UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	
LONG ISLAND LIGHTING COMPANY	Docket No. 50-322-OL-3 (Emergency Planning)
(Shoreham Nuclear Power Station, Unit 1	

DIRECT TESTIMONY OF CHARLES G. PERRY, III AND GREGORY C. MINOR ON BEHALF OF SUFFOLK COUNTY

REGARDING

LILCO'S EMERGENCY BROADCAST SYSTEM

April 13, 1988

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Q. Please state your names and occupations.

A. My name is Charles G. Perry, III. I am a partner in the consulting telecommunications firm of Moffet, Larson & Johnson, Inc.

My name is Gregory C. Minor. I am Vice President of MHB Technical Associates.

Q. Please briefly summarize your experience and professional qualifications.

[Perry] I graduated from the University of Tennessee with a degree in electrical engineering. For the past 22 years, I have had extensive technical experience in cable, broadcasting and

private radio. Between 1966 and 1973, I was involved in a variety of technical and managerial positions related to the television industry. Between 1973 and 1977, I was the manager of applications engineering at Jerrold Electronics Corporation, where I was involved in signal strength measurements and the design of cable television plant and CATV receiving antenna tower. Between 1978 and December 1983, I was a Vice President of Westinghouse Broadcasting and Cable, Inc., where I was responsible for, among other things, cable, studio and transmitter plant construction as well as operations and engineering consultation to the radio, television and cable operations of the company. In January 1984, I joined Moffet, Larson & Johnson, Inc. I am a partner in the firm, and also a registered professional engineer in Virginia and South Carolina. Further details regarding my education, experience and professional qualifications are summarized in my resume, which is Attachment 1 to this testimony.

I should also briefly discuss my firm of Moffet, Larson & Johnson, Inc. Moffet, Larson & Johnson and its predecessors have been providing consulting services to the telecommunications industry since 1952. The firm is comprised of approximately 30 engineers and staff personnel, and has a national base of clients. The firm performs services with respect to every class of broadcast station, cable television systems, cellular systems, and common carrier operations. The firm regularly files appli-

cations for broadcast licenses with the Federal Communications Commission ("FCC") for AM and FM radio stations, television stations and various types of common carriers, including microwave, cellular, paging, two-way radio and multiple distribution systems. Over the years, Moffet, Larson & Johnson has conducted numerous measurements of AM, FM and TV antenna patterns; it has also frequently been engaged in the preparation of detailed equipment specifications for transmitters, antennas, towers, transmission lines and AM, FM and TV systems. The firm regularly prepares, and directs the preparation of, application and allocation engineering work, and conducts feasibility studies involving AM, FM, TV and common carrier facilities. Members of the firm regularly testify as expert witnesses before the FCC and other federal, state and local agencies.

Moffet, Larson & Johnson has engineers and a staff trained and experienced in performing field strength measurement tests and conducting measurements of radio frequency radiation patterns; further, it owns and controls equipment necessary to perform such measurements. The firm maintains computers to process computations for propagation diffraction analyses and has access to numerous sophisticated computer programs dealing with antenna design and adjustment, radio propagation, microwave path selection and optimization, terrain analyses, general allocations, TV and FM frequency searches and data base management. The firm also operates Broadcast Data Service, a division of

Moffet, Larson & Johnson, which maintains AM, FM and TV broadcast facility data bases and associated applications programs. A more detailed description of the firm's personnel and experience is appended to this testimony as Attachment 2.

[Minor] I graduated from the University of California at Berkeley with a bachelor of science degree in electrical engineering; thereafter, I received a masters degree in electrical engineering from Stanford University. I have taken courses in radio field theory and related subjects. For 16 years, I was employed by the General Electric Company and worked on matters related to the design, construction and operation of nuclear monitoring and safety systems, including hands-on experience at reactor sites. I have been with MHB Technical Associates, an engineering and energy consulting firm, for 11 years. During that time, I have been involved in a wide variety of projects, many of which have related to the operation and construction of, or emergency planning for, nuclear power plants. I have testified as an expert witness in numerous proceedings before the Nuclear Regulatory Commission, including those involving the health and safety, the emergency planning, and the February 13, 1986 FEMA-graded exercise proceedings in the Shoreham litigation. I am a member of the Nuclear Power Plant Standards Committee of the Instrument Society of America, and I served as a peer reviewer of the NRC's TMI Accident Investigation Report. Further details regarding my education, experience and professional qualifications

are summarized in my resume, which is Attachment 3 to this testimony.

Q. Do you jointly sponsor this testimony?

A. Yes. Nonetheless, in a number of instances, we indicate the primary author or sponsor of an answer. Where no primary sponsor is noted, our answer represents a joint effort although, even then, one of us may be more familiar than the other with particular matters or aspects of the testimony.

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to address LILCO's proposed Emergency Broadcast System ("EBS").

Q. Are you familiar with LILCO's proposed EBS?

A. Yes. LILCO's most recent EBS proposal was first revealed by LILCO in its "Motion for Summary Disposition of the WALK Radio Issue," dated November 6, 1987 ("LILCO's Summary Disposition Motion"). It is our understanding that LILCO's Summary Disposition Motion was precipitated by the withdrawal of WALK-FM and -AM radio station as the primary, or lead, EBS station from LILCO's prior EBS network. According to LILCO, WALK was selected to be the primary, or lead, station because it is

"the most powerful broadcasting station in the area and simultaneously broadcasts on AM and FM." LILCO Plan, Appendix A, at IV-3 (Rev. 6). LILCO's Summary Disposition Motion noted (at pages 5-6) that WPLR-FM in New Haven, Connecticut, had replaced WALK-FM and -AM as the new primary EBS station, that four secondary radio stations had also withdrawn from LILCO's EBS network, and that two Connecticut-based AM stations had been added to the EBS network. Thus, at this time, LILCO's proposed EBS network consists of the following stations: WPLR-FM in New Haven, Connecticut; WICC-AM in Bridgeport, Connecticut; WELI-AM in New Haven, Connecticut; WGLI-AM in Babylon, New York; WLIM-AM in Patchogue, New York; WRCN-FM in Riverhead, New York; WRHD-AM in Riverhead, New York; WRIV-AM in Riverhead, New York; and WLNG-AM and -FM in Sag Harbor, New York.

Q. What are the functions of WPLR-FM as the primary, or lead, station in LILCO's proposed EBS network?

A. According to the LILCO Plan, the functions of WPLR are threefold. First, WPLR acts as the "Common Point Control Station" in the event of a Shoreham emergency, through direct broadcasts to the public. LILCO Plan at 3.8-6. Second, WPLR activates broadcast receivers installed (or to be installed) at each of the secondary stations, which enable them either to rebroadcast the EBS messages received from WPLR over their own frequencies, or to tape them for later broadcast. Id. Third,

WPLR is relied upon to activate tone alert radios installed (or to be installed) at various special facilities, such as schools, hospitals, nursing homes and major employers in the EPZ. LILCO Plan, Appendix A, at IV-3, -170, -172, -173.

Q. What contention is involved in the litigation concerning LILCO's proposed EBS?

A. The contention at issue, as modified by the Licensing Board, reads as follows:

> LILCO's new emergency broadcast system ("EBS") proposal relies upon a new primary EBS station, WPLR-FM in New Haven, Connecticut, to perform at least three basic functions: (1) to serve as the primary, direct communication link to the public in the event of a Shoreham emergency; (2) to activate receivers installed at nine secondary EBS stations (two in Connecticut and seven on Long Island), enabling them to broadcast the EBS messages simultaneously over their own frequencies, or to tape them for later broadcast; and (3) to activate tone alert radios to be installed at schools, hospitals, nursing homes, and other large institutions within the 10-mile plume exposure emergency planning zone ("EPZ") around the Shoreham plant. See LILCO Plan, Appendix A at IV-2 and -3; see also OPIP 3.8.2. LILCO's new provisions for radio transmission of EBS messages and other emergency information, and for activation of tone alert radios and receivers installed at the secondary EBS stations, are inadequate, and the Plan fails to comply with 10 CFR §§ 50.47(a)(1), (b)(5) and (b)(6), 10 CFR Part 50, Appendix E §§ IV.D.2 and 3, NUREG 0654 §§ II.E.5 and E.6, and Appendix 3 thereto, and FEMA REP-10,1/ for the following reasons:

1/ FEMA REP-10, Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants (Nov. 1985).

1. WPLR-FM could not and would not function as an effective or adequate primary EBS station for radio transmission of EBS messages and activation of tone alert radios and receivers installed at the secondary EBS stations because:

A. WPLR's broadcast signal is too weak to convey a strong and clear broadcast message throughout the EPZ and surrounding areas. WPLR broadcasts at a power of only 14.1 kilowatts. LILCO's previous primary EBS station -- WALK-FM and -AM -- broadcasts at a power of 50 kilowatts. Thus, WPLR's broadcast power is less than 30% as strong as LILCO's former primary EBS station.

B. The geography of Long Island, combined with the location of WPLR's transmitters, exacerbates the weakness of WPLR's broadcast signal with respect to the public in and around the Shoreham EPZ. Long Island radio antennas are typically oriented in a nominal east-west direction, in order to facilitate reception of radio signals from the New York City area. WPLR's signal, however, comes from north of Long Island, and therefore its reception on directional antennas in the EPZ and elsewhere on Long Island can be impaired or attenuated. In addition, the hilly landscape of the north shore area of the EPZ and other obstructions further diminish the quality of reception of WPLR's signal.

C. WPLR has no AM broadcasting capability. LILCO's previous primary EBS station -- WALK -- could broadcast AM along with FM with the flip of a single switch.[2/] LILCO thus fails to comply with the requirement that there be a capability to issue warning messages on a 24-hour basis.

F. WPLR is based in Connecticut, rather than on Long Island, the location of the Shoreham plant, or even in the State of New York. WPLR is accordingly not a local broadcast station, and LILCO's reliance on that station is

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2/ This ability to simulcast during either day or night operation was one of the reasons LILCO previously relied upon WALK as its primary EBS station. See LILCO Plan, Appendix A at IV-3 (Rev. 3); see also Clawson et al., ff. Tr. 5254, Att. 2, at 1.

contrary to regulatory requirements. See, e.g., 10 CFR Part 50, Appendix E § IV.D.2.

