

March 14, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
)
LOUISIANA POWER & LIGHT COMPANY) Docket No. 50-382
)
(Waterford Steam Electric)
Station, Unit 3))

APPLICANT'S PROPOSED FINDINGS OF FACT,
CONCLUSIONS OF LAW, AND BRIEF
IN THE FORM OF A PROPOSED PARTIAL INITIAL DECISION
ON JOINT INTERVENORS CONTENTION 17/26(1) (a)

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I. OPINION

A. BACKGROUND

1. Procedural Background

This is the second of two partial initial decisions on the application for an operating license for the Waterford 3 Steam Electric Station, Unit 3 ("Waterford 3"), filed by the Louisiana Power & Light Company ("Applicant"). The general procedural history of this proceeding is set forth in the first

"Partial Initial Decision (Operating License)," LBP-82-100 (November 3, 1982), and need not be repeated here.

Joint Intervenors' contentions on synergism and emergency planning were tried in evidentiary hearings during March, April and May, 1982, and were largely disposed of by the first Partial Initial Decision issued by this Atomic Safety and Licensing Board ("the Board"). However, after the close of the hearings, while preparing its first Partial Initial Decision, the Board found the record inadequate as to Joint Intervenors Contention 17/26(1)(a), which challenged the provisions in the emergency plans for notifying residents of evacuation procedures. Accordingly, in its August 17, 1982 "Memorandum and Order (Reopening The Record-Requesting Submissions)," the Board reopened the record, directed Applicant to submit its emergency public information brochure as an exhibit, and invited the other parties' comments on the brochure.

After reviewing the brochure filed by Applicant, the Nuclear Regulatory Commission Staff ("Staff") the Federal Emergency Management Agency ("FEMA"), and the Joint Intervenors submitted comments. Joint Intervenors asserted, inter alia, that the brochure would not be readily comprehensible to a person of only average education, and requested that further evidentiary hearings be held. Applicant replied, requesting, inter alia, permission to submit a revised brochure in response to other parties' comments. In addition, Applicant requested that an evidentiary hearing be promptly scheduled to

expeditiously resolve the limited issue of the adequacy of the brochure, as revised.

By its October 18, 1982 "Memorandum and Order (Re Applicant's Response (Motion) of September 23, 1982, and Joint Intervenors' Motion (Cross-Motion) of September 29, 1982)," the Board ordered further evidentiary hearings limited solely to the adequacy of Applicant's revised brochure (Applicant Exhibits 13 and 14).^{1/} These evidentiary hearings were convened February 8-11, 1983, with all parties -- the Staff, Applicant and Joint Intervenors -- represented. In addition, an attorney representing FEMA participated with counsel for the Staff, presenting the FEMA witnesses, conducting cross-examination and participating in argument.

^{1/} Applicant argued that a further evidentiary hearing on the brochure was not legally required, but agreed that -- in the procedural context presented -- such a hearing might be the most expeditious means of resolving the brochure issue. See "Applicant's Response To Comments of Parties On Emergency Public Information Brochure" (September 23, 1982), at 7-8. Nevertheless, throughout this proceeding, even after further hearings were scheduled, Applicant made repeated efforts to initiate discussions with Joint Intervenors in an attempt to reach a settlement of Contention 17/26(1)(a), and thereby obviate the need for further hearings. See generally, Tr. 4352-54; 4395-401; 4404-06. In response to Board inquiries in the course of the reopened hearings, Applicant recalled at least five specific occasions on which it had indicated to Joint Intervenors its willingness to cooperate with Joint Intervenors in the resolution of their concerns about the brochure. Tr. 4395-401. Applicant's offers were rebuffed by the Joint Intervenors, who took "a hard line" on the brochure matter, ultimately making a "policy decision * * * not to engage in any dialogue with the Applicant on this issue." Tr. 4404-06.

The decisional record of this proceeding consists of: the Board's "Order (Rescheduling Hearing)," 47 Fed. Reg. 58401 (December 30, 1982); the petitions and pleadings filed by the parties; the transcripts of the hearing, including testimony of Applicant, the Staff and FEMA, and Joint Intervenors, and the exhibits received into evidence (see Appendix); and NUREG-0654/FEMA-REP-1 (Rev. 1), "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" ("NUREG-0654"), of which the Board took official notice (Tr. 4029).

