is the point coming out of the diesel where we have incurred the ambient losses. The hottest point is the temperature where we have another source, the heat source, the lube oil.

But the total range of temperatures we have given you is only seven degrees. Maybe around the lube the various fluid pockets and so forth have different temperatures, but that is probably all within 10 degrees.

MR. CHAFFEE: I guess the one thought that is running through my mind is that -- everything that you said makes sense to me. The thing I think you might want to

think about considering is whether or not the lube oil cooler system could cause the temperature of the jacket water that is adjacent to the lube oil -- in the lube oil cooler, would the maximum temperature expected be this 670 degrees or does it have any kind of cyclic nature.

If it turns out that the 170 degree is the maximum temperature that exists in the jacket water system, then you have just bounded it. In other words, that is the max temperature and the minimum is 163, and it all fits together. On the other hand, if there is any cycling of temperature in that lube oil cooler you would want to know about that.

MR. BOCKHOLD: Okay. I don't think there's an issue there, but we will check and see what the on and off set points and reset points are on the lube oil heater, and see what the span of operation is there and see if that could have any effect. My inclination now given the data that I have is probably that is not a big -- it is still bounded by this 10 degree variation. But, we will check that.

MR. CHAFFEE: We have it. I assume that when you are out doing your survey of all these temperatures around the system, you guys are keeping some sort of record of that just for your own records?

MR. BOCKHOLD: I think that information will be in

the test log or we will include it in the test log.

MR. CHAFFEE: Okay, great. What we would like to do is once that stuff is recorded, we would like to get a copy of it. We would like to have that.

MR. BOCKHOLD: Okay.

MR. KENDALL: Are the surface temperatures that you went around and checked, is that just a one time shot or are you going to do that again sometime within this 24 hour period.

MR. BOCKHOLD: I think that if, after a couple of more hours of observation of this, that all we are seeing is steady state. We have no more data to collect, and nothing is changing again. We may not go the full 24 hours. There may be no purpose in that if everything is totally stable.

MR. CHAFFEE: Right, from the standpoint -- I understand what you are saying. I don't disagree with that. The concept being that if you find that the temperature distribution in the jacket water system stays basically constant as a function of time, there is no sense in continuing to draw data.

MR. BOCKHOLD: We have observed maybe an hour and one-half periodicity on the cycling of the jacket water heater, and once we observed that for a couple of more cycles and if we have no other issues like any other heaters or whatever and see no impact from any of those, we will be

inclined to terminate the test and think that we have all the data that can be obtained.

MR. CHAFFEE: I understand. I guess the only thing I would throw out again is this thing with the oil heating portion.

MR. BOCKHOLD: We will investigate that and resolve whether that has any impact.

MR. CHAFFEE: The reason we are going for all this is what we are assuming is that the heat balance that exists in the system is made up of the cycling of these two heaters, the heater for the jacket water tank and the heater for the oil warmup system. Once you understand their cycling periodicity and the cycling of the pumps that are distributing the water, once you look at the periodicity relationship of those and assure yourselves that you have captured what can happen as those things go through the periodic approach, I guess at that point you would have a full picture of what is going on in terms of any transient natures of hot spots associated with the diesel jacket water system as well as the lube oil system.

It sounds like you already have good data, that the jacket water itself near the sensors is fixed as a function of time, because you have had no variations. I guess once you look at what the lube oil -- the only other thing that contacts this thing that can transmit heat I

guess is the lube oil system. Once you understand the phenomena of that, then from that you will be able to conclude whether or not you have taken enough data or not.

MR. BOCKHOLD: Right.

MR. KENDALL: Did the surface temperatures taken include different parts on the tank?

MR. BOCKHOLD: We agree. Anything else?

MR. CHAFFEE: What Rick just asked was, in taking your temperature readings on different things did you take any temperature readings near the top of the tank, the hot water going up type of thing making sure that there's not an accumulation of hot water jacket water that is in the top of the tank that maybe is -- later on again, when the thing starts, could provide a slug; did you look at that?

MR. BOCKHOLD: I don't think we have taken any data. Let my folks explain the piping configuration where the return water enters the tank and where we take the suction to the pump. I think that configuration may well dispel any stratification ideas in the tank. Who can speak to that?

MR. BURR: The water after it leaves the area around the sensors that we have on top -- the trip sensors -- it goes into the standby. The suction of the pump comes out the side of the heater.

MR. CHAFFEE: The concept that you are giving us

is that you have relatively cold, 163 degree water is passed by the sensors and goes into the top of the standpipe, and then that water goes down. Is the heater near the bottom of the standpipe?

MR. BURR: About the middle.

MR. CHAFFEE: About the middle. And then, the pump that takes the suction off that standpipe that is, the warmup pump, it is located about the middle of the tank?

MR. BURR: The suction actually comes out of the side of the heater.

MR. KENDALL: My point for asking the question was is that it seems to me that you guys --

MR. BURR: We can't hear you.

MR. KENDALL: The reason I asked the question was, it seems to me that you guys want to make sure that you know that this temperature thing from different temperatures in the system is or could definitely said is not a cause. From what you have told us, I don't think that we can conclude that you have done that.

MR. BURR: We will find out whether it is the cause or not when we run the test. If we don't see a temperature rise, all this is immaterial.

MR. KENDALL: You are saying that there is no point in taking surface temperatures at different points within the system?

MR. BURR: If we run the test and we find out that there's no temperature rise, it don't make any difference.

MR. CHAFFEE: But in fact you are taking some measurements. You have already said you have gone down to the survey.

MR. KENDALL: My point for asking the question was, I just hope we are not in a situation later on where we say something like did you take a temperature here, and we can't explain whether that would or would not have been a contributor or not.

MR. BURR: If, after the test we find that we have a problem, we will have to investigate and find out where that problem is.

MR. BOCKHOLD: Let me just summarize here. We got the standpipe -- I understand that issue that you are bringing up of any potential stratification in the standpipe. But the configuration is that the coolant water returning from the diesel enters toward the top of the standpipe and it flows down toward the heater, and the suction to the pump is in the vicinity of the heater.

That configuration should basically preclude stratification. Ken's point is that if there is any stratification when we run the final test, any slug of water will show up in our temperature measurements. That is the whole bottom line of the testing that we are doing. We

think that should show any affect.

MR. CHAFFEE: Okay, I understand. Again, I guess we all agreed to the extent that you can as you have been doing when you do your survey, you are trying to -- in fact, it was good that you did that because that led you to this thing about the lube oil cooler having -- apparently at this point it seems to be the hot spot. That is good, because that will now lead you into trying to characterize what that means in terms of is the 170 degrees is the hottest it could be or is perhaps the lube oil system cycles, could it be a little hotter than that.

Again, what Rick is pointing out -- it sounds like you agree -- to the extent that you take surveys, you want to make sure your survey is comprehensive enough that you capture any other potential hot spots that exist so that you can evaluate their significance and their possible variation as a function of time. I think we are all on the same wavelength. I am glad to hear that you found this one with the lube oil cooler.

Again, when people are out there taking measurements, as long as they keep in their mind where those potential hot spots are and go out and take those readings and look for those, I think they will be able to qualitatively at least figure out what the worse case conditions might be. We agree that once you do the test,

hopefully that will bear out whether or not it is a real problem or not in terms of the diesel starting.

MR. MOSBA: We will find out with the test, but right now the piece of information that George Bockhold gave you that we are not seeing substantial shifts of the temperature probe with rates of change in temperature and then it's tripping in the 190 type temperature range, and our observations that the system is barely homogeneous and that the hot spots are in the 170 degree range, we think those are sufficiently far apart that right now it doesn't look like the slug of water theory is what is causing any tripping.

Our tests will verify that, and that's where we are.

MR. CHAFFEE: Who just talked?

MR. MOSBA: Alan Mosba again.

MR. CHAFFEE: Let's pause a second here. Let's assume that what we are going to find when this is all done that the max temperature that those temperatures see on a start is -- I don't know -- would we guess maybe 165 degrees or something like that?

MR. MOSBA: Probably no more than 170.

MR. CHAFFEE: Let's assume 170 then. Let's assume that the max you will see is 170. The next question we have is, let's assume that at the vent that's the maximum

temperature we saw was 170. The next question would be why did the trip occur? Let me ask another question.

At this point, my understanding is that your best projection in terms of what caused the trip was the trip on high jacket water temperature sensors, and that is because you were able to reproduce the annunciation that existed at the time of the second trip by simulating a high jacket water temperature trip condition; is that right?

MR. BOCKHOLD: Yes. This is George again.

MR. CHAFFEE: George, we were just trying to work through the thinking process. Let's assume that when all is done here it turns out that the max temperature that these sensors are going to see in the start and one of the fellows proposes to use 170 degrees because that's the max temperature that they seen in the lube oil cooler. The next discussion was, let's go back and figure out that if that's what it turns out to be, if it's only 170 degrees -- we said the second trip at this point, the belief is that the second trip of the diesel during the event was caused by high jacket water temperature trip.

That is because you were able to reproduce the annunciations that occurred on that second trip by simulating a trip on high jacket water temperature. I guess what is true at this point is -- I am not sure if everybody wants to say that the fact caused it, but it's the most

likely cause of the trip?

MR. BOCKHOLD: We said it is the most probable cause.

MR. CHAFFEE: The next thing we say is, if the highest temperature that those sensors should have seen in the event was 170 degrees but they actually caused the trip. The next question is, how do we account for that. What could have caused them to trip if they only saw a temperature of 170 degrees?

I guess what is true in theory, they were set for something about 200 degrees and we need to come up with a rationale for this 30 degree difference between the set point and the actual temperature. The question is, how do we account for that, what could have happened? If it turns out that the rate of temperature change is not an explanation for that difference, then what is there left that can be pursued in terms of trying to understand why these sensors caused the diesel to trip.

MR. BOCKHOLD: What we have to do is, we have to test the probes which are currently under quarantine. What I was going to say associated with this conversation and really with some of our other conversations that we have had is, what we would propose is go get an independent lab -- I think we are looking at Wiley, but I don't think we decided on that independent lab.

We collected all the quarantine pressure switches, we would get appropriate team of people, and if the NRC wanted to be part of that team it would be fine, or if you just want to look at the procedures that would be fine.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: Let's take the quarantine switches and establish very detailed test programs and go and test the switches and see if we could get the answer to your question. Basically, that's where we are at. In fact, Louis Ward in our Birmingham Corporate Office has been assigned the lead on that. Basically, we plan to move this offsite to have Birmingham take the lead on determining or working with you all on these temperature switches.

MR. CHAFFEE: Sounds good. Do you have a phone number for him?

MR. BOCKHOLD: It's 205-877-7802, Louis Ward.

MR. CHAFFEE: Did I get that number correct; 205-877-7802?

MR. BOCKHOLD: That is correct.

MR. CHAFFEE: Did you get any feeling from them in terms of what kind of timeframe this would all occur under?