2. LILCO relies on nine smaller, secondary stations (two in Connecticut and seven on Long Island) to complete its new EBS network headed up by WPLR-FM. These secondary stations could not and would not compensate for the inadequacies and ineffectiveness of WPLR as the primary EBS station, and they could not and would not function adequately or effectively to transmit EBS messages or emergency information to the public in the EPZ ~~and surrounding areas~~ during a Shoreham emergency because:

A. The new EBS network has significant gaps in its AM coverage of the EPZ at night. WELI-AM, in New Haven, Connecticut, provides the only regular nighttime coverage to the EPZ. That coverage, however, extends only to the northern portion of the plume exposure EPZ; there is no nighttime AM coverage of the southern part of the EPZ under LILCO's new EBS network. Accordingly, a substantial portion of the population in ~~and around~~ the EPZ might not receive emergency information via LILCO's new EBS network in the event of a Shoreham emergency. ~~LILCO's previous EBS network, including WALK, was capable of providing 24-hour AM and PM coverage of not only all of Suffolk County, but also all of Nassau County and much of Connecticut.~~

Q. Do you agree with this contention?

A. Yes, we do. Briefly stated, the contention alleges that: WPLR might not convey a strong and clear broadcast message throughout the EPZ; the reception of WPLR may be impaired or attenuated by the geography of Long Island, combined with the location of WPLR's transmitters and the nominal east-west orientation of rooftop radio antennas in the EPZ; WPLR has no AM broad-

casting capability; and the EBS network now relied on by LILCO has significant gaps in its AM coverage of the EPZ at night, thereby exposing a substantial portion of the population in the EPZ to the possibility of not receiving emergency information via LILCO's EBS network in the event of a Shoreham emergency. We agree with these allegations, for the reasons discussed later in this testimony.

Q. Are you familiar with the Nuclear Regulatory Commission regulations and guidance cited in the EBS contention?

A. [Minor] Yes. 10 CFR § 50.47(a)(1) states:

> (a)(1) Except as provided in paragraph (d) of this section, no operating license for a nuclear power reactor will be issued unless a finding is made by NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

10 CFR § 50.47(b)(5) and (b)(6) state:

> (5) Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and followup messages to response organizations and the public has been established; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.
>
> (6) Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.

10 CFR Part 50, Appendix E §§ IV.D.2 and 3 state:

> 2. Provisions shall be described for yearly dissemination to the public within the plume exposure pathway EPZ of basic emergency planning information, such as the methods and times required for public notification and the protective actions planned if an accident occurs, general information as to the nature and effects of radiation, and a listing of local broadcast stations that will be used for dissemination of information during an emergency. Signs or other measures shall also be used to disseminate to any transient population within the plume exposure pathway EPZ appropriate information that would be helpful if an accident occurs.
>
> 3. A licensee shall have the capability to notify responsible State and local governmental agencies within 15 minutes after declaring an emergency. The licensee shall demonstrate that the State/local officials have the capability to make a public notification decision promptly on being informed by the licensee of an emergency condition. By February 1, 1982, each nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public within the plume exposure pathway EPZ. The four-month period in 10 CFR 50.54(s)(2) for the correction of emergency plan deficiencies shall not apply to the initial installation of this public notification system that is required by February 1, 1982. The four-month period will apply to correction of deficiencies identified during the initial installation and testing of the prompt public notification systems as well as those deficiencies discovered thereafter. The design objective of the prompt public notification system shall be to have the capability to essentially complete the initial notification of the public within the plume exposure pathway EPZ within about 15 minutes. The use of this notification capability will range from immediate notification to the public (within 15 minutes of the time that State and local officials are notified that a situation exists requiring urgent action) to the more likely events where there is substantial time

available for the State and local government officials to make a judgment whether or not to activate the public notification system. Where there is a decision to activate the notification system, the State and local officials will determine whether to activate the entire notification system simultaneously or in a graduated or staged manner. The responsibility for activating such a public notification system shall remain with the appropriate governmental authorities.

NUREG 0654 §§ II.E.5 and E.6 state:

> 5. State and local government organizations shall establish a system for disseminating to the public appropriate information contained in initial and followup messages received from the licensee including the appropriate notification to appropriate broadcast media, e.g., the Emergency Broadcast System (EBS).
>
> 6. Each organization shall establish administrative and physical means, and the time required for notifying and providing prompt instructions to the public within the plume exposure pathway Emergency Planning Zone. (See Appendix 3). It shall be the licensee's responsibility to demonstrate that such means exist, regardless of who implements this requirement. It shall be the responsibility of the State and local governments to activate such a system.

FEMA REP-10 (Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants (Nov. 1985)) and Appendix 3 to NUREG 0654 (Means for Providing Prompt Alerting and Notification of Response Organizations and the Population) are also cited in the contention. They are not set forth in this testimony, because of their length.

Q. Does LILCO's EBS proposal comply with these regulations and guidance?

A. [Minor] No. LILCO's current EBS proposal attempts to limit the dissemination of emergency information to only those persons within the 10-mile EPZ. However, the regulations and guidance, and even LILCO's own Plan, do not so limit the areas that should receive emergency information. While it is true that 10 CFR § 50.47(b)(5) and NUREG 0654 II.E.6 may limit the early notification requirements (i.e., sirens and initial EBS messages) to the 10-mile plume exposure EPZ, it is equally true that 10 CFR § 50.47(b)(5) provides for establishment of "initial and followup messages to response organizations and the public" (emphasis added), not just those persons within the EPZ. Moreover, 10 CFR § 50.47(b)(6) and NUREG 0654 § II.E.5 are not expressly limited to those persons within the 10-mile EPZ.

In addition, LILCO's own Plan provides for the communication of emergency information to persons outside the 10-mile EPZ. For example, OPIP 3.8.2, § 5.2.2.g (concerning EBS "Message Assembly") instructs the LERO Coordinator of Public Information as follows:

> At the direction of the Director of Local Response, obtain from the Radiation Health Coordinator information concerning where ingestion pathway protective action levels may have been exceeded. Develop a supplementary EBS message to inform people in these

areas of appropriate actions and where they can call for further information. (Emphasis added).

Moreover, OPIP 3.8.2, Attachment 4, which contains LILCO's sample EBS messages, includes the following:

> If you are outside the 10 mile emergency planning zone there is no reason to take any action. If conditions change in the future, these recommendations may change and we will inform you immediately. (Emphasis added).

Q. Have you conducted any tests or surveys, or otherwise attempted to verify the signal level and coverage of the stations currently participating in LILCO's EBS network?

A. [Perry] Yes. Jeffrey M. Bixby, a senior engineer with Moffet, Larson & Johnson, and I performed field tests on Long Island during the week of March 14, 1988. The results of those tests are reflected in an engineering report prepared by me and under my supervision and direction. That report is appended to this testimony as Attachment 4.

[Minor] I am familiar with the Moffet, Larson & Johnson report and was with Messrs. Perry and Bixby during the first two days that their field tests were performed. Thereafter, for the remainder of the week, I was in frequent contact with Messrs. Perry and Bixby in order to stay apprised of the results

of the field tests. Following completion of the field tests, I reviewed the data reflected in the report which is Attachment 4 to this testimony, and provided comments to Mr. Perry, through counsel, concerning such data. Although not prepared by me, I believe that the facts stated in the report are true, and I concur in the conclusions reached by Moffet, Larson & Johnson, as described in the attached report.

Q. Did you review any LILCO reports or other data concerning the purported coverage of the EPZ by any of the stations participating in LILCO's proposed EBS network prior to performing the field tests?

A. [Perry] No. At the time Moffet, Larson & Johnson was retained by Suffolk County, it was decided that neither I nor any other Moffet, Larson & Johnson personnel would have access to or review any LILCO reports, or any data reflected in such reports, prior to performing any field tests or preparing any reports on Suffolk County's behalf. Prior to performing the field tests, I was aware that Cohen and Dippell, P.C., a radio and television consulting engineers firm, had been retained by LILCO to conduct field strength measurement tests of WPLR-FM's coverage within the 10-mile Shoreham EPZ and that it had prepared reports on those tests. In addition, I was generally aware of the fact that Cohen and Dippell had reviewed signal contour maps on file at the FCC for other stations participating in LILCO's proposed EBS network.

Although I may have reviewed one map that was an attachment to a report prepared for LILCO by Cohen and Dippell prior to performing the field tests, I did not review any Cohen and Dippell reports, or even any data reflected in those reports, prior to performing the field tests, or preparing the report which is Attachment 4 to this testimony. Nor did I have, or participate in, any discussions regarding any Cohen and Dippell reports or data prior to performing the field tests and preparing the attached report.

[Minor] Prior to the time Mr. Perry's firm conducted the field tests, I did review LILCO's Motion for Summary Disposition and the attached Cohen and Dippell engineering reports and other data. However, in all conversations with Mr. Perry and others at Moffet, Larson & Johnson, I was careful not to discuss these reports, or the data and conclusions they reflected. Indeed, as noted above, it was decided at the time Moffet, Larson & Johnson was retained and requested to conduct its field tests that no discussions regarding the substance of Cohen and Dippell's reports or other data would be held with Mr. Perry or others in his firm until after the field tests had been conducted and the report reflecting the test results had been prepared.

Q. Mr. Perry, did you review the Cohen and Dippell reports and data prior to preparing this testimony?

A. [Perry] Yes. I also reviewed LILCO's November 6, 1987 Motion for Summary Disposition.

Q. What was the purpose of the field tests performed by Moffet, Larson & Johnson?

A. [Perry] The purpose of the field tests was to verify the signal level of the radio stations participating in LILCO's EBS.