2. Organization of This Partial Initial Decision

This Partial Initial Decision begins with the Board's Opinion, Part I of the decision, which is largely comprised of discussion of Joint Intervenor Contention 17/26(1)(a) and its resolution, and includes a brief statement of the controlling law.^{2/} Parts II and III of this decision are the Board's

^{2/} Applicant has not here addressed the evidence on matters such as the distribution of the brochure which were the subject of proposed findings of fact and conclusions of law previously filed by the parties. Rather, the instant proposed findings and conclusions are limited to the subject matter of the reopened evidentiary hearing, i.e., the content of the brochure. The Board, in its deliberations, may wish to consider the proposed findings and conclusions filed earlier by the parties with respect to Contention 17/26(1)(a), to the extent the earlier filings have not been rendered moot by the reopened evidentiary hearings, superseded by the parties' later filings, or addressed elsewhere in the Board's first Partial Initial Decision. For example, the emergency information to be broadcast at the time of an accident was considered by the Board in conjunction with Contention 17/26(1)(c) in the first Partial

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Findings of Fact and Conclusions of Law. The Board's Order, authorizing the Director of Nuclear Reactor Regulation to issue a full-power license (upon fulfillment of the conditions imposed in the Order of the first Partial Initial Decision, as modified in our "Memorandum and Order (Re Applicant's Motion For Reconsideration or Clarification)" of December 14, 1982), is part IV of this decision.

B. JOINT INTERVENORS CONTENTION 17/26(1)(a)

Joint Intervenors' Contention 17/26(1)(a) asserted that:

Application has failed to adequately make provision, according to the Emergency Plan contained in Chapter 13.3 of the FSAR, for evacuation of individuals located within the 10-mile plume exposure pathway emergency planning zone for the Waterford 3 site in the event of a serious reactor incident, as required by applicable NRC regulations, in that:

- (a) the provisions for notifying residents of evacuation procedures are inadequate.

(Continued)

Initial Decision, and need not be addressed in the second decision. See also "Applicant's Proposed Findings of Fact, Conclusions of Law, and Brief In The Form Of A Proposed Initial Decision" (June 11, 1982), at 33-36, 66-72; "Joint Intervenors' Findings of Fact and Conclusions of Law On Contention 17/26" (June 21, 1982), at 5, 18; "NRC Staff's Proposed Findings of Fact, Conclusions of Law and Form of Order" (July 15, 1982), at 3-4, and "NRC Staff's Brief In Support Of Its Proposed Findings of Fact, Conclusions of Law and Form of Order" (July 15, 1982), at 12; and "Applicant's Reply To The Proposed Findings of Fact and Conclusions of Law On Contentions 17/26(1) and (2) (Emergency Planning) Filed By Joint Intervenors and NRC Staff" (July 26, 1982), at 19-21.

1. The Development of The Brochure

The development of the Waterford 3 emergency public information brochure has been an extended iterative process, spanning a period of approximately one year. The brochure has been developed in accordance with the emergency plans of Applicant as well as the State and local Parish governments, and in compliance with the Nuclear Regulatory Commission's ("NRC") emergency planning regulations and the planning standards and criteria set out in "Criteria For Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Rev. 1, November 1980 ("NUREG-0654"), a joint publication by the NRC and the Federal Emergency Management Agency ("FEMA"). PF 6-7.

The development of the brochure has been a cooperative effort, involving the review of the brochure by State and Parish emergency planning officials, as well as the NRC Staff and FEMA. In addition, Applicant requested that Dr. George Klare, a psychologist specializing in "readability" review the brochure and recommend changes to improve its readability. Dr. Klare carefully considered and was responsive to the comments of all parties -- including those of Joint Intervenors in their testimony and early filings -- and adopted all those which, in his professional judgment, would improve the brochure. Proposals of Joint Intervenors which, in his opinion, would make the document confusing or more difficult to read

were rejected. The reasons for rejecting such proposals were addressed in detail in Applicant's testimony, as discussed in Section 4, infra. Dr. Dennis Mileti, a sociologist with expertise in emergency public information systems, also reviewed the brochure for Applicant, to ensure that it included all appropriate information. PF 7-9.

The result of this effort is a brochure entitled "Waterford 3 Nuclear Unit Safety Information." The brochure includes a map of the area within a ten mile radius of Waterford 3, as well as a chart which identifies evacuation routes, reception centers for evacuees, and pickup points for public transportation. The map and the chart are color-keyed to one another, and the brochure will be published in full color. PF 10-11.