MR. BOCKHOLD: No, I didn't get any feeling. I believe that Louis got that assignment this morning, so he's off to work on his new assignment.

MR. CHAFFEE: We should just contact him directly?

MR. BOCKHOLD: Contact him directly. Ken Burr has been one of our lead engineers. He is the senior project engineer, and he is working with our diesel testing. He normally lives in Birmingham, so he will be getting back there shortly and be working with Louis on this.

MR. CHAFFEE: Okay. Just a second. We have to caucus here on this. Just a second, George.

[Short pause.]

MR. CHAFFEE: George, this is Al. Can you hear me?

MR. BOCKHOLD: Yes, go on, Al.

MR. CHAFFEE: Rick just brought up a good point. I think that you are probably aware of this. Catawba had some problems with the pressure sensor switches on their pressure valve diesel, and it was because of moisture problems. I understand from our discussions that it is probably not the case here.

I believe that some of the quarantined switches include some pressure switches. The thought that we had was that it would probably be a good idea if in this test program that they are doing if they took a look at the pressure switches at least to the point to verify that you don't have that kind of problem that they had at Catawba.

MR. BOCKHOLD: I spoke to a person at Catawba and, yes, I understand they had problems with pressure switches.

Further, I understand that they had a clearance problem is what I thought the gentleman told me on their pressure switch and they changed to a difference clearance and actually a different model number and then they did not have any pressure switch problem.

We did not get pressure switch problem indication.

MR. CHAFFEE: I thought you got a low jacket water pressure annunciator the same time that you got the high jacket water temperature.

MR. BOCKHOLD: That was a turbo charger lube oil pressure annunciator. That was not -- they got main bearing engine low lube oil pressure.

MR. BURR: They had a problem with the old model pressure switches. We have new models, the same as they have now.

MR. KENDALL: The model pressure switches installed on the diesels during the time at your plant were not the same models that they had problems with at Catawba.

MR. BOCKHOLD: We have, and we have checked the new models.

MR. CHAFFEE: When you say new models, is that a new Calcon model or the new model is the Calcon switch versus a previously older versus another manufacturer's switch that was previously used?

MR. BOCKHOLD: Calcon is what I believe.

MR. BURR: The number was -- I am just guessing now -- I think it was 4400 was the old number and the new one has a B on the end of it, 4400 B. We have the B model.

MR. CHAFFEE: Both made by Calcon?

MR. BOCKHOLD: That is correct.

MR. CHAFFEE: I didn't know that either. They actually changed their models. That model change is just for the pressure switches and not for the temperature sensors?

MR. BOCKHOLD: Correct. That is our knowledge.

MR. CHAFFEE: Where are we at. There's going to be a test program to try to figure out what is wrong with these high jacket water temperature sensor switches. Is that program going to only look at the jacket water temperature sensor, or is it also going to get into and address the other sensors that are currently quarantined?

MR. BOCKHOLD: My plan was to basically give them all the switches and let Louis Ward and those folks and the laboratory work out the details of that. I am not quite prepared to answer that, and I think it would be appropriate for you to contact Louis or we could have Louis contact you.

MR. CHAFFEE: Okay. Sounds good to me. Our first cut would be, we would like to see them do the testing on all the quarantined switches so they can figure what went wrong with all the switches that are quarantined for which

there is something -- that there is believed to be something wrong with them.

Some of the quarantined switches I think perhaps are switches that were taken off and nothing was wrong with them, but they were just taken off as --

MR. BOCKHOLD: That were leaking a little bit but would have normally been acceptable, but we were very conservative and wanted to get the best switches we could out there.

MR. CHAFFEE: I understand. There needs to be another dialogue to talk about what switches are going to be tested and so on and so forth. We will conduct that dialogue with Louis Ward. That's going to go on to look into the sensors. This is ongoing now, in terms of looking into the impact of temperature variations in the system. Is there any other rocks that haven't been looked into in terms of the diesel's operation during the event? I guess not.

Region II, do you have any questions or comments?

MR. BROCHMAN: No. We are fully onboard and have been talking with them with respect to diesel generator operability issues.

MR. CHAFFEE: I guess that's all we have. Thank you very much, George. The transcriber needs to get the names of the people that were talking.

MR. BOCKHOLD: Before we hang up here Al, I went

and checked with Herb. He has probably a ream of ERF pictures and I am going to have him Federal Express that up to you tonight.

MR. CHAFFEE: Okay, great.

MR. BOCKHOLD: We will also send it in the package --this will either be the originals or copies, I don't know which. You will get another submittal of them too. If they are originals don't lose them, because the copies are not going to be very good.

MR. CHAFFEE: Okay, understand. Is there anything else that anybody has?

[No response.]

MR. CHAFFEE: Thank you very much. We will talk to you again tomorrow at 10:00. Wait a second, one question. If everything goes well, the procedure -- we haven't seen it but we understand that you guys faxed it up and we will take a look at it. We will get comments back to you as soon as we can. When are you planning on doing the test? What is the timeframe for that?

MR. BOCKHOLD: About two hours from now.

MR. CHAFFEE: You are planning on doing it at 1:00 o'clock?

MR. BOCKHOLD: Between 12:00 and 1:00.

MR. CHAFFEE: Between 12:00 and 1:00, so an hour from now?

MR. BOCKHOLD: That's right.

MR. CHAFFEE: We would appreciate it if we could have gotten the procedure a little more than one hour just before you planning on doing the test. We will take a look at it right now if we have it. If we haven't got it, we will give you a call back. Again, we would ask you to wait and give us a chance to look at it before you start it up.

MR. BOCKHOLD: Okay. Herb faxed it up to you before this phone call ever started. In fact, I thought he faxed it up at 9:00.

MR. CHAFFEE: Our understanding was that there was nothing here and we were told that you guys were in the process of faxing it as we got on the call.

MR. BOCKHOLD: I think he verified it's there, but I will check on that.

MR. CHAFFEE: We will check. Sometimes these things get shuffled. Again, we checked this morning when we came in and were told nothing was here. When we called down to verify it we talked to somebody down there and they said they were just in the process of faxing it as we started the call. We will go find it, and if we can find it we will take a look at it and give you a call back with our comments. If we can't find it, we will call back and we should talk to Mehdi Sheibani?

Let me ask you a question. In case we can't find

it, what Mehdi Sheibani's phone number?

MR. BOCKHOLD: He's on extension 3209.

MR. CHAFFEE: Okay. We will give him a call here as soon as we are able to determine whether or not there's a problem with us getting it or not.

MR. BOCKHOLD: Okay.

MR. CHAFFEE: Thank you. Before you decide you are all done, you are going to go back and assess the impact of the lube oil system and make sure that you have enough data to cover any variations in that, right?

MR. BOCKHOLD: Yes. We will do that from the data and we will also look at the test points.

MR. CHAFFEE: You understand what I am saying. It would be unfortunate to decide just to do it for four hours and then find out after you have gone and run the test that you really didn't have it all understood what sort of temperature changes are going on in that lube oil system.

MR. BOCKHOLD: We agree. We agree that it is important to look at that.

MR. CHAFFEE: Okay. Thank you.

[Whereupon, at 10:56 a.m., the telephone conference concluded.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Operations Interview

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

JON HUNDLEY
Official Reporter
Ann Riley & Associates, Ltd.

03-203-G-90

GPC EXHIBIT II-___
BOCKHOLD EX. X

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Telephone Conference: IIT, Licensee, Region II (CLOSED)

Docket No.

LOCATION: Bethesda, Maryland

DATE: Friday, April 6, 1990 PAGES: 1 - 34

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

- - - - - - - - - - - - - - - - - - -X

In the Matter of: :

Telephone Conference: IIT, :

Licensee, Region II :

(CLOSED) :

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Nuclear Regulatory Commission

Operations Center

7735 Old Georgetown Road

Bethesda, Maryland

Friday, April 6, 1990

The above-entitled matter commenced at 10:12 o'clock a.m., when were present:

Alfred Chaffee, Incident Investigation Team Leader

Ken Brockman, NRC Region II

Rick Kendall, NRC

George Bockhold, Vogtle

Lewis Ward, Vogtle

PROCEEDINGS

[10:12 a.m.]

MR. CHAFFEE: It's April 6th, at 10 o'clock. This is of IIT Vogtle.

Now, what I want to do is talk about a little bit about the diesel generator. I guess maybe the first thing we should talk about is the following:

Rick has been trying to pull together, from all the various information sources, what exactly the history is in some of these sensors, and what he is finding is that there is a lot of -- in fact, Rick, why don't you begin the talk?

MR. KENDALL: Okay.

What I have tried to do is take the different sources of information that we had that discusses the history of the sensors, and there are basically four sources of information.

The first source are the notes from the blackboard or dry board, whatever you call it, in the large conference room, that Al wrote up during our meetings on the diesel.

The second source was the document that was given to us, I guess, the day before we left. It was called "Global Diesel Generator Sensor History: A Summary". And the first page of that had some information concerning diesel reliability and some other stuff on it.

The third source was a telefax that you sent up here, and it was a copy of a note from Mark Briney to George Bockhold. It was dated April 3, 1990.

And the fourth source of information was a second telefax that gave us sensor history for the other quarantine sensors.

And when you look at all these pieces of information, there is a lot of contradicting information just concerning when it was last calibrated, concerning what maintenance work order was associated with it, differing dates. It's impossible, from all these sources, to try to put together a complete story.

So, what I did was I developed a matrix, and I put in one example, on one of the temperature switches, of the type of information that we would like, and we'd just like to telefax you a copy of the matrix, and then have you fill in the holes.

MR. BOCKHOLD: That would be good. And in parallel with what you're doing, yesterday I talked to Mark Briney about -- his letter to me is probably the most detailed and most accurate information, and it takes him a period of time to pull that information together, and on the temperature switch items, he was going to work those as a higher priority and pull that information together.

The differing dates you saw is the relationship to

when the work order was closed, in comparison to when the calibration itself was done. So, I'm sure that caused some confusion. And some of the other words there were the job got changed and assigned to a different person for a period of time, and he started to use different words.

So, why don't you telecopy what you want us to fill in? We'll give it to Mark Briney, and Mark Briney will fill that in and supply any information that way.

MR. KENDALL: Okay. That sounds great, and we realize it's going to take a couple of days, probably, to do it.

MR. BOCKHOLD: Okay?

MR. KENDALL: Fantastic.

MR. CHAFFEE: Okay. Then let's go on to the diesel generators themselves.

Maybe the first thing we should do is talk about this dew point situation and what you guys believe with regard to that, and then I guess -- I thought we'd go in and talk a little bit about what you found on the testing and where you're going with the testing.

MR. BOCKHOLD: Okay. On the dew point situation, yesterday afternoon it came to my attention that on the 29th of March we had run a test, and the test on the dew point was unsatisfactory. So, you know, we had some concern about why the test on the A Diesel was unsatisfactory on the 29th,

and we're pulling in together a bunch of information.