Q. Which stations were tested?

A. [Perry] All the AM stations participating in LILCO's proposed EBS network were tested, namely WICC (Bridgeport, Connecticut), WELI (New Haven, Connecticut), WGLI (Babylon, New York), WLIM (Patchogue, New York), WRHD (Riverhead, New York), WRIV (Riverhead, New York) and WLNG (Sag Harbor, New York). Due to time constraints, relatively few measurements were taken of WPLR-FM, and no measurements were taken of WRCN-FM (Riverhead, New York) or WLNG-FM (Sag Harbor, New York). The data gathered concerning WPLR were insufficient to permit any conclusions regarding its coverage of the EPZ.

Q. How were the tests performed?

A. [Perry] Measurements of all the AM stations participating in LILCO's EBS were taken at points initially selected by use of a 2 mile x 2 mile grid, in the manner provided in Section 73.314(c) of the FCC regulations. Additional measurements were taken of WICC, WELI and WLIM along radials established through the EPZ. In accordance with generally accepted and standard procedures, all measurements were taken during daytime hours, specifically during the period from two hours after sunrise to two hours before sunset.

Q. What equipment was used to perform the tests?

A. [Perry] All AM measurements were made with a Potomac Instruments field intensity meter, type FIM-41, which is designed specifically for the purpose of measuring the field strength of radio signals.

Q. Was the instrument calibrated?

A. [Perry] Yes. The meter, serial number 189, had a current calibration certificate. As a precautionary measure, the meter was returned to the manufacturer immediately following completion of the field tests for an "incoming" calibration of three frequencies (600, 1290, 1600), covering the range of the stations

measured. The instrument was found to be well within the manufacturer's specifications.

Q. What were the results of the field tests you conducted?

A. [Perry] The results of the tests are reflected in the engineering report which is Attachment 4 to this testimony. Briefly summarized, the test results indicate that while the AM stations currently participating in LILCO's EBS appear to provide coverage to the entire EPZ during the day, nighttime AM coverage is inadequate. Indeed, based upon the field tests conducted, it must be concluded that the AM stations in LILCO's EBS provide only minimal nighttime coverage of the EPZ.

Q. Does your conclusion regarding the inadequacy of nighttime AM coverage within the EPZ take into account LILCO's claim that the AM stations in its EBS network would use their full daytime facilities to broadcast emergency information during a Shoreham emergency?

A. [Perry] Yes. As noted above, all field measurements were taken during daytime hours, in accordance with FCC-accepted practices and procedures. As discussed below, it is not possible to take reliable AM measurements during the nighttime. Moreover, only three of LILCO's AM stations normally broadcast at night

(WICC, WGLI and WELI), and two of those three stations (WICC and WGLI) broadcast at lower power levels at night.

Accordingly, for purposes of this proceeding and the conclusions reached in the Moffet, Larson & Johnson engineering report, it has been presumed that the AM stations participating in LILCO's proposed EBS would use their full daytime facilities during nighttime hours to broadcast emergency information during a Shoreham emergency. Nevertheless, based on the results of the field tests conducted, it is my opinion that WRHD, WLNG and WGLI would not provide any meaningful or reliable nighttime service within the EPZ, and that WICC and WELI, and to a limited extent, WLIM and WRIV, would provide only minimal nighttime coverage of the EPZ. Indeed, LILCO's seven AM stations, collectively, could be expected to provide meaningful or reliable AM nighttime coverage only to the northern edge and portions of the southwestern corner of the EPZ. See Figure 8 to Attachment 4 of this testimony, which reflects those areas of the EPZ where nighttime coverage from one or more of LILCO's AM stations can be expected. It should be noted that, with respect to the nighttime AM coverage provided by LILCO's AM stations, there is virtually no disagreement between me and LILCO's expert witness, Mr. Dippell. Indeed, the results reflected in Figure 8 of my firm's report (Attachment 4 to this testimony) are quite similar to those reached by Mr. Dippell's firm, as reflected in Figure 2 to the Cohen and

Dippell September 1987 engineering report (included as Attachment 6 to LILCO's Motion for Summary Disposition).

Q. Is it your opinion, then, that there is no dispute between you and LILCO's consultant with respect to nighttime AM coverage of the EPZ?

A. There does not appear to be any dispute between us concerning the areas of predicted nighttime coverage within the EPZ. LILCO, however, claims that nighttime AM coverage is adequate. See LILCO's Summary Disposition Motion at 11. LILCO makes this claim in the context of discussing its agreements with the AM stations and FCC regulations which, according to LILCO, commit the stations to broadcast at any time in response to emergency conditions, and require the use of full daytime facilities should the emergency occur at night. Even if LILCO is correct, there would be significant gaps in the nighttime AM coverage provided by LILCO's AM stations. See Attachment 4, Figure 3. Thus, we find LILCO's assertion that its proposed EBS network provides adequate nighttime AM coverage to be incorrect.

Q. Assuming the AM stations used their full daytime facilities to broadcast emergency information during a Shoreham emergency, why would nighttime AM coverage not be the same as daytime AM coverage?

A. At night, the AM coverage of the EPZ would be limited by interference from other stations due to a phenomenom known as sky wave.

Q. What is sky wave?

A. In general terms, sky wave is the characteristic that causes the broadcast signal from AM stations to travel longer distances during the nighttime than during the daytime, resulting in additional interference at nighttime for other AM stations with similar frequencies. In the daytime, high energy from the sun's radiation effectively destroys the smoothness of the ionosphere, which is a layer of ionized particles above the surface of the earth. At night, however, without the sun's radiation, the ionosphere stabilizes and forms a reflecting surface that allows AM stations to transmit longer distances. For this reason, most AM stations are required to broadcast at lower power levels during their nighttime operation.

Q. Are the LILCO EBS stations impacted by the sky wave effect?

A. Yes. As a result of sky wave effect, the nighttime reception of the stations in LILCO's proposed EBS network could be impacted by distant stations' signals. Thus, the coverage of

LILCO's stations would be adversely affected by the sky wave phenomenom.

Q. How adverse an effect would sky wave have on nighttime AM coverage of the EPZ, if all the AM stations participating in LILCO's proposed EBS operated at their full daytime facilities in the event of a Shoreham emergency?

A. It is difficult to quantify the amount of interference that would result from sky wave, because it is not possible to make reliable nighttime measurements of AM stations.3/ However, it is possible to predict "night limits" for AM stations, which refer to the received signal strength necessary to overcome distant interfering signals so as to provide a clear, reliable and "listenable" signal. The "night limits" are calculated pursuant to a complex formula set forth in the FCC rules. The tables and maps attached to the Moffet, Larson & Johnson report (Attachment 4 to this testimony) identify the night limits for each of the seven AM stations in LILCO's proposed EBS network. As the data reflected in those tables and maps indicate, even if all AM stations participating in LILCO's proposed EBS network operated at their full daytime facilities during a Shoreham emergency, AM coverage within the EPZ at nighttime would be severely restricted and

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3/ LILCO's witness, Mr. Dippell, agrees that it is not possible to make reliable nighttime measurements of AM stations, and has testified that LILCO did not make any nighttime measurements of the AM stations participating in LILCO's EBS network. See Dippell deposition, at 66, 69.

limited. Certainly, nighttime coverage would be significantly less than would be the case during the daytime.

Q. Would any factor other than sky wave limit AM coverage of the EPZ?

A. Yes. There are several factors that would limit AM coverage of the EPZ; significant among them is ground conductivity.

Q. What is ground conductivity?

A. In very simple terms, ground conductivity is the ability of the ground to "conduct" or carry an AM radio signal. Under conditions of "perfect" conductivity, signal strength varies inversely with distance.

Q. Does the EPZ have "perfect" conductivity?

A. No. The ground of the EPZ has an abnormally high sand content, which adversely affects the conductivity of AM signals. Thus, the EPZ has low ground conductivity. Moreover, higher frequency AM stations, like WGLI (1290 kHz), WRIV (1390 kHz), WRHD (1570 kHz), WLIM (1580 kHz) and WLNG (1600 kHz), are more adversely affected by ground conductivity than are lower frequency

stations. Hence, their coverage of the EPZ would be even more limited.

Q. Can ground conductivity be predicted?

A. Yes. Maps prepared by the FCC, known as M-3 maps, are used to predict ground conductivity throughout the United States.

Q. How accurate are these maps?

A. [Ferry] It is my experience that the FCC's M-3 maps often overstate conductivity. In other words, in most cases a region's actual ground conductivity is somewhat lower than as shown on the maps. With respect to the EPZ, the level of measurements made by Moffet, Larson & Johnson indicate that the ground conductivity is poorer than indicated by the FCC's M-3 maps.

Q. LILCO has indicated that, as long as there is FM coverage of the entire EPZ, "[n]othing more is necessary." See deposition of Douglas Crocker (March 8, 1988), at 120. Do you agree?

A. No. Given the significant consequences of a radiological emergency at Shoreham, it is important to have both daytime and nighttime AM and FM coverage of the EPZ. With respect to LILCO's proposed EBS network, it is not even clear that the signal

from WPLR-FM, LILCO's lead EBS station, will reach all areas of the EPZ. Certainly, there may be areas in the EPZ that will not be able to receive a strong, clear, interference-free signal from WPLR due to several factors. First, the hilly geography of the north shore area of the EPZ, combined with other obstructions and the location of WPLR's transmitters -- approximately 50 miles from the EPZ -- impairs and attenuates WPLR's signal. Second, there are several FM stations located in the proximity of the Long Island area, which operate on frequencies close to WPLR's frequency of 99.1 -- most notably, WAWZ in Zarephath, New Jersey. These stations could interfere with WPLR's signal, thereby limiting the strength and clarity of WPLR's signal in the EPZ. Third, WPLR has a negligible listenership rate within the EPZ. Indeed, recent Arbitron ratings reveal WPLR's listenership rate within Suffolk County to be only about 1%, meaning that, at any given time, on average, only about one person out of every 100 in Suffolk County listening to radios is listening to WPLR. Therefore, even assuming WPLR could be clearly heard throughout the entire EPZ, adequate AM coverage is necessary because hardly anyone would be listening to WPLR in the event of an emergency at Shoreham.4/ Fourth, not all households in the EPZ have access to an FM radio. LILCO's own survey, commissioned in connection with LILCO's unsuccessful effort to resolve summarily the remanded EBS issues, reveals that about 3% of all households in the EPZ have no

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4/ Indeed, LILCO's entire EBS network, including WPLR, has a collective listenership rate of only about 4% in Suffolk County.