2. The Purpose of The Brochure

The brochure is a pre-emergency document, designed to "prime" the public for the situation-specific emergency information that would be broadcast at the time of an emergency at Waterford 3. The most important function of the brochure is to direct the public to turn on their radios and TVs upon activation of the outdoor sirens. PF 12.

One of Joint Intervenors' witnesses, a social psychologist, asserted that the purpose of the brochure is to persuade individuals to evacuate in an accident at Waterford 3. The primary focus of the witness' work is the factors influencing

the adoption of positive health habits by children and adolescents, involving "behavior modification" over a period of time. The witness sought to generalize from the findings in this line of research to the situation of an actual emergency at Waterford 3, where an evacuation has been ordered. PF 13-15.

However, it is inappropriate to attempt to draw conclusions about the factors which will influence public emergency response from findings about the factors which influence the development of good health habits. The determinants of public behavior in an emergency are situational; that is, the public's perception of reality at the time of an emergency is determined largely by the situation-specific perceptions of risk that the public possesses during the emergency, which are shaped by the information disseminated at the time of the emergency. Indeed, while experts on emergency response intuitively believe that pre-emergency public education materials, such as the brochure, must in some measure enhance emergency response, the studies on the subject uniformly indicate that such materials have no significant effect on actual behavior in an emergency.^{3/} PF 15-17.

^{3/} Still, those who have read the brochure prior to an accident will recall in an emergency that public officials have planned for such emergencies. They will also recall that some responses to an emergency are appropriate and some inappropriate, and that there are sources of official information to which they should turn. And, of course, some people may actually refer to the brochure at the time of the emergency.

Thus, contrary to the basic premise of Joint Intervenors' witness, the role of the brochure is not to persuade individuals to evacuate in an accident at Waterford 3. Such a brochure cannot motivate behavior in a future emergency. The motivation to take any protective action, including evacuation, is determined by the specific information disseminated at the time of the actual emergency. PF 18.

But, even assuming it were possible for a pre-emergency brochure to motivate specific behavior in some future emergency, there is significant danger in attempting to do so. Joint Intervenors' witness contended that the brochure must arouse in individuals some (unspecified) optimal level of fear, so that those individuals will evacuate in an emergency. But the precise nature of the risk involved in an accident can only be determined at the time of the accident and -- for some accidents -- evacuation would be an inappropriate response. Therefore, a brochure which arouses fear to a level motivating evacuation (assuming such a brochure could be designed) would evoke an inappropriate public response in some circumstances. PF 19.

For similar reasons, the practice evacuation of the public which Joint Intervenors' witness urged could be very counter-productive. Public behavior in an emergency is significantly influenced by people's past experience with emergencies. People who participated in an artificial practice evacuation would form experiences that they might recall in a future

actual emergency, even if those experiences were inapplicable to the actual emergency. Thus, a practice evacuation of the public would increase the likelihood that, in an actual emergency, people would evacuate prematurely or when sheltering (rather than evacuation) is the appropriate response. PF 20.

Joint Intervenors' witness also recommended that a survey be conducted to determine fear levels in the area around the plant, and that several different brochures be prepared reflecting the varying fear levels. However, since the brochure is not intended to induce fear in the public in order to motivate evacuation in some future emergency, there is no need for the suggested survey or for the preparation of several different brochures. Joint Intervenors' witness also emphasized the importance of credibility in a document intended to motivate behavior, and recommended a study of communicator credibility with respect to the brochure. However, given that the brochure is not a motivational tool, there is no need for such a study. In any event, there is no indication that the brochure is not credible. PF 21-22.

3. The Content of The Brochure

The standards which FEMA and the NRC use to evaluate emergency public information brochures provide that the brochure should include:

- a. educational information on radiation;
- b. contact[s] for additional information;

- c. [information about] protective measures, e.g., evacuation routes and relocation centers, sheltering, respiratory protection, radioprotective drugs; and
- d. [information about] special needs of the handicapped.

The educational information on radiation in the current brochure has been condensed from that included in a previous draft, eliminating extraneous material not directly related to instructions about what to do in an emergency. The current brochure describes what radiation is, how Waterford 3 works, and the classes of emergencies for accidents at nuclear plants. PF 24-25.

In reviewing brochures, the federal emergency planning experts recognize that brochures are not intended to be physics textbooks on radiation, and that absolute technical accuracy must in some respects be compromised for simplicity, so that the general public can understand and use the information presented. The general nature of radiation and the risk it presents have been explained adequately in the brochure before the Board. The NRC Staff and FEMA have concluded that the brochure includes sufficient educational information on radiation, and meets the provisions of the federal emergency planning guidance. PF 26-29.