At this point -- and this is speculation on my part -- the evidence is tending to point to a bad instrument, a bad dew-point sensor instrument, and we only have one onsite, and we're getting another one, and other than that, you can speculate seven different dozen ways on this thing, but that's what the evidence is starting to point to, because when we test air at similar conditions, it all appears to be higher right now. Okay?

And it's at a significantly different condition, like our instrument air in the turbine building. The instrument does appear to work correctly, but at the diesel temperature pressure dew point, the instrument may not be working correctly.

MR. KENDALL: This is a test instrument.

MR. BOCKHOLD: So, basically, what happened is we got this information; put the jacket water test, basically, on hold until we could determine what we had; and what we did in the meantime is that the appropriate procedure that the vendors and our experts tell us to use if you have a higher dew point in the diesel storage tanks is basically to do a feed-and-bleed on the tank, and over a day or so, the air will clean up to -- the dew point will clean up to the required quality.

We started that. We checked the instrument lines

at one of the low points on the A Diesel. We also checked the receiver by blowing it down. We haven't really gotten any real water out of the receiver in blowing it down. The comment was that we haven't seen any water coming out of the bottom of the receiver, and there's a drain valve right -- there's a drain pipe right on the bottom. Further, the diesel system engineer blew one of the drain points down on -- and this is the A Diesel -- on the control air system, and he didn't see any moisture come out of that line.

And we've run some other tests. Like we ran one test quickly on the B Diesel. That showed bad. We're off to run a test in a few minutes on one of Unit 2's diesels. I expect that's going to show bad, because right at this point, what I believe is that the instrument is bad.

In parallel with this, we're going to buy -- we're going to find another instrument, so we can do this test with a different instrument and see what that tells us.

In parallel with this, when the Cooper people get in in the morning, which I guess is about 11 o'clock or so, we'll give them a call. Given the indication that we have on the air and the dew point that this instrument is reading, we believe we can probably do the jacket-water test without doing any damage to the control or instrument air system.

We believe that even at an elevated dew point,

this is a long-term problem and not an immediate problem for -- associated with the controls on the diesel. We believe the diesels are operable right now, for example, and we believe this is -- you wouldn't want to run like this for months, if you had an elevated dew point.

So, we want to verify our belief with the Cooper people. If we do verify our belief with the Cooper people, we will go ahead and run the jacket-water test.

MR. CHAFFEE: When do you expect to have the new instrument onsite to do the dew point?

MR. BOCKHOLD: Don't know. Maintenance was off this morning to go find one from one of our fossil plants or maybe even buy one in Augusta.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: I'm not sure we can get exactly the same instrument that we have. The one that we have has a radioactive source in it, and you have to be, you know, appropriately licensed to have this instrument.

So, we'll get something that's equivalent, but it probably won't be exactly the same instrument.

MR. CHAFFEE: But you'll get one that meets whatever the standards are for its readings being -- felt to be correct, one that's calibrated and that's -- I don't know if there's any industry standards in that area for that type of test instrument or not.

You will ensure that your test instrument is properly pedigreed.

MR. BOCKHOLD: Yes.

MR. CHAFFEE: Okay.

Well, okay. I guess as far as doing the test before you have satisfied yourself, through a test, that the dew point of the air is within spec or not, I guess you're probably right that it wouldn't cause any damage to the diesel. It obviously would be preferable that you get that thing all resolved and clean up before you ran the diesel.

As far as that goes, George, I think what we'll do is, after the call, Region II and we will talk about Cox a little bit and decide what our feelings are on that. I understand where you're coming from.

MR. BOCKHOLD: We've basically put the test on hold until we could resolve the issues with dew point. Okay?

And one of the parallel paths was that our engineers, our folks believe that the air quality that we are actually seeing in the instrument controls and in the receiver, even if the dew point was a little bit high, would not be of concern for operability of the diesel engines, would not affect the control systems. We are verifying that with Cooper. If Cooper agrees with those opinions, we would be prepared to go ahead and run the test.

In the meantime, in parallel, we are doing the appropriate procedure with the air receiver and the air dryer that if the dew point is not correct, we'll go ahead and lower the dew point in the air tank. But we're not seeing the dew point in the air tank getting any better. So, we're starting to believe, more and more, we have a bad instrument, and the instrument has somehow failed.

MR. CHAFFEE: I see. Okay. I understand.

[Pause.]

MR. CHAFFEE: George, Rick is going to talk to you a little bit at Catawba.

MR. KENDALL: It's our understanding that Catawba is the only other plant with TDI diesels that has a refrigerant-type dryer, and there were some problems at Catawba with their dew point and moisture affecting their Calcon pressure switches, and we understand that you don't think you have a dew-point problem, and we understand that you've also got a different model of pressure switch that may not be subject to the same types of problems that they had at Catawba.

However, when we go back and look at this thing, one of the tests that was run was on jacket-water pressure disconnecting the sense line, and the diesel tripped after 80 seconds, which was one of the timeframes during the event, and just putting everything together, one of the

things that we would like to either prove or disprove is that the problems that Catawba had are not the same problems that you have or that you don't have the same problem that they had at Catawba.

MR. WARD: This is Lewis Ward.

We talked to Catawba yesterday afternoon, after this question came up, and the problem that they had was associated -- they also have a desiccant in their dryer system. They attributed their problems to an incident where the desiccant became saturated, and they got desiccant into their air system, and they saw some corrosion on carbon steel surfaces due to the desiccant.

MR. KENDALL: Okay. Appreciate that. We had some bad information then.

MR. CHAFFEE: So, Vogtle does not use desiccant?

MR. WARD: No. We just have a straight refrigeration system.

MR. CHAFFEE: And Catawba has a refrigeration system and desiccant?

MR. WARD: That's what they told us, yes.

MR. CHAFFEE: Okay. We were also told -- I think I was told this -- that the model -- I'm not sure this is right -- that the Calcon switches that you have at Vogtle are a newer model than those that existed somewhere else where problems existed, and I think it was Catawba. Does

that make any sense?

MR. BOCKHOLD: The pressure switches that Catawba had a problem with and they changed to a newer model, we changed to the same newer model.

MR. CHAFFEE: Okay. Do you happen to know what the new model -- you know, what the change was?

MR. BOCKHOLD: I believe the change was a clearance change in the switch itself.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: That comes from a brief conversation that I had with the guy at Catawba -- Wally Greene.

MR. CHAFFEE: Okay. The other thing you should be aware of is -- we received from you the Part 21 on Calcon switches dated April '88. We have also been told, but we haven't gotten the document yet, that there was a supplement to that Part 21 that was dated May 12, '88. We'd like to get our hands on that, and I guess we'd also like to make sure that you're aware of it. I would assume that you guys must have it in your records, as well.

MR. BOCKHOLD: Yes, we do have the Part 21. I gave copies to Rick Kendall.

MR. CHAFFEE: I know we got a copy of the April '88 Part 21, but did you give us the supplement, also? There's a supplement to it that was dated May 12th of '88.

MR. BOCKHOLD: I gave you the April one.

MR. CHAFFEE: Right. That's my point. Apparently there is not only the April '88 Part 21 but there's a supplement to that Part 21. It's the supplement to the Part 21 that I personally haven't seen. I wanted to make sure you guys were aware of it, and we also want to see it.

MR. BOCKHOLD: We'll send it to you.

MR. CHAFFEE: Okay.

Okay. Let's see.

Question: On your testing that you've done so far, you've been collecting some data, and we had some questions yesterday, and where we left off yesterday was -- well, maybe, at this point, I should just ask you. Can you run through where you are in collecting data -- I would assume that you've continued collecting data over some period of time -- and what you've found, and is there anything new in that regard, lube oil and that sort of stuff?

MR. WARD: What are you looking for?

MR. CHAFFEE: I want to get a mental picture of things like have you continued to see that the -- okay. First, how long have you been taking data now? Have you continued taking data since you started the test? Has the temperature continued to remain steady at 163 degrees for the sensor? Have you looked into the lube oil system to see

how its temperature varies as a function of time? Have you found any new hotter spot than the 170 degrees that existed on the lube oil heat exchanger? Information like that.

MR. WARD: We have continued to take the readings since yesterday. That temperature has not varied more than probably a degree and a half.

We have monitored the lube oil heater. The lube oil heater turns on and off at about a 50-minute cycle. And if you look at lube oil temperature, the lube oil temperature, in and out, averages about 155 degrees when it turns on. It turns off when you get an inlet temperature of about 167 degrees. Then it stays off for 50 minutes. Meanwhile, the temperature comes down to about 155 or so and repeats the same cycle.

MR. CHAFFEE: So, the cycle, as I understand it, is when the temperature gets down to 155 degrees, the lube oil heater comes on. It stays on for about how long?

MR. WARD: Fifty minutes.

MR. CHAFFEE: It stays on for 50 minutes. And that then heats up the temperature to 167 degrees, and at that point, it turns off, and it remains off for how long?

MR. WARD: Almost identical time -- 50 minutes.

MR. CHAFFEE: Fifty minutes. And then it repeats the cycle. So, the temperature cycles between 55 degrees and 167 degrees.

MR. WARD: Correct.

MR. CHAFFEE: And that temperature that you're measuring is the temperature at the inlet to the warmup pump for the lube oil system which takes a suction close to the heater?

MR. WARD: Temperatures that we're reading are the temperatures on the engine panel, which is called lube oil in and lube oil out -- lube oil into the engine and lube oil out of the engine.

MR. CHAFFEE: Okay. How do those temperature readings relate to the temperature that the jacket-water system sees when the system is in the warmup condition?

MR. WARD: Jacket water is used to cool the lube oil.

MR. CHAFFEE: Right. I understand that. But with the diesel secured and the warmup systems working -- you know, what we said yesterday was the hottest place you saw --

MR. WARD: Was at the inlet to that heat exchanger, which those two temperatures match up. You've got two thermometers that are next to each other, and they read the same. The inlet jacket water and the lube oil reads about 167.

MR. CHAFFEE: I see. Okay. So, where you're reading the lube oil heat exchanger inlet temperature and

the jacket-water temperature for -- where you were monitoring that are the same location.

MR. WARD: Yes.

MR. CHAFFEE: Okay. I understand.

Okay. What that suggests, then, is if the max temperature they saw was 167 degrees in the lube oil, it sounds like the lube oil system and the jacket-water systems were both designed to control their temperatures around the same values.

MR. WARD: Yes. The jacket-water heater has not turned off at all since that once cycle we seen early in the test. It's been on continuously.

MR. CHAFFEE: Okay. Well, this is unrelated to the event, but I guess the one thought that has run through our minds up here was do you have a problem with the strength of that jacket-water heater, in the sense that it's -- if you're in the middle of a very cold period of time, you know, like in the winter or something, that it wouldn't be able to provide the necessary heat to keep the jacket-water system --

MR. WARD: Diesel building is maintained at a temperature, so they shouldn't change any. We maintain the diesel building at a temperature. It's not like the diesel building gets colder in the wintertime. We've got heaters in.