FM radio. Further, according to LILCO's survey, about 8% of all EPZ households have no FM radio in their automobiles. Thus, without conceding the accuracy of LILCO's survey, even if it is assumed that everyone with FM/AM radios listened only to FM stations or, indeed, only to those FM stations participating in LILCO's EBS -- assumptions which would be entirely unrealistic -- there would still be a significant portion of the EPZ population without access to emergency information.

Q. Have you had an opportunity to review the Cohen and Dippell engineering report dated June 1987 concerning the field strength measurement surveys of WEZN-FM and WPLR-FM?

A. Yes. [Perry] As noted above, however, I did not review any Cohen and Dippell reports until after the Moffet, Larson & Johnson field tests and report had been completed.

Q. What is your opinion of the June 1987 Cohen and Dippell report as it relates to the field strength measurement tests conducted of WPLR?

A. The Cohen and Dippell report raises many questions concerning the purported coverage of the EPZ by WPLR. First, the measurements made by Cohen and Dippell may not provide an accurate picture of WPLR's coverage of the EPZ. There are certain conditions that can affect the accuracy of FM measurements. For

example, weather conditions, obstructions (such as hills and buildings) and the seasons of the year can all affect the accuracy of FM measurements. Moreover, the Cohen and Dippell field tests were made with a receive antenna elevated 30 feet above ground level. As such, the measurements were taken in accordance with Section 73.314 of the FCC rules. Nonetheless, very few persons with FM radios have receive antennas elevated 30 feet above ground level. Further, very few antennas owned by the general public are as strong or effective as the receive antenna used by Cohen and Dippell. As a result, Cohen and Dippell's measurements, even if accurate, may not be appropriate for use in determining the number of EPZ households capable of receiving WPLR's broadcast signal.

Second, the location of WPLR's transmitters, coupled with the geography of Long Island and the directional orientation of rooftop radio antennas in the EPZ, likely impairs or attenuates the reliability of WPLR's signal in the EPZ. WPLR's transmitter is located in the New Haven, Connecticut, area -- approximately 50 miles to the north of the EPZ. However, most of the rooftop antennas in the EPZ are oriented in a nominal east-west direction, in order to facilitate reception of radio and television signals from the New York City area. See, e.g., Dippell deposition, at 126.

Third, it is likely that the hilly landscape of the north shore area of the EPZ and other obstructions further diminish the

quality of reception of WPLR's signal in certain portions of the EPZ.

Fourth, with respect to the radial measurements of WPLR taken by Cohen and Dippell, the FCC's 50/50 curve for FM radio was relied on to compute WPLR's 1 mV/m contour. The 1 mV/m contour for WPLR included in the Cohen and Dippell reports represents the distance at which the median value of WPLR's signal exceeds 1 mV/m at 50% of the potential receiver locations at least 50% of the time. However, given the significant potential consequences of a radiological emergency, the use of a 50/50 curve may be inappropriate, in that it would not provide as reliable an estimate of a radio signal's coverage as would be provided by the use of a 90/50 curve.

Q. What is a 90/50 curve?

A. A 90/50 curve illustrates the distance where the median value of an FM signal exceeds 1 mV/m at 90% of the potential receiver locations at least 50% of the time.

Q. How are 90/50 curves used?

A. 90/50 curves are typically used instead of 50/50 curves in situations where there is a need for the signal to be received with a high degree of certainty. For example, 90/50 curves are

often used to measure the area of reliable coverage for pager systems.

Q. LILCO's EBS proposal relies on WPLR to activate broadcast receivers installed at the nine secondary EBS stations, which would allegedly enable those secondary stations to either rebroadcast the EBS messages received from WPLR over their own frequencies, or to tape them for later broadcast. In your opinion, is WPLR's signal capable of activating these broadcast receivers?

A. It is questionable whether WPLR's signal would reliably activate the broadcast receivers installed (or to be installed) at each of the nine second-tier stations currently participating in LILCO's EBS.5/ Assuming the accuracy of the field strength measurements for WPLR reported by Cohen and Dippell, the coverage of WPLR does not appear to reach the broadcasting facilities of certain stations in LILCO's EBS network -- including WLNG-FM and -AM in Sag Harbor, New York; WGLI-AM in Babylon, New York; and WLIM-AM in Patchogue, New York -- with a strong, reliable signal. Therefore, WPLR's signal may not be capable of reliably activating the broadcast receivers at those stations. Moreover, we are not aware of any evidence one way or the other as to whether the

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5/ More specifically, it is our understanding that LILCO has committed to providing and installing at each station a single-frequency broadcast receiver set at WPLR's frequency, and an EBS tone-activated switch. See LILCO's Motion for Summary Disposition, at 9.

broadcast receivers at the other secondary stations in LILCO's proposed EBS network can be reliably activated by WPLR's signal.

Q. LILCO's EBS proposal also relies on WPLR to activate tone alert radios installed (or to be installed) in special facilities such as schools, hospitals, nursing homes, handicapped facilities, and large employers. In your opinion, can WPLR be relied on to activate these tone alert radios?

A. We do not know, nor apparently does LILCO. We are aware of no evidence, however, that these tone alert radios would be reliably activated by WPLR's signal.

Q. Have you had an opportunity to review the September, 1987 engineering report prepared by Cohen and Dippell concerning the computed signal contours for WICC, WELI, WGLI, WRHD, WLIM, WLNG (AM and FM), WPLR and WRCN?

A. Yes, we have. [Perry] As noted above, however, I did not review any Cohen and Dippell reports until after the Moffet, Larson & Johnson field tests and report had been completed.

Q. The Cohen and Dippell report includes, as Figure 1 and Figure 3, computed AM 0.5 mV/m and FM 1 mV/m (60 dBu) contour maps. Are you familiar with those maps?

A. Yes. Those maps include measured contours, as well as computed contours, however. According to LILCO's witness, Mr. Dippell, the map includes measured contours for WPLR-FM and WELI-AM. The contours for the other stations in LILCO's EBS network are computed. See Dippell deposition, at 81. At this time we do not have available to us the data necessary to assess the accuracy of the measured contours.

Q. Please explain what is meant by a computed contour.

A. A computed contour is the estimated or predicted coverage of a radio signal. For the purpose of application for an FCC license, stations must submit computed contours of interference-free or reliable signal coverage.

Q. LILCO asserts that computed contours are generally very conservative, and that most stations' actual broadcasts would be heard at distances well beyond those shown by computed, or predicted, contours. Do you agree?

A. Not necessarily. The accuracy of computed contours can vary greatly. While it is true that some signals can be heard beyond computed contours, it is also true that some signals might not reach the outer limits of their computed contours. To our knowledge, LILCO has not tested eight of the 10 stations in its proposed EBS network, to determine whether their signals actually

reach their computed, or predicted, contours. Given the significant consequences of a radiological emergency at Shoreham, we consider this a serious omission by LILCO.

Q. Can densely populated areas affect the accuracy of computed contours?

A. Yes. In more densely populated areas, there will likely be more interference. Sources of such interference include power lines, electric appliances, automotive ignition systems, and interfering signals from other radio stations. The FCC defines "densely populated" as those communities with a population of 2,500 or more persons. The EPZ has several such communities within it.

Pursuant to 47 CFR § 73.182(e), under daytime conditions a signal level of 0.5 mV/m is generally considered sufficient to provide meaningful and reliable service. In more densely populated areas, however, considerably more signal is generally assumed to be required. As a guideline, the FCC assumes that a signal level of 2.0 mV/m or greater is required for communities with populations of 2,500 or more. There is no indication, however, that Cohen and Dippell took this FCC guidance into account in laying out the computed contours for eight of the 10 stations in LILCO's EBS network. See Cohen and Dippell engineering report (September 1987), Figure 1.

Q. Cohen and Dippell's September 1987 report also includes, as Figures 2 and 4, maps of the purported nighttime AM and FM coverage of the EPZ. Are you familiar with those maps?

A. Yes. Those maps demonstrate that, even according to Cohen and Dippell, LILCO's proposed EBS network essentially fails to provide any AM or FM coverage west of the EPZ.

[Minor] Thus, LILCO's EBS proposal fails to comply with NRC regulations and guidance, as well as LILCO's own Plan.

Q. Does that conclude your testimony?

A. Yes.

ATTACHMENT 1

RESUME

Charles G. Perry, III
Moffet, Larson & Johnson, Inc.
1925 North Lynn Stree, Suite 700
Arlington, Virginia 22209

Married: Evelyn R. Perry

Children: Charles G., IV
David Reis

Languages: Spanish
Fluent both in oral and written
State Department FS-3 rating

Education: BSEE University of Tennessee, 1966
Honors graduate

MBA coursework - Specializing in finance - no degree

Syracuse University 1969 - 1970

Western Illinois University 1970 - 1973

Temple University 1974 - 1977

Professional Engineer in Virginia #15347

Professional Engineer in South Carolina #10608

Foreign experience:

Columbia, South America 1961 - 1964
One of first 25 Peace Corps Volunteers Worked in Community Development 2 years and Educational TV one year.

Mexico City 1968
Planned an installed Channel 8 Studio and Production Center for Television

Resume of Charles G. Perry, III

Work Experience:

1984 to Present: Moffet, Larson & Johnson, P.C.
Seventh Floor
1925 North Lynn Street
Arlington, Virginia 22209

Title: Partner

Duties: Consulting engineering in the field of telecommunications.

Responsibilities:

1. Prepare FCC Forms and Documents for clients
2. Work with Client and with Client Legal Counsel as required
3. Provide Expert Testimony when necessary before courts or FCC
4. Work with other FCC Consulting Engineers as necessary.
5. Prepare quotations and prices for bid requests from prospective clients.
6. Supervise client projects as required, indlucing design and construction of actual projects.
7. Perform environmental testa at client sites (Radiation Hazards).
8. Supervise employee work as necessary.
9. Treasurer of firm.