The brochure also contains a section entitled "Where To Get More Information or Other Help," which directs the reader to call the local Parish emergency preparedness offices for

additional information or for answers to any questions about information in the brochure. The telephone numbers for the Parish offices are included immediately after the reference, and are repeated elsewhere in the brochure. The federal emergency planning experts have therefore concluded that the brochure meets applicable federal standards and includes adequate information on contacts for additional information. PF 30.

In addition, the brochure includes information about protective measures that may be appropriate in an emergency at Waterford 3. The evacuation route map and "Chart for the 16 Sections around Waterford 3" (which identifies schools and public transportation pickup points, evacuation routes, and reception centers by section, Parish and community) are clear, comprehensible and accurate. The brochure also addresses the protective action options other than evacuation, e.g., sheltering and respiratory protection. Accordingly, the federal emergency planning experts have concluded that the brochure includes adequate information about protective measures, and complies with applicable federal standards. PF 31.

Finally, the brochure addresses the special needs of the handicapped. The brochure expressly advises all persons who would need special assistance in an emergency to complete the "Special Needs Card" which will be enclosed with the brochure. The brochure also encourages neighbors to assist those who may

have difficulty filling out the card. The federal emergency planning experts have therefore concluded that the brochure meets the special needs of the handicapped, and complies with the applicable federal emergency planning guidance. PF 32.

The NRC Staff and FEMA identified two items for correction. The emergency siren testing schedule, correctly set out in the plan, is inconsistent with the schedule included in the Parish emergency plans. Resolution of this matter requires a change to those plans, but does not affect conclusions as to the adequacy of the brochure before this Board. The federal authorities will review the Parish plans to ensure that the appropriate change is made. PF 33.

The NRC Staff and FEMA also expressed concern that specific language in the brochure was confusing as to whether -- if an emergency were declared while school was in session -- parents should wait at home for their children or evacuate themselves and assume that the schools would transport the children to the appropriate reception centers. The potentially confusing language has been deleted from the brochure. PF 34.

Both FEMA and the NRC Staff have essentially "signed off" on the brochure. With the indicated change to clarify parents' actions with respect to school children, FEMA has concluded that the brochure as a whole satisfies the joint federal emergency planning criteria. Similarly, given the indicated corrective actions, the NRC has no reservations about the adequacy of the brochure. PF 35.

Dr. Klare, who has reviewed the brochures currently in use for all operating nuclear plants in the nation, also reviewed the brochure with respect to four types of information -- what could happen in the event of an emergency, how the public would be notified, who might be affected, and what actions the public might be asked to take. Dr. Klare found that the brochure presented the specified information very well -- at least as well as the other brochures he reviewed, and better than most. PF 36.

Dr. Mileti also reviewed the content of the Waterford 3 brochure, and concluded that the brochure provides adequate information about (a) the nature of the risk which might be presented in an emergency; (b) the official emergency public information system which would be activated in an emergency; and (c) the actions the public might be asked to take in an emergency. PF 37.

Joint Intervenors' witness was concerned that "fear is underplayed" in the brochure, so that the message of the brochure might be "totally discounted." However, Dr. Mileti does not believe that the brochure "underplays" the risk involved in a radiological emergency. Taken as a whole, the brochure will not cause the public to take a radiological accident or protective actions less seriously than they should, such that their ability or willingness to take protective actions might be compromised. Rather the very existence of the brochure -- entitled "Safety Information" -- discussing the

possible need for evacuation of such a large area appropriately emphasizes the risk involved. PF 38-39.

4. The Readability of The Brochure

Dr. Klare reviewed an earlier draft of the brochure, and made changes to improve its "readability" without affecting its basic content. The term "readability" refers to the quality of presentation and style of writing which makes a document easy or hard for a reader to understand. PF 40.

Joint Intervenors' readability witness, an Assistant Professor of Education at a local college, agreed that the changes made by Dr. Klare were "positive," but asserted that other changes should be made too. She initially questioned the selection of a folder/brochure format (rather than a leaf-turning booklet), which she considers "cumbersome." However, the brochure format is typical of the emergency public education materials prepared for nuclear plants and -- even when fully opened -- is only about the size of a page of newspaper, and is smaller than a standard road map. Moreover, the brochure format allows a very large presentation of the brochure map and chart. If the Waterford 3 public education material were to be published in booklet form, the map and chart would necessarily be smaller and more difficult to read. PF 41.