MR. CHAFFEE: Okay.

So, I guess what you conclude from all of that is that at least the initial conditions for the -- okay.

The next question is this: Based on all this data you've taken, what do you believe and how confident are you that what you believe is right, in terms of the temperature distribution of the water that exists in the jacket-water system and the lube-oil system, such that what's your expectation that you're going to see when you do a start in the diesel?

Have you got a feeling for that yet, from all the data you've taken?

MR. WARD: Be a few degrees rise, I, at this point, don't expect much.

MR. CHAFFEE: So, your impression is that the temperature of the jacket-water system and the temperature of the lube-oil system is pretty evenly distributed by the warmup system such that there's not much variation in temperature and that when the diesel starts, you should think of it sort of as a homogeneously mixed -- mixture of water from a temperature standpoint in both systems at the time the diesel starts?

MR. WARD: It appears like now. Won't know until after we do the test.

MR. CHAFFEE: So, you haven't found any hot or

cold spots in these two systems relative to the average temperature.

MR. WARD: No.

MR. CHAFFEE: Okay. Have you taken enough -- you know, looking around the system, taking temperatures on pipes or whatever -- to be satisfied that you'd be very surprised to find a hot or a cold spot?

MR. WARD: Only place that I know right now of where we'd find anything warmer is that lube-oil heat exchanger.

MR. CHAFFEE: Okay.

MR. WARD: That goes up to 167.

MR. CHAFFEE: So, basically, it's only about 4 degrees warmer than what the sensors are saying.

MR. WARD: Yes.

MR. CHAFFEE: Okay. I have a question. When the diesel is sitting there and it gets called upon to call a safety function, initially, I guess, as far as ultimately removing heat from the diesel, that's done by this nuclear service cooling water. I guess I have been told that, at least, when the diesel gets its initial start signal, although the nuclear service cooling water system, whether or not the pump is running or not, they don't actually get flow to the heat exchanger because there is some sort of a temperature control that prevents that.

The question I have is sort of some of the details. Does that start off, then, with the valves completely shut or are they partially by-passed? How long does it take before those -- is there any kind of a timer that insures that they don't open for a period of time or what temperature do they have to begin to see before they begin to open. How long does it take them to open?

MR. BOCKHOLD: What I was told -- and Ken Burr, correct me if I am wrong -- is this is basically kind of like a throttling by-pass valve. It is fully open at 170 degrees and fully shut at 152. Is that correct? So, with jacket water at 163 that valve is partially open, or partially closed, at about halfway.

MR. CHAFFEE: What's the temperature of nuclear service cooling water?

MR. BOCKHOLD: It will vary but anywhere, I guess, from 45 degrees to 85 degrees.

MR. CHAFFEE: And at this point, right now, today, it's what?

MR. BOCKHOLD: Well, my pool is about 62 degrees, so I would say it's about that.

MR. CHAFFEE: Okay. Then let's assume that if the jacket water system is at 168 degrees, then that oil must be flowing through that heat exchanger and right now it must be being cooled, to some extent, by this nuclear service

cooling water because it's colder, and there is some flow through there.

MR. BOCKHOLD: The jacket water has its own nuclear service cooling water cooler. The low boil has its own separate nuclear service belt.

What's your question?

MR. CHAFFEE: What I'm trying to understand is what the heat balance is here. It sounds like what we've got is the low boil is cooled by the jacket water, the jacket water is cooled by the nuclear service cooling water and it sounds like if this nuclear service cooling water system is running which it is right now, if the valve is partially open it's going through and cooling off the water that's in the jacket water so one of the things that's occurring right now in terms of heat loss that the jacket water system is trying to make up for is the energy that's being removed due to the nuclear service cooling water system being partially cooling that heat exchanger. I just want to make sure my understanding is correct.

MR. BOCKHOLD: It's being mixed up in your head. We've got -- in standby, we have a small jacket water pump that pumps about 90 gallons a minute around the system but it by-passes the nuclear service cooling water. The main shaft pump which pumps anywhere from, let's say, 1200 to 1800 gallons per minute, okay, it flows through a large

nuclear service cooling water heat exchanger.

MR. CHAFFEE: Well probably the coldest point in the jacket water system is the water that's in that heat exchanger because it's probably at 62 degrees.

MR. BOCKHOLD: Yes.

MR. CHAFFEE: And that cold slug of water, then, will first be introduced into the system when the diesel starts and then that cold slug of water is going to find its way through until it hits these sensors -- unless it's heated up as it goes through the engine -- it hits the sensors once the diesel starts. So, I guess we would expect that we are probably going to see, when the diesel starts up, a dip in temperature before it then goes back up. At least, based on what we just talked about.

MR. BOCKHOLD: You might see a dip in temperature.

MR. CHAFFEE: Might see one. Okay.

Are there any other dynamics of any other portions of the jacket water system or the lube oil system where you have something else going on, it's either hotter or colder. I think it's important that people understand going into the test what they might expect to see. Granted, at this point, it sounds like we may see a cold slug go in. I guess what we said yesterday is perhaps it's not that significant because your testing yesterday showed that the rate of temperature change shouldn't have that much of an impact but

it sounds like, from what you just said we shouldn't be surprised to see the temperature of the jacket water temperature probes dip down fairly -- could be all the way down to 62 degrees for a period of time, followed by an increase back up as the engine heats up.

MR. BOCKHOLD: I expect a decrease in temperature because most of the flow will be going around that heat exchanger.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: You know, we are speculating. There is a potential for temperature to drop and then come back up. It really depends on how that three-way valve is going to respond to temperature changes and how fast it is going to respond, and how fast the heat input from the diesel, you know, heats up.

MR. CHAFFEE: Say that one more time, George.

MR. BOCKHOLD: The shaft-driven pump delivers some by-pass flow around the cooler, some flow to the cooler. Then it comes back together and mixes so that temperature is going to go down. But then that cool water is going to come up and be right next to the cylinders in the diesel and it's going to pick up heat from the diesel at that particular point. Then it's going to come up to the temperature probes where we got it instrumented, okay? So, you know, my reaction is probably the temperature will drop some and then

come up but, you know, you have got a good bit of dynamics here working where you have got a control valve working and you have heat input from the diesel cylinders working so we will see what happens.

MR. CHAFFEE: Okay. Again, the only thing that I'm pointing out is I think it's important that people have it clear in their minds how all that integrated system activity is going to occur in the start so that people can be looking for expected parameter changes and recognize what kinds of things they should be looking for in terms of something that's abnormal, to make sure that people are as prepared as possible to, you know, look for things going right or going wrong as the test occurs.

In addition, what's true is in thinking through some of these dynamics it would -- maybe you guys have done all this, but to the extent you haven't in thinking through the dynamics it then can make it clearer to you what sort of parameters you need to make sure are established so that the test itself will be an effective test demonstrating that you don't have any problems.

For example, I understand that there will be a couple of differences between this test and a true simulation of what happened in the event because you are not going to be loading onto the buss and having certain load sequence. What we have been told and I don't necessarily

disagree with is that that difference has no impact because it's not going to have any significant impact on the portions of the system that are being tested. And I don't disagree with that but I would think that to reach that conclusion the people that are reaching that conclusion would have to make sure they understood what all the different phenomena that are going to be occurring to make sure that those parameters that aren't going to be the same would have no impact.

So, understanding the dynamics like you were just describing of how this cold water or other things, you know, how the water is going through the different components leading to the sensor, in terms of seeing how the inner system interaction is, will be important for them to understand. If they have not fully done that, what we're saying is they need to complete that process because you would be a little concerned, I would think, that if after you did the test and people were studying the results and stuff they found that oh, woops! Actually, it turns out that one of the things we didn't have established was one that was critical to make sure that this was an effective test and, therefore, we need to do the test again.

MR. BOCKHOLD: We understand what you're saying.

MR. CHAFFEE: Okay.

We understand. I guess it sounds like you are

probably going to be doing that test sometime late today. Is that sort of your guess, George?

MR. BOCKHOLD: I hope to be able to do the test this afternoon.

MR. CHAFFEE: Okay.

Region II, did you have any comment?

MR. BROCKMAN: I've got none from here in the headquarters.

MR. MILLER: I understand they will start the first test this afternoon. Assuming that test goes well, do we have any testing beyond that.

MR. CHAFFEE: I'm sorry, Ken. Could you say that one more time.

MR. BROCKMAN: I understand the first test is to start this afternoon. If things go well on that test, I am interested in any hypothesized schedules for subsequent testing after that so that I can have my resources at the site appropriately marshalled.

MR. BOCKHOLD: At this point, Ken, we have no more diesel tests that we plan to do unless something unusual comes out of this test or we think of something in the meantime. The next test being, I believe, on the temperature switches and Lewis Ward will be coordinating that with a lab someplace and probably, Lewis, you might speak to what schedule, if any schedule, you have been able

to think about.

MR. BROCKMAN: George, you've got a function schedule after you put in the MWO.

MR. BOCKHOLD: Yes, but I believe the IAT was not interested in that.

MR. BROCKMAN: But I am.

MR. BOCKHOLD: That would occur immediately after that.

MR. BROCKMAN: After what?

MR. BOCKHOLD: After the jacket water test.

MR. BROCKMAN: You won't have the MWO in that. You can't do the functional until you've got those trips taken care of with that MWO.

MR. BOCKHOLD: We have the MWO. It is approximately four to six hours duration and we would then go do the functional immediately after that.

MR. BROCKMAN: So you would anticipate that that is probably an activity to be done this evening, then?

MR. BOCKHOLD: Probably, yes. We have already done that on the B Diesel.

MR. BROCKMAN: Okay.

MR. CHAFFEE: Okay. George, on the one test that you are going to be doing later today. The one thing that, I guess, we are particularly interested that you focus on is making sure that the dynamics of that nuclear cooling

service water system is well understood. We know in the event that that thing got cycled on later on and -- the same thing. Just make sure that -- it would be very disappointing to find out afterwards that somehow you had to do it again because the parameters weren't exactly right.

Okay. Why don't we go on ahead to Lewis Ward and what his --

MR. WARD: Okay. On the temperature switches, I talked to Wyley Labs yesterday and, basically, briefed them on what had happened at the plant and what some of the concerns were. They were, obviously, willing to put together a test program for us. Their approach would be to do a design review of the switches in a paper-type review first. Do a failure-type analysis on materials in the switches that would be most subject to either failure or corrosion or degradation and then examine a new switch destructively, or at least take it apart and look at the inside and confirm that their engineering review was on the right track and then design us a sequence for examining and testing these switches to establish what had happened to them or see what kind of drift or erratic operation we might have seen out of these particular switches.

I am getting a proposal. They are faxing a proposal to me this morning to do that. They had indicated if we elected to go that sequence the first part of that,

the engineering review and the test sequence they could have in about a three-week time frame.

MR. CHAFFEE: Okay.