Resume of Charles G. Perry, III

1978 to Dec. 1983: Westinghouse Broadcasting and Cable, Inc.
888 7th Avenue
New York, New York 10106

3/82 to 1984: MUZAK Corporation
Title: Vice President - Affiliate Relations

Immediate Supervisor: Tony Hirsh - President

Duties: Brought on board to help resolve serious operational difficulties and an impending rebellion by franchisees caused by several years of poor management and neglect by MUZAK and Teleprompter management.

Responsibilities:

1. Represent company to Affiliate Group (Franchisees)
2. Manage sales of private label audio products to franchise group
3. Improve profitability of audio product sales
4. Contract with FM stations for provision of side channel (SCA) required for carriage of MUZAK signal in owned and operated franchises
5. Recontract satellite transponder service to improve quality of signal delivered to MUZAK operations
6. Develop new tape player for on-premises tape playback
7. Redesign Satellite Communications System using Westinghouse satellite.

Resume of Charles G. Perry, III

12/78 to 3/82
Title: Vice President
Operations and engineering

Immediate Supervisor: Daniel L. Ritchie, President and CEO

Duties: Job was multifaceted, including responsibility for new technologies investigation, capital investment planning and management, and operations and engineering consultation to senior staff of radio, television, and cable operations of the company.

Responsibilities:

1. Develop and implement capital investment plan of $30-40 million annually
2. Provide engineering and operating liaison between senior staff and stations group
3. Investigate and make recommendations concerning new technologies
4. Develop group purchase arrangements for better financial efficiency
5. Select and develop engineering management personnel for company
6. Interface with Westinghouse Electric staff as required.

Major Accomplishments:

1. Completion of $15 million studio building for KPIX-TV
2. Assisted purchase of one TV and four FM facilities
3. Construction of major satellite communications system for broadcast group
4. Rebuilt AM, FM, and TV transmitter plant for all facilities
5. Planned and obtained funding for rebuild of 60,000 subscriber cable system in South Georgia.
6. Organized 9 Station FM group in Houston, Texas to build a 2000 foot broadcast tower. Leased side space on tower to new TV station.
7. Organized Charlotte TV stations to apply for and obtain permission to build a 2000 foot tower in Charlotte.
8. Planned and set up a Teletext experiment at KPIX-TV in San Francisco.

Reason for leaving: Requested to take Muzak job

Resume of Charles G. Perry, III

1977 to 1978: Durham Life Broadcasting Co.
410 South Salisbury Street
Raleigh, North Carolina

Title: Director of Engineering

Immediate Supervisor: Douglas R. McClarty
Vice President and General Manager
WPTF-TV

Duties: Responsible for engineering design and construction of a new television broadcast facility for Durham Life Broadcasting, Inc. Moved transmit location for better market coverage, and completely rebuilt studio operation while maintaining normal on-air operation.

Responsibilities:

1. Design and construct new transmit site to include tower, building, transmitter, and accessory equipment
2. Redesign studio facility for modern operation while maintaining normal studio operation
3. Plan purchases, obtain necessary approvals, and negotiate contracts for major items
4. Hire and develop staff as required for proper operation of station
5. Operate and maintain physical equipment plant
6. Work as required with Durham Life staff.

Major Accomplishments:

1. Completion of $2.5 million transmitter plant within timetable
2. Reduced tower cost by $40,000 through use of new technology
3. Completed studio installation with no loss of air time, and within budget
4. Developed highly capable eleven man engineering staff

Reason for leaving: Offered position by Westinghouse Broadcasting and Cable, Inc.

Resume of Charles G. Perry, III

1973 to 1977: Jerrold Electronics Corporation
Hatboro, Pennsylvania

Title: Manager of Applications Engineering

Immediate Supervisor: William H.Lambert
Vice President - Marketing

Duties: Responsible for engineering design of cable television plant and for preparation of proposals for sales force. Provided cable plant design for customers and Turnkey Construction Department. Worked with engineering and with marketing to properly posture CATV products for market.

Responsibilities:

1. Managed staff ranging from 75 to 15 engineers, designers and support people to serve CATV marketing and sales groups.
2. Turnkey sales of head end equipment, including design, proposals, construction, and installation
3. Worked with engineering, sales, marketing and construction groups to improve products, system designs, and customer relations

Major Accomplishments:

1. Mechanized design department using programmable calculators to substantially improve both accuracy and output of group
2. Developed and implemented pre-packaging of CATV head-end equipment, improving quality and profit margins
3. Combined proposal writing team with system design team for improved efficiency and flexibility.

Reason for leaving: Offered position by Durham Life Broadcasting, Inc.

Resume of Charles G. Perry, III

1970 to 1973: Harris Broadcast Products
Quincy, Illinois

Title: Manager of Television Service

Immediate Supervisor: Curtis King
Television Sales Manager

Duties: Responsible for service support function for television transmitter line recently introduced by Harris. Set up service department, and developed a program to supply parts and service as well as installation supervision and training.

Responsibilities:

1. Managed staff of three to five people to provide service parts and advice on a twenty-four hour basis
2. Planned and implemented a service parts inventory, and set up a manning system for 24 hour coverage
3. Worked with engineering, sales, and marketing as necessary to improve products, and to facilitate sales.

Major Accomplishments:

1. Worked to identify and to resolve serious electrical problems with the new transmitter line before damage to the marketing program became serious
2. Worked to eliminate a serious vendor problem before it could damage the program
3. Installed, checkout out, and obtained FCC approval for the highest powered TV transmitter ever built.

Reason for leaving: Offered position by Jerrold Electronics Corporation.

Resume of Charles G. Perry, III

1966 to 1970:	Visual Communications Products Dept. General Electric Company Syracuse, New York
Title:	1966: TV Service Engineer 1968: Regional TV Service Engineer 1969: Coordinator TV Demo Studio
Immediate Supervisor:	M. R. Duncan 1966-1968 Television Service Manager Paul Schonewolf 1969-1970 Manager - Marketing

Duties: Started out in TV service, then became a regional engineer in the Washington, D.C. area. Travelled extensively for the company, including jobs in Europe, Asia, and South America.

Transferred to Syracuse to run a demonstration TV studio, where I was responsible for presentations and sales assistance.

Reason for leaving: Accept a management job with Harris.

ATTACHMENT 2

MOFFET, LARSON & JOHNSON, INC.

5203 LEESBURG PIKE CONSULTING TELECOMMUNICATIONS ENGINEERS FALLS CHURCH, VA 22041

History of Moffet, Larson & Johnson, Inc.

Moffet, Larson & Johnson, Inc. is a Virginia based consulting telecommunications engineering firm located in Falls Church, Virginia. The corporation moved to Virginia in 1977 from 711 Fourteenth Street, N.W., Washington, D.C. 20005. Moffet, Larson & Johnson, Inc. is licensed under the State Corporation Commission, Commonwealth of Virginia. We represent or have represented, in an engineering capacity, radio (AM and FM) and television stations in every state of the union. This includes commercial and non-commercial stations. We also represent or have represented CATV systems, cellular systems and common carrier operations.

Our corporation's founding father was John A. Moffet, Sr., who passed away June 1, 1983. He joined the firm of Silliman, Moffet and Rohrer in 1952 as a senior partner. In 1977, Mr. Moffet became President of the firm of Silliman, Moffet & Kowalski, and its successor firms. He remained President and Chairman of the Board until his death.

H. Drew Larson, Jr. was a Senior Engineer with the firm from May, 1969 until his death, July 11, 1984. At his death, he was Vice President and a member of the Board of Directors. Mr. Larson prepared or supervised preparation of a large number of technical studies and applications in all of the communications fields and was the author of numerous sophisticated computer programs in use by the firm.

Wallace E. Johnson became a partner in Moffet, Larson & Johnson, Inc. May 1, 1982. For 37 years, he was employed as an engineer by the Federal Communications Commission and was Chief of the Broadcast Bureau from August, 1971 to May, 1979. He has served as Executive Director of the Association of Broadcast Engineering Standards (ABES) since June, 1979. He also serves on the FCC/Industry Radio Advisory Committee and is Chairman of the Technical Sub-Group. On June 24, 1983, he became President of the firm, succeeding Mr. John A. Moffet.

Douglas B. DeLawder is a Senior Engineer, partner and corporate Vice President in the firm. He has been associated with the firm since 1958. As an engineer, he has prepared or assisted in preparing a large number of applications filed with the FCC including AM, FM, TV and auxiliary type proposals as well as various types of common carrier proposals such as microwave, cellular, paging, two-way radio, multiple distribution systems, and point to point microwave for control operations.

History of Moffet, Larson & Johnson, Inc. (Continued)

Charles G. Perry, III joined the firm in January, 1984. Previously he was associated with Westinghouse Broadcasting & Cable, Inc. where he last served as Vice President of Affiliate Relations for the Muzak Corporation and earlier as Vice President of Broadcast Operations and Engineering. He has had extensive technical experience in cable, broadcasting, and private radio areas.

Marianna W. Cobb has been associated with the firm as a consultant since 1967. Mrs. Cobb is a recognized expert in the field of antenna design in the medium frequency band and in AM, FM and TV broadcast allocation studies.

Philip L. Rice, Sr. is associated with the firm as a consultant. He is a recognized expert in the field of propagation and while with the National Bureau of Standards was the primary author of NBS Technical Note 101 which is the prime propagation prediction model used by engineers.

There are 25 additional engineers and staff personnel in the firm. Detailed resumes of the above noted senior engineers and additional engineers associated with the firm are available upon request.

The full service type of quality engineering work done by our firm includes preparation of detailed equipment specifications for transmitters, antennas, towers, transmission lines, test equipment, closed circuit television systems and other TV, AM and FM equipments and systems. Our engineers conduct or participate in the measurement of AM, FM and TV antenna patterns, VSWR, etc., at the station site or at the manufacturers antenna test range. Our professional engineers also observe and/or participate in the checkout of TV antennas and/or other equipment at the purchaser's location.