Joint Intervenors' readability witness favored numbering the pages of the brochure. But the brochure does not call for

reference back and forth to specific pages, and there is a natural reading sequence without page numbers. The addition of page numbers would actually be confusing to readers, because there would be no clear way to number the panels of the opened brochure. None of the emergency public education brochures for other nuclear plants have numbered pages. PF 42.

Joint Intervenors' readability witness was also generally critical of the reading sequence of the brochure, but made few specific suggestions. However, on the basis of one of her comments, the educational information about radiation was moved, to precede the information about specific emergency plans. The reading sequence of the brochure is now a very good one. PF 43-44.

Joint Intervenors also criticized the use of headlines in the brochure, expressing particular concern that the number of headlines would make it difficult to locate the "vital information" in the brochure. Their readability witness advocated that the information be divided into only a few major categories, with a few major subheadings. However, great care was exercised in the selection of headlines for the brochure. Material is presented in small units with appropriate, descriptive headings, so that readers will be able to locate information in the brochure with no difficulty. PF 45.

Nor is there any reason to label as "Summary" the panel headed "What To Do If You Hear The Outdoor Sirens," as Joint Intervenors' witness recommended. Such a headline might induce

some readers to read only the summary panel, whereas they might otherwise read the entire brochure before realizing that the content was concisely summarized at the beginning. In any event, the present action-oriented heading will draw people to the information on the panel better than would the heading "Summary." PF 46.

The relative sizes of headlines in the brochure, and the effect of headline size on readability, were explored extensively. We make a few recommendations for minor modifications to headline size. However, Dr. Klare used great care in the layout of the brochure, exercising his expert judgment in considering factors such as headline size and headline importance. Given the nature of the changes we recommend, which will not significantly affect readability, we need not impose a license condition on the subject. PF 47-50.

Joint Intervenors' readability witness generally criticized the length of the brochure, and their social psychologist questioned whether the public would read it at all. However, health and safety is a topic of the highest interest to readers. The very title of the brochure -- "Safety Information" -- and the emphasis on safety throughout will motivate the public to read the document. PF 51.

Joint Intervenors' only specific suggestion with respect to the length of the brochure challenged the use of repetition in the brochure. However, the information which is repeated in the brochure -- particularly the emergency broadcast radio and

TV stations -- is the most important information in the brochure. The repetition of such material assures that casual scanners of the brochure will be exposed to that information, even if they don't read the rest of the brochure. Repetition of key information also helps low ability readers, who may be unable to understand the information in one context, but comprehend it in a second, slightly different context. Repetition also makes it possible for material to pass into long-term memory (so that it may be recalled in an emergency). And, of course, repetition in the summary section of information that appears elsewhere in the brochure provides an easy reference at the time of an emergency. In any event, the amount of repetition in the brochure is relatively limited, and does not add significantly to the work a reader must do to secure the presented information. PF 52-55.

Joint Intervenors' readability witness also expressed concern that dictionary-type definitions of the terms "reception centers" and "pickup point" are not included in the brochure. The insertion of such definitions would only add words to the brochure, and is not necessary. Research indicates that these terms would be understood by most low ability readers, even out of context. But the terms are used in context in the brochure, which will help low ability readers even further. Such use in context is, in fact, the way the meanings of most terms are learned. Generally, functional definitions (such as those used in the brochure) are preferable to formal, dictionary-type definitions. PF 56-58.

Joint Intervenors' witness further criticized the size of the type used in the brochure as being too small. However, there is no correlation between type size and comprehension, except where the very smallest type is concerned. The type used in the chart is not too small. The witness further asserted that the chart is not color-coordinated with the map. But, as we indicated above, the brochure will be published in full color, and the chart will be color-keyed to the map. PF 59-60.

Joint Intervenors' witness also expressed concern that the use in the chart of the multi-syllabic terms "communities," "evacuation," and "reception" will make the chart too difficult for many readers. Because these terms are commonly used in emergency planning (and so would probably be used to some extent in an emergency), it is not advisable to attempt to substitute other words. In any event, research suggests that even low ability readers will understand these terms as they are used in context or functionally defined in the brochure. PF 61.