MR. WARD: I did inform them that the NRC and Calcon and several other people would be interested in looking at the test plan ahead of time and probably witnessing the test.

MR. CHAFFEE: Okay. Just a second.

I think a couple of people just joined in this line. For those people that did just join, we have another conference call on this line at 11:00, so if you will just hold on for a second we will finish. This is Al Chaffee with IAT. We will finish this dialogue we are having here and then go on to that. So if you would just be patient for a few minutes.

Okay. I understand, Lewis.

Okay.

MR. WARD: Was that what you were looking for?

MR. CHAFFEE: Yes. I would have been nice if they could have, here in the short term, just done some -- what would you call them? Sort of a repeatability study, where they just take one of these switches and run it through a number of tests. Let me say it differently.

It would have been helpful if they could have, up front, before they did a lot of some of this other stuff,

simply take a switch or maybe two switches and simply do the following type of testing, to give us some initial information: Do a test where they were to demonstrate how repeatable the switch's performance was. You know, they just took a switch and did like four or five occurrences where they did carefully-controlled temperature increases and see where the switch tripped and see if it repeated itself with good reproduceability.

Do the kind of tests that George had his people did onsite, where they varied the rate of temperature change and see how the switch's set-point changes in regards to that. And then maybe do a set of tests where they would try to introduce through the air some particles of different sizes and see if that had any impact on that switch.

And if they could do that testing fairly quickly here, like in the next week, then they could see what kind of results they got with that and then follow that up with some of this more exhaustive testing. The advantage of that would be that we could get some quicker-term type of information in terms of these switches, with the more detailed analysis being done later.

[Pause.]

MR. CHAFFEE: Well, anyway, we're in the process with the agency of contacting some group -- and we're not sure who it's going to be -- to sort of follow on to all of

this.

Again, what I just said, I recognize that what Wyle is proposing is probably the long, exhaustive thing that needs to be done to get to the bottom line on all this, and for what it's worth, what I'm saying is that if there is some way that they can provide some short-term feedback in terms of some information about these switches, in terms of their reliability, reproduceability of their results, and some information in terms of their sensitivity to certain types of variations of the environment they were in, that would be helpful, to try to get a feeling for how the problems with these switches could have contributed to what happened here at Vogtle.

But again, it's not clear to me that we're going to have all these answers before the IIT report is issued. But to the extent we can, the IIT report will be being published, I think, sometime around May 7th. So, again, what our interest sort of is is to try to see what information we can get before that, to have it in the report, but I recognize that some of this stuff isn't going to be worked out until after the report is published, and it will end up being, probably, something generic that will be handled over the longer term.

So, do you understand what I'm saying? If there is a way to get some information --

MR. BROCKMAN: They are willing to do whatever we want them to do. If you want to release some of these quarantined switches -- and I'd send it to them this weekend or this coming Monday -- they'll be happy to take them.

MR. CHAFFEE: What I'm proposing, what I just talked about is propose that they do just some switches off the shelves, because at this point, what I want to try to make sure we put to bed is to what extent are they just dealing with a switch problem?

In other words, if you can take a switch off the shelf and just, you know, run it through its paces, repetitively, the same test and you get good reproduceability, that tells you at least one thing. It tells you that its characteristics don't change just as a matter of sitting there in the bath.

And then if you do a couple of tests like they did at the site, where they varied the temperature over a bigger range than what they were able to do at the site, then you put to bed the fact of how sensitive the switch is to the rate of temperature change.

If you then do a couple of tests with a switch off the shelf where you go through and maybe introduce some varying size particles and get a feeling for to what extent that can cause a problem in a switch, then what you've done is you've then sort of tested the environment for a good

switch that you got from the manufacturer in terms of sort of the parameters that it will work with, and then at that point, once that's done, then you can do that with -- in conjunction with the other study that they wanted to do to set yourself up for them going out and looking at what the specific failure mode was on the switches that are quarantined.

But at least it puts to bed some of the folklore that exists. I mean, you know, some people have told us that the rate of temperature change impacts the set-point on the switch. The results that George had done at the site tends to repudiate that.

We've also been told that if you get some particulate in there, perhaps that could impact the switch. Well, it would be nice to know if that, in fact, is true or not.

It would also be nice to know -- we've also had situations where the licensees calibrated the switch, only to find a day later it's not calibrated. Well, it would be nice to know whether or not that is because the switch is just poor repeatability, that it can drift all over the place on its own, or in fact, it's something of above and beyond that. It would be nice to put to bed the fact that a switch does have good repeatability and, therefore, that if the calibration is changing, it must be due to something

occurring to that switch from the time it's calibrated until the time it's installed. Another thing might be to see -- you know, maybe somehow try to see if there is some way handling could cause problems.

So, there's some type of tests that Wyle could do that could be done, you know, sort of leading into some of these detailed material analyses that they want to do, but there's some of the type of tests that they could do, you know, perhaps in the short term, to try to quantify the problems we're dealing with.

At this point, from what we saw at the site, you know, we're up here having the suspicion that perhaps a lot of the big problem is just the fact that it turns out that the bottom of that sensor -- you can rotate the bottom of the sensor, and if you can rotate the bottom of the sensor, it has exactly the same equivalent effect as if you were doing a reset in the calibration. By that, I mean one rotation of the sensor bottom is equivalent to 100 degrees change in calibration set-point, which is identical to an action being done at the top.

So, you know, sort of almost like a rehearsal of how the things are calibrated might much more quickly lead to what's going on in terms of these sensors than some of the more exhaustive things that may still need to be done.

If they find that reproduceability is really bad,

then that's when you get into looking at the materials and things of that nature.

MR. BROCKMAN: Okay. I will approach them with that today.

MR. CHAFFEE: You have the drift of what I'm talking about.

MR. BROCKMAN: Okay.

MR. CHAFFEE: Okay. We need to have a fax number to send this stuff down that Rick has for the matrices of switch data.

MR. WARD: I will call Cherie and give her the fax number.

MR. CHAFFEE: Okay.

Again, Lewis, if all this stuff I just said -- if you guys don't agree with that -- this has to be your test program, not my test program, and I've only thrown out ideas of things that I think you should consider.

You guys, in conjunction with your own organization, need to think through in your own minds what sort of test program you need, and I appreciate the fact that, where you can, it would be the concept of trying to make it responsive to the IIT, and I think you can do that, but still, you know, you need to use your own technical expertise in terms of deciding what sort of testing is appropriate, in discussions with Wyle.

MR. WARD: Okay. What's your extension number, Al?

MR. CHAFFEE: It's 492-7229.

MR. WARD: Okay.

All right. I understand what you're driving at, and I'll apply my expertise, but I do want to run it back by you before we go charging off.

MR. CHAFFEE: Okay. And I'd like you, when you do that, to talk to Rick Kendall. He is the one on the team who has the lead on the diesel, and his number is 492-7318.

MR. WARD: Okay. Sure will.

MR. CHAFFEE: Okay.

Thanks. That's all we had, unless somebody else has any comments.

MR. BOCKHOLD: No comments from the site.

MR. CHAFFEE: Okay. Thank you.

MR. WARD: Thank you.

[Whereupon, at 11:02 a.m., the teleconference was concluded.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Telephone Conference

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Jon Hundley

JON HUNDLEY
Official Reporter
Ann Riley & Associates, Ltd.

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GPC EXHIBIT II-
BOCKHOLD EX. Y

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Incident Investigation Team
Telephone Conference Call
with Licensee and Region II

Docket No.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

INCIDENT INVESTIGATION TEAM

TELEPHONE CONFERENCE CALL

WITH LICENSEE AND REGION II

U.S. Nuclear Regulatory Commission

7735 Old Georgetown Road

Bethesda, Maryland

Saturday, April 7, 1990

10:00 a.m.

PARTICIPANTS:

U.S. Nuclear Regulatory Commission

Alfred E. Chaffee, Incident Investigation Team Leader

Rick Kendall, NRC

Vogtle

George Bockhold

Ken Brochman

Ken Burr

Louis Ward

PROCEEDINGS

[10:00 a.m.]

MR. CHAFFEE: Okay, let's go ahead. My name is Al Chaffee. Ken, why don't you go ahead and take us through the test and what you guys saw.

MR. BURR: This is Ken Burr. When we started the engine, it took about 40 seconds after we started and it gradually ran down in temperature from 163 to approximately 155 and one-half. We contribute that to the water that is in the jacket water cooler. That valve appears to be approximately one-half way open, so it's sucking up that cold water in there and driving it down.

MR. CHAFFEE: The valve that you are talking about that is one-half way open, is that the valve, that three way valve that either directs or doesn't direct jacket water through the cooler, or are you talking about a valve that is in the nuclear cooling service water system that somehow directs or redirects nuclear cooling service water to the cooler?

MR. BURR: I'm talking about the three-way valve that directs the jacket water.

MR. KENDALL: It's a temperature control valve, right?

MR. BURR: Right.

MR. CHAFFEE: Okay, I understand. Did you see

anything else? After it went down to 155 degrees, is that where it was when you then tripped the diesel or did it start going back up?

MR. BURR: It stayed within a few degrees of that. It came up a degree or so on the other starts, but it roughly stayed down in that area.

MR. CHAFFEE: Okay. How about the second start, did you see the same thing?

MR. BURR: No. Water was already mixed in it. It stayed in about that area.

MR. CHAFFEE: It stayed about in that area.

MR. CHAFFEE: The second start it stayed around 155 degrees both before and during the start?

MR. BURR: Right.

MR. CHAFFEE: It seems to me if I remember correctly after that, then you went on and started the diesel one more time and ran it for a period of time?

MR. BURR: We did not see any more temperature changes, just a few degree changes but nothing drastic.

MR. CHAFFEE: I guess what that tends to suggest then is, unless there is something else that occurred during the event, would it be correct to conclude that the jacket water temperature sensors probably did not see a real temperature higher than 163 degrees?

MR. BURR: Correct.

MR. CHAFFEE: In light of that information -- based on that information, what does that then cause you to think in terms of what happened during the event in terms of the trip --in terms of what caused them or what occurred?

MR. BURR: I show an intermittent problem with two sensors.

MR. CHAFFEE: Did you have any failures of the jacket water temperature sensors that were such that they would have been in a trip condition for temperatures lower than 163 degrees?

MR. BURR: I don't think we found any on recalibration that were that low. We found one that was 186 degrees A1, remember?

MR. CHAFFEE: Yes.

MR. BURR: We replaced both of those, and both of those are in quarantine. The other one calibrated okay and is still on the engine.

MR. CHAFFEE: What do you think, Rick? With this information, it's beginning to sound to me like the jacket water temperature sensors didn't have anything to do with it. I guess that can't be true, because they had the -- when we were talking to the Cooper fellow -- is he there, by chance?

George, is the Cooper guy back on site?

MR. BOCKHOLD: They are not.