Moffet, Larson and Johnson, Inc. prepares and/or directs the preparation of application engineering work, allocation engineering work and feasibility studies involving TV, FM and AM or common carrier facilities.

Our engineers testify as expert witnesses before the Federal Communications Commission in hearings.

History of Moffet, Larson & Johnson, Inc. (Continued)

We maintain a computer to process computations for complex propagation diffraction analysis, the analysis of proximity effects at points near a radiator and detailed TV and FM frequency searches using the corporation's completely computerized data banks in these areas. We have numerous sophisticated computer programs dealing with antenna design and adjustment, radio propagation, microwave path selection and optimization, terrain analysis, general allocations, TV and FM frequency searches and data base management.

Field work is facilitated by a 3/4 ton van equipped with a 30' telescoping mast for FM and TV measurements. The van is also fitted with a 1.5 kW AC generator and computer facilities for data collection and processing. All test equipment for AM field work is also available.

The firm has a staff trained and experienced in the measurement of Radio Frequency Radiation (RFR) referenced to ANSI and other standards, and has equipment to do required measurements. RFR measurements provide assurances that licensing requirements are met and that on site personnel area not exposed to hazardous levels of Radio Frequency Radiation. Measurements can be performed either on a broadband basis or based on specific frequencies of interest.

The firm operates Broadcast Data Services, (BDS) a division of the parent firm. BDS maintains AM, FM and TV broadcast facility data bases and associated applications programs. BDS is used by many consulting engineers and private broadcasters as a source of both FCC data and various computer programs. BDS also provides a research service for clients upon request.

Moffet, Larson & Johnson, Inc. serves clients on a local to national scale including every class of broadcast station together with cellular radio, common carrier operations and other fields.

ATTACHMENT 3

PROFESSIONAL QUALIFICATIONS OF GREGORY C. MINOR

GREGORY C. MINOR
MHB Technical Associates
1723 Hamilton Avenue
Suite K
San Jose, California 95125
(408) 266-2716

EXPERIENCE:

1976 to PRESENT

Vice-President - MHB Technical Associates, San Jose, California

Engineering and energy consultant to state, federal, and private organizations and individuals. Major activities include studies of safety and risk involved in energy generation, providing technical consulting to legislative, regulatory, public and private groups and expert witness in behalf of state organizations and citizens' groups. Was co-editor of a critique of the Reactor Safety Study (WASH-1400) for the Union of Concerned Scientists and co-author of a risk analysis of Swedish reactors for the Swedish Energy Commission. Served on the Peer Review Group of the NRC/TMI Special Inquiry Group (Rogovin Committee). Actively involved in the Nuclear Power Plant Standards Committee work for the Instrument Society of America (ISA).

1972 - 1976

Manager, Advanced Control and Instrumentation Engineering, General Electric Company, Nuclear Energy Division, San Jose, California

Managed a design and development group of thirty-four engineers and support personnel designing systems for use in the measurement, control and operation of nuclear reactors. Involved coordination with other reactor design organizations, the Nuclear Regulatory Commission, and customers, both overseas and domestic. Responsibilities included coordinating and managing and design and development of control systems, safety systems, and new control concepts for use on the next generation of reactors. The position included responsibility for standards applicable to control and instrumentation, as well as the design of short-term solutions to field problems. The disciplines involved included electrical and mechanical engineering, seismic design and process computer control/programming, and equipment qualification.

1970 - 1972

Manager, Reactor Control Systems Design, General Electric Company, Nuclear Energy Division, San Jose, California

Managed a group of seven engineers and two support personnel in the design and preparation of the detailed system drawings and control documents relating to safety and emergency systems for nuclear reactors. Responsibility required coordination with other

design organizations and interaction with the customer's engineering personnel, as well as regulatory personnel.

1963 - 1970

Design Engineer, General Electric Company, Nuclear Energy Division, San Jose, California

Responsible for the design of specific control and instrumentation systems for nuclear reactors. Lead design responsibility for various subsystems of instrumentation used to measure neutron flux in the reactor during startup and intermediate power operation. Performed lead system design function in the design of a major system for measuring the power generated in nuclear reactors. Other responsibilities included on-site checkout and testing of a complete reactor control system at an experimental reactor in the Southwest. Received patent for Nuclear Power Monitoring System.

1960 - 1963

Advanced Engineering Program, General Electric Company; Assignments in Washington, California, and Arizona

Rotating assignments in a variety of disciplines:

- Engineer, reactor maintenance and instrument design, KE and D reactors, Hanford, Washington, circuit design and equipment maintenance coordination.
- Design engineer, Microwave Department, Palo Alto, California. Work on design of cavity couplers for Microwave Traveling Wave Tubes (TWT).
- Design engineer, Computer Department, Phoenix, Arizona. Design of core driving circuitry.
- Design engineer, Atomic Power Equipment Department, San Jose, California. Circuit design and analysis.
- Design engineer, Space Systems Department, Santa Barbara, California. Prepared control portion of satellite proposal.
- Technical Staff - Technical Military Planning Operation. (TEMPO), Santa Barbara, California. Prepare analyses of missile exchanges.

During this period, completed three-year General Electric program of extensive education in advanced engineering principles of higher mathematics, probability and analysis. Also completed courses in Kepner-Tregoe, Effective Presentation, Management Training Program, and various technical seminars.

EDUCATION

University of California at Berkeley, BSEE, 1960.

Advanced Course in Engineering - three-year curriculum, General Electric Company, 1963.

Stanford University, MSEE, 1966.

HONORS AND ASSOCIATIONS

- Tau Beta Pi Engineering Honorary Society
- Co-holder of U.S. Patent No. 3,565-760, "Nuclear Reactor Power Monitoring System," February, 1971.
- Member: American Association for the Advancement of Science.
- Member: Nuclear Power Plant Standards Committee, Instrument Society of America.

PERSONAL DATA

Born: June 7, 1937
Married, three children
Residence: San Jose, California

PUBLICATIONS AND TESTIMONY

1. G. C. Minor, S. E. Moore, "Control Rod Signal Multiplexing," IEEE Transactions on Nuclear Science, Vol. NS-19, February 1972.
2. G. C. Minor, W. G. Milam, "An Integrated Control Room System for a Nuclear Power Plant," NEDO-10658, presented at International Nuclear Industries Fair and Technical Meetings, October, 1972, Basle, Switzerland.
3. The above article was also published in the German Technical Magazine, NT, March, 1973.
4. Testimony of G. C. Minor, D. G. Bridenbaugh, and R. B. Hubbard before the Joint Committee on Atomic Energy, Hearing held February 18, 1976, and published by the Union of Concerned Scientists, Cambridge, Massachusetts.
5. Testimony of G. C. Minor, D. G. Bridenbaugh, and R. B. Hubbard before the California State Assembly Committee on Resources, Land Use, and Energy, March 8, 1976.
6. Testimony of G. C. Minor and R. B. Hubbard before the California State Senate Committee on Public Utilities, Transit, and Energy, March 23, 1976.

7. Testimony of G. C. Minor regarding the Grafenrheinfeld Nuclear Plant, March 16-17, 1977, Wurzbuerg, Germany.

8. Testimony of G. C. Minor before the Cluff Lake Board of Inquiry, Regina, Saskatchewan, Canada, September 21, 1977.

9. The Risks of Nuclear Power Reactors: A Review of the NRC Reactor Safety Study WASH-1400 (NUREG-75/014), H. Kendall, et al, edited by G. C. Minor and R. B. Hubbard for the Union of Concerned Scientists, August, 1977.

10. Swedish Reactor Safety Study: Barseback Risk Assessment, MHB Technical Associates, January, 1978. (Published by Swedish Department of Industry as Document Dsi 1978:1)

11. Testimony by G. C. Minor before the Wisconsin Public Service Commission, February 13, 1978, Loss of Coolant Accidents: Their Probability and Consequence.

12. Testimony by G. C. Minor before the California Legislature Assembly Committee on Resources, Land Use, and Energy, AB 3108, April 26, 1978, Sacramento, California.

13. Presentation by G. C. Minor before the Federal Ministry for Research and Technology (BMFT), Meeting on Reactor Safety Research, Man/Machine Interface in Nuclear Reactors, August 21, and September 1, 1978, Bonn, Germany.

14. Testimony of G. C. Minor, D. G. Bridenbaugh, and R. B. Hubbard, before the Atomic Safety and Licensing Board, September 25, 1978, in the matter of Black Fox Nuclear Power Station Construction Permit Hearings, Tulsa, Oklahoma.

15. Testimony of G. C. Minor, ASLB Hearings Related to TMI-2 Accident, Rancho Seco Power Plant, on behalf of Friends of the Earth, September 13, 1979.

16. Testimony of G. C. Minor before the Michigan State Legislature, Special Joint Committee on Nuclear Energy, Implications of Three Mile Island Accident for Nuclear Power Plants in Michigan, October 15, 1979.

17. A Critical View of Reactor Safety, by G. C. Minor, paper presented to the American Association for the Advancement of Science, Symposium on Nuclear Reactor Safety, January 7, 1980, San Francisco, California.

18. The Effects of Aging on Safety of Nuclear Power Plants, paper presented at Forum on Swedish Nuclear Referendum, Stockholm, Sweden, March 1, 1980.

19. Minnesota Nuclear Plants Gaseous Emissions Study, MHB Technical Associates, September 1980, prepared for the Minnesota Pollution Control Agency, Roseville, MN.

20. Testimony of G. C. Minor and D. G. Bridenbaugh before the New York State Public Service Commission, Shoreham Nuclear Plant Construction Schedule, in the matter of Long Island Lighting Company Temporary Rate Case, case # 27774 September 22, 1980.

21. Systems Interaction and Single Failure Criterion, MHB Technical Associates, January, 1981, prepared for and available from the Swedish Nuclear Power Inspectorate, Stockholm, Sweden.