Joint Intervenors' witness believed that the use of the term "and" in the chart column heading "Schools and Pickup Points" was unnecessarily confusing, since it suggested that schools and pickup points were entirely distinct classes, when -- in fact -- all schools are pickup points. To eliminate the potential for confusion, the heading was changed to "Schools and Other Pickup Points." But there is another concern as

well. Despite the brochure's explicit instructions to parents not to go to schools to pick up their children in an evacuation, the heading may confuse parents and mislead them into thinking that they are supposed to pick up their children at their schools. Accordingly, the Board recommends that the heading be changed to simply "Pickup Points." Given the minor nature of this suggestion, it is unnecessary to impose a license condition on the subject. PF 62.

Joint Intervenors also criticized the placement of the instructions for the use of the chart. The map and the chart must be used together. Thus, the instructions for the use of the two are presented together, in a single panel which extends the length of the map and the chart immediately below it. The placement of the explanatory material on the use of the chart will not confuse readers. Joint Intervenors also complained that the material explaining the use of the chart appeared under the "unsuitable" heading "Try This Example." The information about the use of the chart is actually repeated twice -- first in steps 1 through 5 under "Follow These Steps For Using The Chart," where the steps are appropriately captioned with reference to the use of the chart. Only then is the use of the chart illustrated, under "Try This Example." PF 63.

Joint Intervenors' readability witness was also concerned that the pickup points (as represented by dots on the map) might not stand out from other information on the map. But,

before the hearing commenced, local emergency planning officials had independently remedied this concern. To make it easier to find specific pickup points on the map, each will be designated by a properly located numbered triangle, with the same symbol beside the name of the pickup point on the chart. If -- when the actual layout of the final brochure is done -- it is difficult to read the numbered triangles, an adjustment will be made to ensure that the symbols are readable. PF 64-65.

Joint Intervenors' witness further asserted that intersecting streets must be marked on the map, to assist people driving to pickup points. However, people who lack transportation would walk to the pickup points nearest their homes, where they would be picked up by public transportation, not by individuals driving to the pickup points. The pickup points are major local landmarks, which will be known to persons living in the neighborhood. It is therefore unnecessary to add more streets and street names to the map, which would involve more detail and would make the map more difficult to read and confusing. PF 66-67.

The brochure explains, "Your children may live within ten miles of Waterford 3, but go to a school farther away. If they do, plan to pick them up at the school yourself." In light of this statement, it was suggested that readers be instructed not only to locate their children's reception center on the chart (as is presently the case), but also to locate their children's

school on the map, to determine from the map whether the school is within ten miles of the plant. But such an instruction is unnecessary. Parents are likely to know where their children's schools are anyway, and will certainly know from the information already presented in the brochure whether the school their children attend is within ten miles of the plant. In any event, there is only one school in the two local Parishes which is more than ten miles from the plant. PF 68-69.

Instructing readers to locate their children's school on the map might encourage them to go to the school in an evacuation, which is an inappropriate response where the school is within ten miles of the plant. Therefore, for emergency planning reasons, it would be counterproductive to add the suggested instruction. Moreover, such an instruction would of necessity add more detail to the brochure and, depending on the wording used, could negatively affect readability. PF 69.

Joint Intervenors' witness broadly criticized the brochure, alleging that it failed to take into consideration the characteristics of the people of the Acadiana parishes, to which it is addressed. However, the witness had no specific recommendations in this respect, and the only illustrations offered involved the use of vernacular. And Joint Intervenors' witness and Dr. Klare agree that the brochure should not be written in the vernacular. PF 70.

Dr. Klare has visited Louisiana a number of times, traveling through the rural areas as well as the cities. He

has also had extensive experience working with readers and writers from across the South. In revising the brochure, he was sensitive to the particular ethnic and cultural characteristics of the population for which it is intended. And, of course, representatives of the State of Louisiana, as well as of the local Acadiana Parishes, reviewed the brochure at each stage of its development and substantially rewrote portions of it. Thus, all persons involved in the development of the brochure are cognizant of the unique cultural characteristics of the people who will read it. PF 71.

Joint Intervenors also challenged the decision of local government officials to print the brochure in English only. According to 1980 census data, 99.3% of the people 18 years or older in St. Charles Parish speak English well or very well. Similarly, 99.5% of the people 18 years or older in St. John Parish speak English well or very well. The census data thus confirms the judgment of the local officials. PF 72.

Dr. Klare conducted a complete analysis of all textual material in the brochure. The overall document is at the sixth grade reading level, close to the fifth grade level. The sections range from the most difficult sections, the educational information on radiation, which are at the seventh grade level, to the summary box, which is at the fourth grade level, close to the third grade level. In Dr. Klare's opinion, far over half of the adult population of the local Parishes -- approaching 90% -- will comprehend the brochure. This judgment

is based on the readability of the document, and on 1970 and 1980 census data. PF 73-75.