MR. CHAFFEE: If I think back to what they told us about -- remember they did that little test as part of the test program -- I can't remember all of it. It's something about they simulated a jacket water temperature sensor trip and did something else and tried to reproduce the annunciations they had after the second trip.

MR. BOCKHOLD: Ken Burr, help me if I am saying something not quite right. What I believe is that we had the jacket water trips in -- okay -- when we started the engine or simulated an engine start --

MR. BURR: Started it with two sensors vented.

MR. BOCKHOLD: We started the engine with two sensors vented. I think we even did this on a B-diesel. That would go ahead and give the annunciation that we saw on the second start of the A-engine.

MR. CHAFFEE: You mean, the second start and trip of the A-engine?

MR. BOCKHOLD: Correct.

MR. CHAFFEE: That annunciation was what?

MR. BOCKHOLD: Was jacket high water temperature trip, turbine lube oil trip -- what was the other one? Hold on, and I will look it up.

[Pause.]

MR. BOCKHOLD: Low jacket water pressure. The three annunciations were a low turbo lube oil pressure, low

jacket water pressure, and high jacket water temperature.

MR. CHAFFEE: In that testing did they try doing it the other way around, simulating a low jacket water pressure and see what kind of indications they got with that?

MR. BURR: Yes, we did.

MR. CHAFFEE: What did you get?

MR. BURR: I would have to go back and look at it again, it's been a while since we did that.

MR. BOCKHOLD: Let me ask Ken. You did not get the same indication -- no, he got a different indication. It was not the same indication as the second trip.

MR. CHAFFEE: George, if I heard what you just said, when you simulated the low jacket water pressure, you did not get the same annunciations -- you don't believe that you got the same annunciations as you got when you simulated high jacket water temperature trip.

MR. BOCKHOLD: Correct.

MR. CHAFFEE: Based on that, do you remember what you did get when you simulated low jacket water pressure? Did you only get the low jacket water pressure trip signal?

MR. BOCKHOLD: I believe so that was it, yes.

MR. CHAFFEE: That was the only one that was in?

MR. BOCKHOLD: I would have to go back and make sure, but as I remember that's all we got.

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MR. CHAFFEE: I guess if that's the case, it certainly says it was jacket water. It seems to indicate that it was jacket water temperature. I have to admit, it surprises me that the jacket water temperature sensors could be that bad if they only saw 163 degree water that two of them would trip. I guess it's possible.

MR. BOCKHOLD: With the alarms that we had, it reproduced the alarms exactly.

MR. CHAFFEE: I guess the other thing that surprises me though is what I have been told is that the jacket water temperature trip signals are emergency trip signals, and they remain in when you do an emergency start. If you were have hypothesized that the first and second trip -- let's say the second trip was due to high jacket water temperature, it is unclear to me why suddenly it is not a problem for the emergency start.

There doesn't seem to be any clear pattern in this whole thing in my mind.

MR. BURR: It's an intermittent problem.

MR. CHAFFEE: Is it your belief that it caused the first two trips and obviously -- is that your --

MR. BOCKHOLD: Yes, that's our --what we would say is the probably cause.

MR. CHAFFEE: Somehow it fixed itself before the third start?

MR. BOCKHOLD: An intermittent problem.

MR. CHAFFEE: I guess what is true is, we did see that one high jacket water temperature sensor that they had a problem in later testing once they pulsed it with pressure it fixed itself; wasn't that right?

MR. BOCKHOLD: Correct.

MR. CHAFFEE: Let me ask this question, maybe this is part of it. When they went to do the emergency start the third time, is there some way that doing the emergency start could have had the effect of having a pulse pressured to the jacket water temperature sensors that might have fixed one of them without people realizing that could account for why you didn't get -- I guess the other thing that is true is, not just one fixed it but two fixed themselves, didn't they?

When they did the emergency start they didn't get a high jacket water temperature sensor malfunction either, did they?

MR. BOCKHOLD: That is correct.

MR. CHAFFEE: The two that went bad, both of them fixed themselves somehow for that third start one could hypothesize.

MR. BOCKHOLD: That's correct.

MR. CHAFFEE: So, I wonder if there is something about the emergency start method that perhaps pulsed both of them? Hell, I don't know. After you did that testing, are

you now working on your MOD, or do you have the MOD in?

MR. BURR: We put the MOD in. We have done an engine start without an air roll and a complete UV test again, to demonstrate that the MOD works in a complete emergency mode. We tested the A-diesel with the MOD in an actual condition that it would see in a blackout.

MR. CHAFFEE: I guess at this point as far as getting to the root cause of what is going on with that diesel during this particular test, the best hope is to hope that when they go out and investigate these quarantined switches that they will be able to reproduce, the fact that they intermittently failed such that they would trip with a temperature of down around 163 degrees.

Of course, that would mean that they would have basically been in a trip condition at the time when the diesels started. Is jacket water temperature one of those things that gets bypassed for a period of time?

MR. BURR: It is just bypassed for the first 60 seconds.

MR. CHAFFEE: What it tends to suggest then is that two of those particular sensors, temperature sensors, must have been in trip for the entire period up until the emergency start. Maybe they just would not reset. That tends to suggest that they were in the trip condition once they were placed in the -- wait a second, that doesn't make

sense.

They had to have worked properly previously or when you did your previous testing you would have -- did you guys have an records when you did your testing in maintenance of these jacket water temperature sensors giving you any kind of sensor malfunction?

MR. BOCKHOLD: In the data request that you asked for associated with the switches, we have provided the data. I can read through that because I just happen to have it on my desk if you want.

MR. CHAFFEE: Okay.

MR. BOCKHOLD: You want me to do that now, or what?

MR. CHAFFEE: Yeah. Basically what I am curious about is -- I guess I have this feeling that there must have been a prior occasion when the particular jacket water sensor probes that tripped in the event must have been found to have worked properly on some previous test with all the testing you did.

MR. BOCKHOLD: We ran the diesel before the event in accordance with the surveillance and declared it operable. We had done some prior starts on it and that type of stuff.

MR. CHAFFEE: My question is on that start that was done before the event where everything properly, is it

clear that the people would have recognized and did or did not -- they must have documented that they had no high jacket water temperature sensor malfunction alarms.

MR. BOCKHOLD: The documantation that we typically have on it is just that the diesel ran satisfactorily.

MR. CHAFFEE: It sure seems strange that the sensor probes would have been in a non-trip condition on a start and after the diesel is secured they -- okay, I don't know. There's no way that after -- after you guys secured the diesel, did anybody bother to see if the temperature of the jacket water area changed any after that -- that wouldn't make sense either.

MR. BOCKHOLD: What we have is probable cause was associated with intermittent failures of the jacket water switches.

MR. CHAFFEE: I guess that's as good a answer as any. Do you anything, Rick?

MR. KENDALL: No.

MR. CHAFFEE: I guess on Monday you guys are going to be going up and talking to Region II?

MR. BOCKHOLD: That's correct.

MR. CHAFFEE: It sounds like at this point, as far as any further troubleshooting of this, it's going to focus on the quarantined sensors.

MR. BOCKHOLD: That's correct.

MR. CHAFFEE: Louis, how are you doing on coming up with some tests for the switches in general and eventually more specifically the quarantine switches?

MR. WARD: I spent most of the afternoon yesterday with Rick Kendall and Harvey Wyckoff -- I have a real good feeling of what I believe the concern is or what the immediate interest is or was at that time on the switches, the reliability of those type of switches in general. For the short term, we would be looking at taking a couple of new switches from stock and doing a reliability test on them and then leading into the failure evaluation of the ones that are in quarantine.

They expressed an interest in handling that Step 1 if you want to call it that, the reliability demonstration on the new switches. That information is available for the IIT report, and the quarantine would be a longer term evaluation.

MR. CHAFFEE: I understand. Again, obviously, the first priority is to find out what went wrong with those switches. That priority takes precedent over whether it is found out before or after the IIT report is issued. Obviously, if the story of these switches including what caused them to fail during the event could be found before the report goes out, that would be our -- that would obviously be what we would like to happen.

MR. BOCKHOLD: You would like to see us --

MR. CHAFFEE: We would like to know what caused the trips to fail and know how reliable the switches are before the IIT report is issued, but that is a secondary priority to making sure you find out. As far as a timeframe goes, if there was an ideal world, we would probably like to have all the answers to this thing probably by April 21st.

I don't know what it takes to get there. I guess the first priority is to find out what went wrong. Again, our preference would be to find out before the report is issued. Currently, the report is scheduled to be made available to people around May 7th.

MR. BOCKHOLD: Okay.

MR. CHAFFEE: If there is any way when you guys start scoping this thing out that you could get the reliability stuff done and get a plan of attack to go in and look at these quarantine switch -- the ideal goal would be to shoot for having this thing all resolved by April 21st. Recognize that you shouldn't do that if it results in not being able to do the job right.

MR. WARD: I think to properly evaluate the switches that are in quarantine by two weeks from today, I frankly think we would have to rush headlong into doing that.

MR. CHAFFEE: We will rely on your judgments,

technical judgment on how you pull this together and just ask you to do your best. If you can't do that, do it to the time clock you can do.

MR. WARD: Okay.

MR. CHAFFEE: Realize that the IIT report will provide, if it has that root cause in there, an excellent mechanism to get the word to the industry in terms of what went wrong with that diesel. To the extent that it isn't known, it will have to come out in some other form. It is not just -- there is a benefit to the industry if you can get it done in time for the cause to appear in the report. It will cause the word to get spread better.

But, on the other hand, if you can't there's other ways of getting it out. There are other types of ways it can come out.

MR. WARD: I think there are plenty of data channels that we can get it to the rest of the industry.

MR. CHAFFEE: Okay. Rick, if the two of you will keep in contact. If possible, we would like you guys to try to get it done before the report gets out so that we can have it in there. It would be nice to know that, if possible, what you are pursuing is the cause for what happened to that diesel -- if it was to turn out that you guys were able to conclusively show that the sensors did not cause the trip then, of course, we would need to scratch our

heads and try to figure out what else might have occurred in this diesel that could have caused it.

That would mean that there is something else that is roaming around and it can manifest itself at some later time under some conditions similar to that.

MR. WARD: I understand and we will push ahead with all due speed.

MR. CHAFFEE: Okay. Is there anything else that we should talk about?

MR. BOCKHOLD: I can't think of anything else.

MR. CHAFFEE: Okay. Thanks George. I guess on Monday you guys -- I suspect you will be up in the Regional Office. I will be tapped in, just listening to you guys and the dialogue. I guess we are going to schedule our phone call with the site at 9:00 o'clock, and all we intend to talk about there is administrative things, documents and stuff.

I guess for that call I am not sure who will be there from your side for that call. I don't envision it lasting very long. Will it be Skip Kitchens, or who do you think will be the senior person we will be talking to on Monday morning?

MR. BOCKHOLD: Skip will be there, but if it is just administrative stuff we could allow Mehdi to do it.

MR. CHAFFEE: That's fine with me.