22. Testimony of G. C. Minor and D. G. Bridenbaugh before the New Jersey Board of Public Utilities, Oyster Creek 1980 Refueling Outage Investigation, in the matter of the Petition of Jersey Central Power and Light Company for approval of an increase in the rates for electrical service and adjustment clause and factor for such service, OAL Docket No. PUC 3518-80, BPU Docket Nos. 804-285, 807-488, February 19, 1981.

23. Testimony of G. C. Minor and D. G. Bridenbaugh on PORV's and Pressurizer Heaters, Diablo Canyon Operating License hearing before ASLB, in the matter of Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2), Docket Nos. 50-275-OL, 50-323-OL, January 11, 1982.

24. Testimony of G. C. Minor and R. B. Hubbard on Emergency Response Planning, Diablo Canyon Operating License hearing before ASLB, Docket Nos. 50-275-OL, 50-323-OL, January 11, 1982.

25. Systems Interaction and Single Failure Criterion Phase II Report, MHB Technical Associates, February 1982, prepared for and available from the Swedish Nuclear Power Inspectorate, Stockholm, Sweden.

26. Testimony of G. C. Minor, R. B. Hubbard, M. W. Goldsmith, S. J. Harwood on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Contention 7B, Safety Classification and Systems Interaction, Docket No. 50-322-OL, April 13, 1982.

27. Testimony of G. C. Minor and D. G. Bridenbaugh on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 11, Passive Mechanical Valve Failure, Docket no. 50-322-OL, April 13, 1982.

28. Testimony of G. C. Minor and R. B. Hubbard on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 27 and SOC Contention 3, Post-Accident Monitoring, Docket No. 50-322-OL, May 25, 1982.

29. Testimony of G. C. Minor and D. G. Bridenbaugh on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Suffolk County Contention 22, SRV Test Program, Docket No. 50-322-OL, May 25, 1982.

30. Testimony of G. C. Minor and D. G. Bridenbaugh on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Reduction of SRV Challenges, Docket No. 50-322-OL, June 14, 1982.

31. Testimony of G. C. Minor on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station Unit 1, regarding Environmental Qualification, Docket No. 50-322-OL, January 18, 1983.

32. Testimony of G. C. Minor and D. G. Bridenbaugh before the Pennsylvania Public Utility Commission, on behalf of the Office of Consumer Advocate, Regarding the Cost of Constructing the Susquehanna Steam Electric Station, Unit I, Re: Pennsylvania Power and Light, Docket No. R-822189, March 18, 1983.

33. Supplemental testimony of G. C. Minor, R. B. Hubbard, and M. W. Goldsmith on behalf of Suffolk County, before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Safety Classification and Systems Interaction (Contention 7B), Docket No. 50-322, March 23, 1983.

34. Verbal testimony before the District Court Judge in the case of Sierra Club et. al. vs. DOE regarding the Clean-up of Uranium Mill Tailings. June 20, 1983.

35. Systems Interaction and Single Failure Criterion: Phase 3 Report, MHB Technical Associates, June, 1983, prepared for and available from the Swedish Nuclear Power Inspectorate, Stockholm, Sweden.

36. Systematic Evaluation Program: Status Report and Initial Evaluation, MHB Technical Associates, June, 1983, prepared for and available from the Swedish Nuclear Power Inspectorate, Stockholm, Sweden.

37. Testimony of G. C. Minor, F. C. Finlayson, and E. P. Radford before the Atomic Safety and Licensing Board, in the Matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, regarding Emergency Planning - Evacuation Times and Doses (Contentions 65, 23.D and 23.H), Docket No. 50-322-OL-3, November 18, 1983.

38. Testimony of G. C. Minor, Sizewell 'B' Power Station Public Inquiry, Proof of Evidence Regarding Safety Issues, December, 1983.

39. Testimony of D. G. Bridenbaugh, L. M. Danielson, R. B. Hubbard and G. C. Minor before the State of New York Public Service Commission, PSC Case No. 27563, in the matter of Long Island Lighting Company Proceeding to Investigate the Cost of the Shoreham Nuclear Generating Facility -- Phase II, on behalf of County of Suffolk, February 10, 1984.

40. Testimony of Fred C. Finlayson, Gregory C. Minor and Edward P. Radford before the Atomic Safety and Licensing Board, in the Matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, on behalf of Suffolk County Regarding Emergency Planning - Sheltering (Contention 61), Docket No. 50-322-OL, March 21, 1984.

41. Testimony of G. Dennis Eley, C. John Smith, Gregory C. Minor and Dale G. Bridenbaugh before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting company, Shoreham Nuclear Power Station Unit 1, regarding EMD Diesel Generators and 20 MW Gas Turbine, Docket No. 50-322-OL, March 21, 1984.

42. Revised Testimony of Gregory C. Minor before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station Unit 1, on behalf of Suffolk County regarding Emergency Planning - Recovery and Reentry (Contentions 85 and 88), Docket No. 50-322-OL, July 30, 1984.

43. Testimony of Dr. Christian Meyer, Dr. Jose Roesset, and Gregory C. Minor before the Atomic Safety and Licensing Board, in the matter of Long Island Lighting Company,

Shoreham Nuclear Power Station Unit 1, on behalf of Suffolk County, regarding Low Power Hearings - Seismic Capabilities of AC Power Sources, Docket No. 50-322-OL, July 1984.

44. Affidavit of Gregory C. Minor, Emergency Planning Legal Authority Court Case, State Court of New York, September 11, 1984.

45. Surrebuttal Testimony of Dale G. Bridenbaugh, Lynn M. Danielson, Richard B. Hubbard, and Gregory C. Minor, Before the New York State Public Service Commission, PSC Case No. 27563, Shoreham Nuclear Station, Long Island Lighting Company, on behalf of Suffolk County and New York State Consumer Protection Board, regarding Investigation of the Cost of the Shoreham Nuclear Generating Facility, October 4, 1984.

46. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson and Gregory C. Minor on behalf of Massachusetts Attorney General, DPU 84-145, before the Massachusetts Department of Public Utilities, regarding Prudence of Expenditures by Fitchburg Gas and Electric Light Company for Seabrook Unit 2, November 23, 1984, 84 pgs.

47. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson and Gregory C. Minor on behalf of Maine Public Utilities Commission Staff regarding Prudence of Costs of Seabrook Unit 2, Docket No. 84-113, December 21, 1984.

48. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Suffolk County regarding Shoreham Emergency Diesel Generator Loads, Docket No. 50-322-OL, January 25, 1985.

49. Direct Testimony of Dale G. Bridenbaugh, Lynn M. Danielson, and Gregory C. Minor on behalf of the Vermont Department of Public Service, PSB Docket No. 5030, regarding Prudence of Central Vermont Public Service Corporations Costs for Seabrook 2, November 11, 1985.

50. Surrebuttal testimony of Gregory C. Minor on behalf of the Vermont Department of Public Service, PSB Docket No. 5030 Prudence of Central Vermont Public Service Corporations Costs for Seabrook 2, December 13, 1985.

51. Direct Testimony of Dale G. Bridenbaugh, Gregory C. Minor, Lynn K. Price, and Steven C. Sholly on behalf of State of Connecticut Department of Public Utility Control Prosecutorial Division and Division of Consumer Counsel regarding the Prudence of Expenditures on Millstone Unit 3, Docket No. 83-07-03, February 18, 1986.

52. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding the Prudence of Expenditures by New England Power Co. for Seabrook Unit 2, Docket Nos. ER-85-646-000, ER-85-647-000, February 21, 1986.

53. Direct Testimony of Gregory C. Minor on behalf of the Prosecutorial Division of CDPUC regarding CL&P Construction Prudence for Millstone Unit 3, Docket No. ER-85-720-001 March 19, 1986.

54. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding WMECo Construction Prudence for Millstone Unit 3, Docket No. 85-270, March 19, 1986.

55. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding WMECo's Commercial Operating Dates and Deferred Capital Additions on Millstone Unit 3, Docket No. 85-270, March 19, 1986.

56. Rebuttal Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General regarding Rebuttal to New England Power Company's Seabrook 2, Docket Nos. ER-85-646-001, ER-85-647-001, April 2, 1986.

57. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of State of Maine Staff of Public Utilities Commission regarding Construction Prudence of Millstone Unit 3, in the matter of Maine Power Company Proposed Increase in Rates, Docket No. 85-212, April 21, 1986.

58. Implications of the Chernobyl-4 Accident for Nuclear Emergency Planning for the State of New York, prepared for the State of New York Consumer Protection Board, by MHB Technical Associates, June 1986.

59. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of the Vermont Department of Public Service, regarding Prudence of Costs by Central Vermont Public Service Corporation for Millstone 3, Docket No. 5132, August 25, 1986.

60. Surrebuttal Testimony of Gregory C. Minor in the matter of Jersey Central Power and Light Company, regarding TMI Restart and Performance Incentives, (Oral testimony), OAL Docket No. PUC 7939-85, BPU Docket No. ER851116, September 11, 1986.

61. Surrebuttal Testimony of Gregory C. Minor on behalf of State of Vermont Department of Public Service, regarding CVPS/NU Construction Prudence related to Millstone Unit 3, Docket No. 5132, November 6, 1986.

62. Direct Testimony of Gregory C. Minor and Lynn K. Price on behalf of State of Vermont Department of Public Service, regarding Prudence of Expenditures for Seabrook 1, Docket No. 5132, December 31, 1986.

63. Direct Testimony of Gregory C. Minor on behalf of Suffolk County, before the Atomic Safety and Licensing Board, concerning Shoreham - Protective Action Recommendations (Contention EX 36), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-5, February 27, 1987.

64. Direct Testimony of Gregory C. Minor et. al. on behalf of the State of New York and Suffolk County, before the Atomic Safety and Licensing Board, regarding The Scope of the Emergency Planning Exercise (Contentions EX 15 and 16), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-5, April 6, 1987.

65. Direct Testimony of Gregory C. Minor regarding Emergency Planning Reception Centers - Monitoring and Decontamination, Shoreham Docket 50-322-OL-3 (Emergency Planning), April 13, 1987.