Dr. Klare does not believe that it would be appropriate to attempt to reduce further the readability level of the brochure, since message content would begin to be affected. While a few minor modifications may merit consideration, Dr. Klare does not think that the brochure could be improved to make it readable to a larger number of readers than can currently read it. Taken as a whole, the brochure is as readable as possible (consistent with the information being presented), and will be readable by a very, very large segment of the public. PF 76.

It is important to recognize that a given adult's inability to read even the summary section of the brochure does not mean that the individual will not learn of the information in the brochure. Not only other adults but also other children in the household, as well as neighbors and friends, can be expected to help those who cannot read, by reading the brochure to them. The brochure itself explicitly encourages this. And the subject matter of the brochure -- health and safety -- makes it particularly likely that other members of a household will make sure that any member who cannot read get the necessary information. PF 77.

Joint Intervenors have painted the brochure as a matter of "life and death." This is over-dramatization in the extreme. As we discussed earlier, research uniformly indicates that pre-emergency public education has no significant effect on

emergency response. Rather, it is the information disseminated at the time of an actual emergency which is determinative. Thus, individuals who cannot or will not or, for whatever reason, have not read the brochure will not be at greater risk than the rest of the community in the event of an emergency at Waterford 3, provided that the emergency warning information disseminated at the time of the emergency is adequate. The Board has already approved the public alert and notification system for use in an emergency at Waterford 3. See "Partial Initial Decision (Operating License)," LBP-82-100 (November 3, 1982), at 16-18, 41-45. PF 78.

The Appeal Board has correctly observed:

We doubt that unanimous agreement on every sentence of every brochure could ever be obtained. Such agreement is not required. Educational material must be judged in its entirety.

Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-697, 16 N.R.C. _____ (October 22, 1982), slip op. at 17 (footnote omitted). Judging the Waterford 3 brochure in its entirety, and particularly in light of its purpose, the Board finds that the brochure is fully adequate, and meets all applicable emergency planning regulations and regulatory guidance. PF 79.

C. CONCLUSION

The matters examined during the evidentiary hearings on Joint Intervenors Contention 17/26(1)(a) which are not

discussed in this Opinion were considered by the Board and found either to be without merit or not to affect the Board's decision herein. Findings of Fact and Conclusions of Law which are annexed hereto are incorporated in the Opinion. In preparing its Findings of Fact and Conclusions of Law, the Board reviewed and considered the entire record and the Findings of Fact and Conclusions of Law proposed by the parties. Those Proposed Findings not incorporated directly or inferentially in this Partial Initial Decision are rejected as being unsupported by the record of the case or as being unnecessary to the rendering of this decision.

Accordingly, for all the foregoing reasons, it is this day ordered that the Director of Nuclear Reactor Regulation is authorized to issue an operating license to Applicant for Waterford Steam Electric Station, Unit 3, subject to compliance with the conditions stated in the Order of our first Partial Initial Decision, LBP-82-100 (as modified by our "Memorandum and Order (Re Applicant's Motion For Reconsideration or Clarification)" dated December 14, 1982).

II. FINDINGS OF FACT

A. BACKGROUND

1. This Nuclear Regulatory Commission ("NRC") proceeding involves the application filed by Louisiana Power & Light Company ("Applicant") for an operating license for the Waterford Steam Electric Station, Unit 3 ("Waterford 3").

2. Evidentiary hearings were conducted in March, April and May of 1982, in which the parties presented evidence on two areas of concern placed in issue through Joint Intervenors Contention 8/9 and Joint Intervenors Contentions 17/26(1) and (2) -- respectively, the adequacy of evaluations of the effects due to routine releases of radioactivity from Waterford 3 interacting with existing pollutants in the area and the adequacy of certain aspects of emergency planning in the event of an accident at Waterford 3 which results in releases of radioactivity offsite.

3. Joint Intervenors' contentions were largely disposed of by the first Partial Initial Decision of this Board, LBP-82-100, issued on November 3, 1982. However, by its October 18, 1982 "Memorandum and Order (Re Applicant's Response (Motion) of September 23, 1982, and Joint Intervenors' Motion (Cross-Motion) of September 29, 1982)," the Board ordered further evidentiary hearings limited solely to the adequacy of Applicant's emergency public information brochure. Accordingly, in the first Partial Initial Decision, the Board reserved judgment with respect to Joint Intervenors Contention 17/26(1)(a).