MR. BOCKHOLD: Fine. Maybe we will tell Skip that he doesn't have to come.

MR. CHAFFEE: Okay. All we will be talking about then will be documents we need and possible -- like what Warren wanted, to have a discussion with some people and that type of stuff. As far as the diesel discussion goes, I don't anticipate that we will have any of that at the 9:00 o'clock call because I think what we will do is, we will just listen to what you guys tell Region II during your 10:00 o'clock meeting with them.

What we will do on Tuesday, we will go back to the 10:00 o'clock calls again. I guess what will happen is, it will tend to be more of administrative in nature unless something else comes up on the diesel.

MR. BOCKHOLD: What we would have is, we would have from a site -- we would have Louis Ward will take the lead from corporate on those calls from now on.

MR. CHAFFEE: I guess the other thing that would help us --

MR. WARD: Are you all still there?

MR. CHAFFEE: Yes, we are. Let me ask Rick a question. Rick, would it be helpful for us to have the Cooper guy if we could contact him, have him run us through that logic diagram as to why those high jacket water temperature sensors give the various indications so that we

an expound on that if necessary? I can't figure that out.

MR. KENDALL: It would be good to have his number so that we can contact him.

MR. CHAFFEE: Can we have that Cooper representative's phone number so we can contact him? We need to have him take us back through the logic as to why -- let me rephrase that. I assume he's the one we need to talk to, because I'm not sure.

MR. BOCKHOLD: Mr. Shelton from Cooper is in Hawaii.

MR. CHAFFEE: Maybe we can fly out there and talk to him. Do you have any idea when he is going to be back?

MR. BOCKHOLD: I imagine in a week, but he left this weekend.

MR. CHAFFEE: Is there anybody on site who can explain that logic to us?

MR. BOCKHOLD: Yes.

MR. KENDALL: Ken Burr and Ken Stokes.

MR. CHAFFEE: Can you guys do it?

MR. BOCKHOLD: Yes.

MR. CHAFFEE: We need to get the drawings and stuff. Would you be interested in doing that? When would you like to do that?

MR. BOCKHOLD: How about Tuesday. Let Ken Burr do it when he's back in Birmingham.

MR. CHAFFEE: Sounds good to me. We will do that on Tuesday.

MR. WARD: You want to continue having this call at 10:00 Eastern? I heard you say 9:00.

MR. CHAFFEE: Nine on Monday and 10:00 o'clock thereafter.

MR. WARD: Okay.

MR. CHAFFEE: Thanks everybody. Have a nice weekend.

[Whereupon, at 10:23 a.m., the telephone conference concluded.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Telephone Conference Call

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Mary C. Rosenberg

Mary Rosenberg
Official Reporter
Ann Riley & Associates, Ltd.

TAPE 34

April 4, 1990

Tr. 11-14

BOCKHOLD: The switches in the field were calibrated using a water bath inside a thermal well with people lightly tapping on it and watching very closely with the supervision of Cooper engineers right there with our I&C techs.

MALE VOICE: This last time (inaudible).

BOCKHOLD: Not this last time. This is what we actually have in on the diesel (inaudible).

MALE VOICE: Now.

BOCKHOLD: Now. What we did on that one switch in the lab we did some with the I&C folks.

MALE VOICE: Yeah. But, what I'm saying is the arrangement that we had yesterday in the oil bath was a different arrangement than we had the other day. Oil bath is oil bath and I should state that RTD is RTD. But I think what you need to do is lock in and say "this is the way we are going to do it and this is the equipment we are going to use."

BOCKHOLD: I agree with you. The problem is we have different types of people doing different types of tests and . . . and . . . their perception of the correct test methodology of what they are used to and what their experience is is different. And we have been doing a lot of this in parallel to bring the engines to an operable state. And now we have these quarantine switches that we want to go ahead and do a very rigorous . . . all of us want to do a very rigorous test methodology. And we can't do it with the

same people we got still working on the diesels. Well, we can but it all will be four days from now. (Inaudible.)

McCOY: Let me go back . . .

BOCKHOLD: And that's the organization I need to talk you about.

McCOY: Let me go back and get this thing in. One of the items that we have already done is that -- is revise the calibration procedures. Wasn't that what . . . ? For these switches?

BOCKHOLD: These switches that are on the engines they've had close supervision of Cooper engineers while they were calibrated.

McCOY: Been revised and --

BOCKHOLD: No, we did not revise our procedures. We basically did it in a very consistent fashion and part of this overall thing is we will revise . . .

McCOY: We will revise.

BOCKHOLD: Will revise the final procedure that we use. Because there is some controversy over whether the way the Cooper people did it is the best way or is there a better way. And we believe there is even a better way than the way Cooper people had us do it. The way Cooper people had us do it was very consistent.

The thing that was inconsistent was how much air do you (inaudible) upon the switch when you tap it lightly. But, the Cooper people did it the way they would do it if they were calibrating those switches for this engine and any other engine. We had our I&C shop originally calibrate these switches without

giving that piece to Cooper. Okay. Cooper were the people that physically tore it down and put back and supplied the technical expertise. But Cooper watched the calibration of switch in the plant. Basically, when those switches were calibrated the Cooper people closely supervised the technicians that were doing it, and it was done very consistently. And very consistently according to the way Cooper does their calibrating. It was signed off in accordance with our standard procedure. And our standard procedure basically says raise and lower the temperature three times and verify it at (inaudible) which responds correctly.

We have a special procedure on how to calibrate these things, how fast to raise and lower the temperature, that kind of stuff.

McCOY: That ought to address the issue of (inaudible).

BOCKHOLD: Yeah, that's really a long[er?] term action. We believe we've got good switches in the plant now. They were done consistently the way Cooper engineers say that's the way they should be done.

MALE VOICE: These things a couple days ago, you know, before the (inaudible) these were two jacket waters. Did they supervise that?

BOCKHOLD: Yes. Since the event all of the testing and changeout was supervised by Cooper people.

GPC Exhibit II-____
Bockhold Ex. AA

05-209-PD

GEORGIA POWER COMPANY
Inverness Building 40
P.O. Box 1295
Birmingham, Alabama 35242

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92 PROJECT 062884

DG INSTRUMENT TEST OUTLINE

Phase I. Jacket Water Temperature Switch Reliability Evaluation

A. Perform a reliability evaluation of two new temperature switches (Calcon Model A3500), used for Jacket Water High Temperature switches on the Vogtle Electric Generating Plant (VEGP) emergency diesel generators. The purpose of the evaluation is to determine switch setpoint repeatability due to several factors which are outlined in the following test sequences. Additional tests, based on results of these tests, may be added by approval of the GPC test monitor.

B. Test Sequence:

1. Record serial and model numbers, and other pertinent data from the instruments, prior to performing any disassembly or removing the sensor from its thermowell.

2. Remove the sensor from the thermowell and determine the as-found condition of the spacer-tube (how loose, whether or not lock-tite on threads, etc.). If the spacer-tube was not tight, mark the as-received position, then tighten the tube.

3. Connect air supply and test instrumentation to the switch to simulate installed configuration (approximately 60 psig clean, dry air through 1/4 in. tubing and 0.028 in. orifice). Connect test instrumentation to provide continuous recording of air pressure at sensor after the orifice, bath temperature (2 channels -- one in a well, and one in the bath) and time.

4. Perform a calibration of the switch in its thermowell using the attached calibration procedure. Set the switch @ 200 $\pm$ 2°F. This calibration is to remain in effect for the subsequent tests.

5. Perform setpoint tests to measure setpoint and reset sensitivity to the following parameters. The attached test procedure should be used to determine the trip and reset points.

   a. With the sensor installed in the thermowell, check the trip and reset point under the following conditions: (60 psig air supply, slow rate of temperature change (e.g. 1°F/minute)). Remove the sensor from the thermowell and insert it directly in the bath, and repeat the trip and reset test. Repeat the above cycle 2 additional times to check for changes in trip and reset points.

   b. With the sensor installed in its thermowell under varying rates of temperature change (approximately 2,4, 6, 10, 15

and 20°F/minute, with 60 psig air supply pressure).

c. With the sensor installed in its thermowell, with a slow rate of temperature change (~ 1°F/min.), with various air supply pressures (55 and 65 psig).

d. With the sensor installed in its thermowell, with slow rate of temperature change (~ 1°F/min.), 60 psig air pressure, determine the effect of vibration vs. static conditions on the setpoint.

e. With the sensor installed in its thermowell, with a slow rate of temperature change (~ 1°F/min.), 60 psig air pressure, determine the effect of a change in ambient air temperature of approximately ± 20°F on the setpoint.

f. With the sensor installed in its thermowell and the bath temperature near, but just below the switch setpoint, determine the switch response to a rapid reduction in temperature (approximately 10°F in 1 minute).

g. Determine the effect of tightness of the setscrew used to attach the sensor in the thermowell on trip/reset point.

6. Determine the effect of spacer-tube looseness by returning the tube to the position noted in step B.2. If the tube is not loose, then loosen it until it can be easily moved by light finger pressure. Install the switch in its thermowell and recalibrate it using the attached procedure. Check the trip and reset points (at 1°F/minute, 60 psig air) with the sensor inserted in the thermowell and with the sensor inserted directly in the bath, as performed in B.5.a above. Perform each test a minimum of 3 times.

Phase II.

Testing will consist of analysis work on 7 temperature switches to determine the cause of failure. The test method will be determined after the Phase I work is complete.

CALCON REPRESENTATIVE

California Control Company (CALCON)

Cary Hazelitt
1334 Callens Road
Ventura, CA 93003
(805) 650-1597

Mr. Gary Hazelitt was on site (VEGP) and did some initial testing and instructed site personnel on proper calibration methods. He is a good source for information on these switches.

ATTACHMENT 1

TEST PROCEDURE FOR SETTING HIGH TEMPERATURE
JACKET WATER TRIP SWITCHES (CALCON - P/N F-573-330)

1. Install temperature sensor in bath (See Temp. Bath requirements).

2. Hook-up Air Supply (60 psig thru .028 orifice and test gauge) to sensor "IN" port.

3. Heat-up Bath to temperature at which sensors are to be set and stabilize.

4. Set temperature switch to trip by slowly turning split ring clockwise while watching pressure gauge. While adjusting or checking trip temperature setting, lightly tap continuously on the side of the sensor. This simulates engine vibration and will give a more accurate setting. When switch begins to trip, the pressure gauge will drip. The temperature sensor is considered tripped when gauge drops to 20 psi.

5. Cool temp. bath and note that temp. sensor resets (40 psi on gauge) by 10°F below setpoint. Pressure gauge must reset to within 1 psi of supply pressure by 20°F below setpoint.

6. Reheat bath (always starting 20°F below setpoint) and check trip setting. Readjust as required to desired setting. A $\pm$ 2°F tolerance is acceptable.