66. Testimony of Gregory C. Minor, Steven C. Sholly et. al. on behalf of Suffolk County, regarding LILCO's Reception Centers - Planning Basis, before the Atomic Safety and

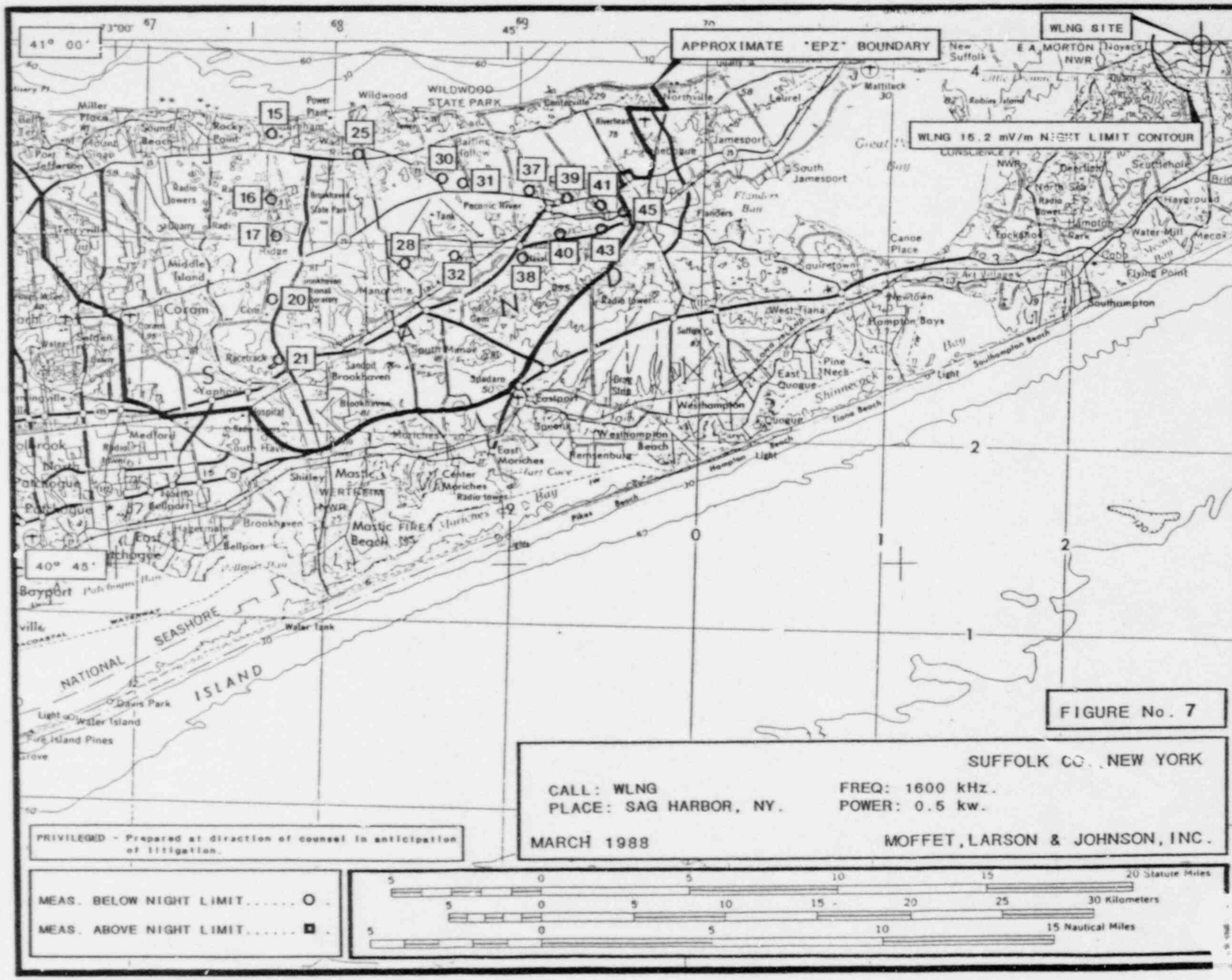
Licensing Board, In the matter of Long Island Lighting Company, Shoreham Nuclear Power Station Unit 1, Docket No. 50-322-OL-3, April 13, 1987.

67. Rebuttal Testimony of Gregory C. Minor and Steven C. Sholly on behalf of Suffolk County regarding LILCO's Reception Centers (Rebuttal to Testimony of Lewis G. Hulman), in the matter of Long Island Lighting Company, Shoreham Nuclear Power Station, Unit 1, Docket No. 50-322-OL-3, May 27, 1987.

68. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor on behalf of Massachusetts Attorney General, before the Federal Energy Regulatory Commission, regarding Canal Electric Company Prudence Related to Seabrook Unit 2 Construction Expenditures, Docket No. ER86-704-001, July 31, 1987.

69. Direct Testimony of Dale G. Bridenbaugh and Gregory C. Minor before the Pennsylvania Public Utility Commission, Regarding Beaver Valley Unit 1, Docket No. 1-79070318, OCA Statement No. 2, August 31, 1987.

ATTACHMENT 4



41° 00'
40° 45'
APPROXIMATE "EPZ" BOUNDARY
WLNG SITE
WLNG 16.2 mV/m NIGHT LIMIT CONTOUR
15
16
17
20
21
25
28
30
31
32
37
38
39
40
41
43
45
WILDWOOD STATE PARK
NATIONAL SEASHORE
ISLAND
FIGURE No. 7
SUFFOLK CO. NEW YORK
CALL: WLNG
PLACE: SAG HARBOR, NY.
FREQ: 1600 kHz.
POWER: 0.5 kw.
MARCH 1988
MOFFET, LARSON & JOHNSON, INC.
PRIVILEGED - Prepared at direction of counsel in anticipation of litigation.
MEAS. BELOW NIGHT LIMIT....... O
MEAS. ABOVE NIGHT LIMIT....... ■
20 Statute Miles
30 Kilometers
15 Nautical Miles

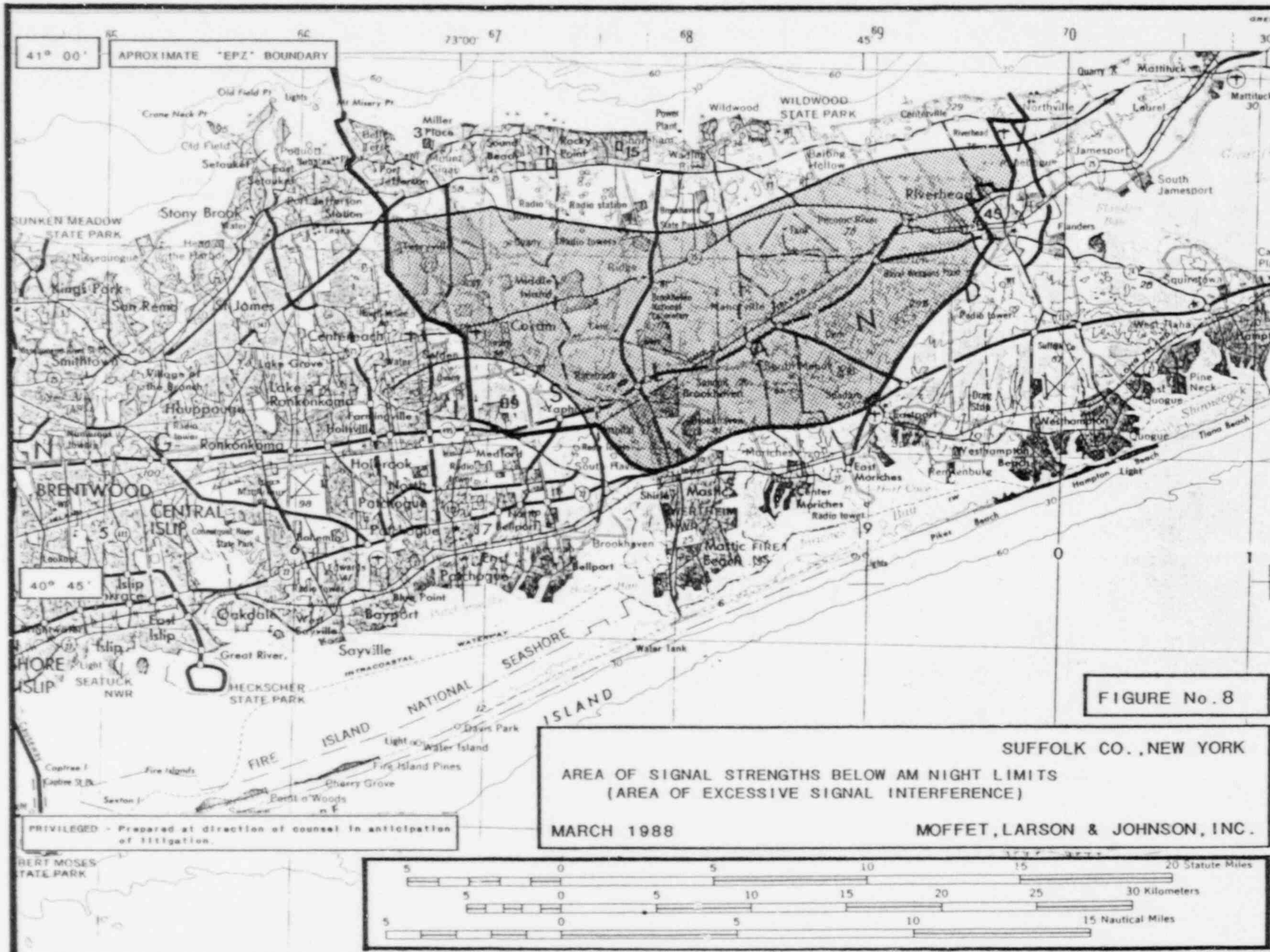


FIGURE No. 8

SUFFOLK CO., NEW YORK

AREA OF SIGNAL STRENGTHS BELOW AM NIGHT LIMITS
(AREA OF EXCESSIVE SIGNAL INTERFERENCE)

MARCH 1988

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