7. Recheck settings until setting within tolerance is achieved two consecutive times.

ATTACHMENT 1, PAGE 2

TEMPERATURE BATH REQUIREMENTS

1. To test temperature switches accurately, a bath must have heating, cooling and circulating abilities.

2. Two Temp. switche thermowells are required submerged 3" into the water.

3. Install Temp. Sensor in one well and a thermometer in the other. (Seal thermometer in well at the top to suppress heat loss. Thermometer should not touch sides or bottom of well).

4. A 60 psi supply pressure thru a 0.028 $\pm$ .001 orifice thru a test gauge to the sensor is required.

TEMPERATURE SENSORS

Transamerica Delaval Inc.
Engine and Compressor Division

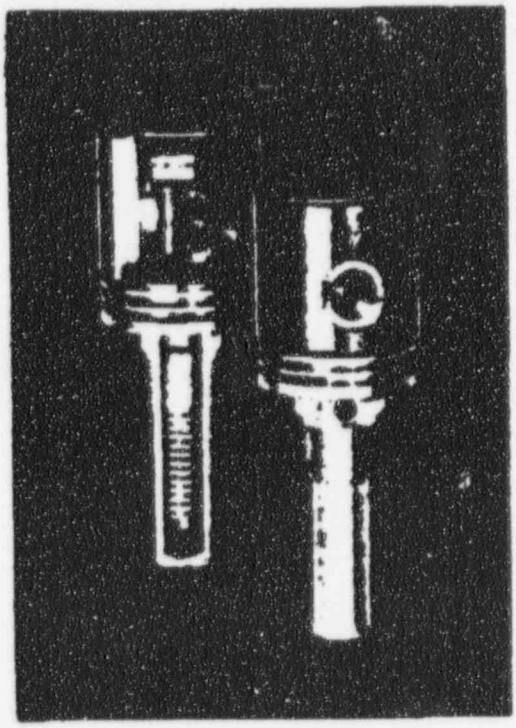
PART NUMBER(S)

F-573-330

FALCON

PNEUMATIC

SECTION A
RANGE 0–400°F



DESCRIPTION• This line of temperature sensors is designed around Calcon's unique solid phase thermal expansion cells. Model variations consist of rising temperature trip (N.C.), falling temperature trip (N.O.) and extended element units. Optional cadmium plated carbon steel or stainless steel wells are offered in the standard length units. Minimum wall thickness is 0.053". Extended element sensors have 304 stainless steel wells with 0.119" wall thickness. Being small in diameter, the sensing element stack permits installation in small diameter wells. The stroke vs. temperature ratio is linear over the full 0–400°F temperature range and the element is sized to give an accurate 100°F setting change for each full turn of the adjusting device. This type of expansion element has more inherent accuracy and linearity than the bi-metal disk type, and it cannot suffer rupture and loss of fluid such as may occur in the filled bellows elements. Actual element hysteresis is approximately 2 to 3°F, although service and installation factors such as wells, heat transfer fluids, rate of temperature change, etc. will impose other time and temperature gradients. The trip point may be affected by supply air pressure changes (approx. 0.3°F /Δ psi). Units must be installed in a thermo-well and if the unit is positioned within 45° of vertical, Dow 710 heat transfer fluid may be used. This material has a gel time of approximately 18 months at 400°F and appreciably longer at lower temperatures. This material must not be allowed to harden in the well and other heat transfer greases should not be used.

APPLICATION• These temperature sensors may be used as a detector in any media system compatible with the temperature range of the sensor and the material and pressure limitations of the wells. Extended element sensors are useful in reaching the center region of pipe fluid flows. Typical uses are on engines, gas compressors, and in the process industry as high and low limit transducers. Data is available relating to pressure and velocity ratings. Special wells for very high pressure service can be supplied.

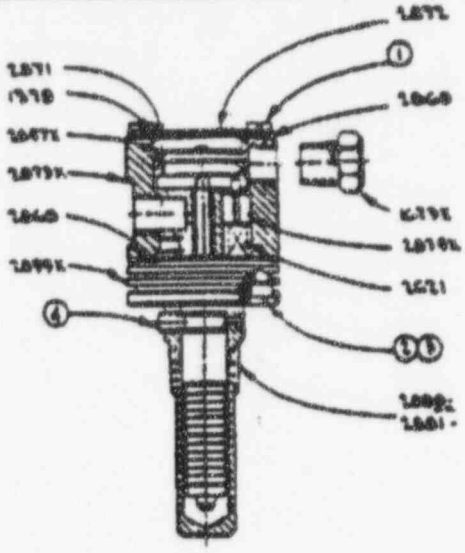
ORDERING INFORMATION• Use the table on the right and the outline details on the back of this sheet. Unless otherwise specified, sensors will be shipped factory set and tested at 300°F (static temperature conditions) with an applied 35 psi supply air. Upon request, special temperature settings will be made at no additional cost. A small vial of Dow 710 heat transfer fluid is supplied with each sensor.

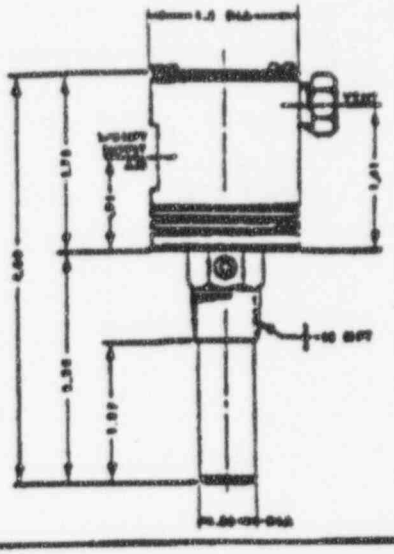
	MODEL NO. NORMALLY OPEN	WELL MAT'L	PIPE TH'D NPT	INSERTION LENGTH "L"	MODEL NO. NORMALLY CLOSED
STD LENGTH	A2850 C	STEEL	3/8	1.37	A2851 C
	A2850 S	304SS	3/8	1.37	A2851 S
EXTENDED LENGTH	A2850-N2	304SS	1/2	2.00	A2851-N2
	-N3	304SS	1/2	3.00	-N3
	-N4	304SS	1/2	4.00	-N4
	-N5	304SS	1/2	5.00	-N5
	A3500-N2	304SS	3/4	2.00	A3501-N2
	-N3	304SS	3/4	3.00	-N3
	-N4	304SS	3/4	4.00	-N4
	-N5	304SS	3/4	5.00	-N5

NORMALLY CLOSED STANDARD LENGTH

P/N	DESCRIPTION	QTY
1671X	VENT SEAL	1
1671	SPRING	1
1847X	ELEMENT SUB ASSY	1
1847X	ADJUSTER SUB-ASSY	1
1860	GASKET	2
1871	LOCK SLEEVE	1
1872	NAMEPLATE	1
1872X	BODY SUB.ASSY	1
1870X	POPPET SUB-ASSY	1
1873	CAP	1
1378	O-RING	1

AS SPECIFIED		
1880	WELL - STANDARD	1
1881	WELL - STAINLESS	

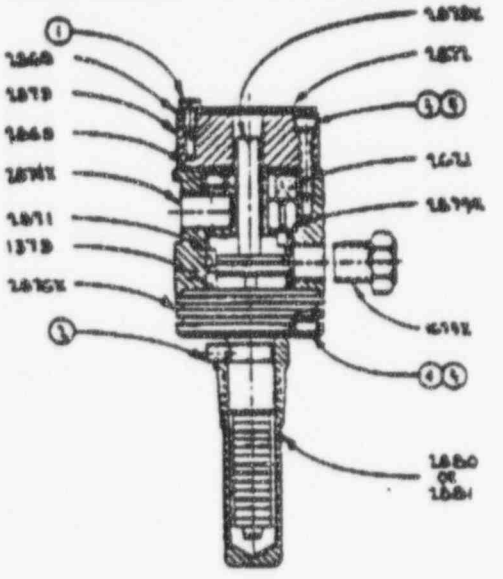


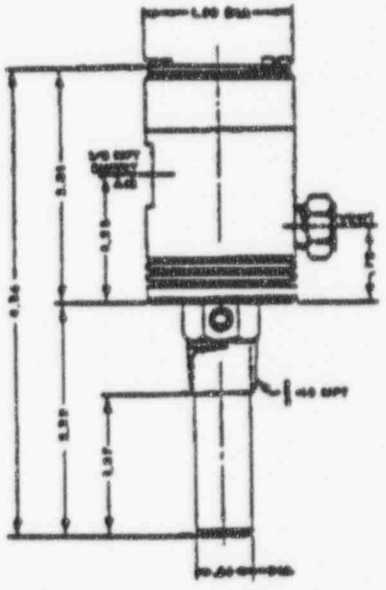


NORMALLY OPEN STANDARD LENGTH

P/N	DESCRIPTION	QTY
1671X	VENT SEAL	1
1671	SPRING	1
1870X	ELEMENT SUB-ASSY	1
1860	GASKET	2
1871	LOCKING SLEEVE	1
1872	NAMEPLATE	1
1870X	BODY SUB-ASSY	1
1870X	POPPET ASSY	1
1870X	ADJUSTER SUB-ASSY	1
1873	CAP	1
1881	PIN	1
1378	O-RING	1

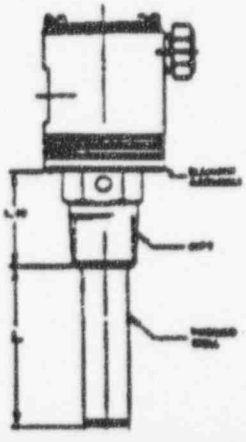
AS SPECIFIED		
1880	WELL - STANDARD	1
1881	WELL - STAINLESS	





EXTENDED ELEMENT SENSORS

PART NUMBER	O.C. ELEMENT	THREAD WELL	"L"	O.P.T.
A2020-[illegible]	[illegible]	2020-2	2.0	[illegible]
-[illegible]	-[illegible]	-3	3.0	
-[illegible]	-[illegible]	-4	4.0	
-[illegible]	-[illegible]	-5	5.0	
A2030-[illegible]	[illegible]	2030-2	2.0	[illegible]
-[illegible]	-[illegible]	-3	3.0	
-[illegible]	-[illegible]	-4	4.0	
-[illegible]	-[illegible]	-5	5.0	



[illegible] AND PARTS ARE AS GIVEN ON STANDARD SHEET ABOVE EXCEPT AS SHOWN. SEALS ARE MACHINED FROM 316 STAINLESS STEEL. FINISHED WALL THICKNESS IS 0.110.

SHORT WELL AND TAPERED WELLS ARE AVAILABLE FOR SPECIAL SHOCK FOLLOWING OR HIGH VELOCITY SERVICE. CONSULT FACTORY FOR AVAILABILITY.

THE SENSOR ATTEMPTS TO MEASURE AT APPROXIMATE CENTER OF THE CONICAL SLEEVE. IT IS [illegible] THAT A SHOCK [illegible] BE MADE BY DELIVERY IS ESSENTIAL.

92 PROJECT 062690