4. Joint Intervenors' Contention 17/26(1)(a) asserted that:

Applicant has failed to adequately make provision, according to the Emergency Plan contained in Chapter 13.3 of the FSAR, for evacuation of individuals located within the 10-mile plume exposure pathway emergency planning zone for the Waterford 3

site in the event of a serious reactor incident, as required by applicable NRC regulations, in that:

- (a) the provisions for notifying residents of evacuation procedures are inadequate.

The reopened evidentiary hearings on this contention were convened February 8-11, 1983, with all parties -- the Nuclear Regulatory Commission Staff ("the NRC Staff"), Applicant and Joint Intervenors -- represented. In addition, an attorney representing the Federal Emergency Management Agency ("FEMA") participated with counsel for the Staff.

5. Applicant's witnesses at the reopened evidentiary hearings included Ronald Perry, an Associate Engineer II-Nuclear employed by Applicant, who coordinated the development of the brochure; Dr. George Klare, a psychologist specializing in "readability"; and Dr. Dennis Mileti, a sociologist with expertise in emergency public information systems. Joint Intervenors presented the testimony of Ms. Sharon Duplessis, an Assistant Professor of Education at a New Orleans college, and Dr. Saundra Hunter, a social psychologist whose research focuses on the social and psychological determinants of health habits in children and adolescents. The NRC Staff presented the testimony of Donald Perrotti, an Emergency Preparedness Specialist with the NRC Staff. Albert Lookabaugh, Supervisor of the Technological Hazards Branch of FEMA Region VI, also testified.

B. JOINT INTERVENORS CONFNTION 17/26(1)(a)

1. The Development of The Brochure

6. The initial draft of the public information brochure was developed in the Spring of 1982, through the joint effort of the various bodies involved in the Waterford 3 emergency planning program. Included in this group were the State of Louisiana represented by the Louisiana Nuclear Energy Division ("LNED") and the Louisiana Office of Emergency Preparedness ("LOEP"), the St. Charles Parish Office of Emergency Preparedness, the St. John the Baptist Office of Civil Defense and Applicant. Perry, ff. Tr. 4066, at 2; Tr. 4065, 4120, 4128 (Perry). The brochure was developed in accordance with the onsite and the offsite emergency plans, and in compliance with Section 50.47 and Appendix E of 10 C.F.R. Part 50 and the applicable joint NRC/FEMA planning standards and criteria set out in "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Rev. 1, November 1980 ("NUREG-0654"). Public information brochures from other nuclear power plants were reviewed as background information. Perry, at 2; Tr. 4340-42 (Perry).

7. The further refinement of the brochure has been an extended iterative process, involving the review of the brochure by State and Parish emergency planning officials, as well as the NRC Staff and FEMA. Perry, at 2; Perrotti, ff. Tr.

4599, at 2-3; Lookabaugh, ff. Tr. 4570, at 1; Tr. 4120-21, 4128, 4131, 4317-18 (Perry). In addition, in mid-September, 1982, Applicant requested that Dr. George Klare, a psychologist specializing in "readability", review the brochure and recommend changes to improve its readability. Perry, at 2-3; Klare, ff. Tr. 4100, at 1-2; Tr. 4078-79 (Klare).

8. The brochure text, as revised by Dr. Klare, was provided to LNEP, LOEP, Parish emergency planning officials, the NRC Staff and FEMA, among others, for review and comment. The text was further revised in response to detailed individual comments, received over a period of approximately one month, with individual changes reviewed in turn by Dr. Klare to ensure maintenance of the improved readability level. Perry, at 3; Klare, at 3; Tr. 4128, 4317-18 (Perry); Tr. 4078-79, 4103-04, 4107 (Klare). Dr. Klare carefully considered and was responsive to the comments of all parties -- including those of Joint Intervenors in their testimony and early filings -- and adopted all those which, in his professional judgment, would improve the brochure. Those proposals of Joint Intervenors which, in his opinion, would make the document confusing or more difficult to read were rejected. The reasons for rejecting such proposals were addressed in detail in Applicant's testimony. See PF 40-79, infra. Tr. 4840-42 (Klare).

9. At Applicant's request, Dr. Dennis Miletic, a sociologist specializing in emergency public information systems, also reviewed the brochure text, to ensure that it provides adequate

information about the nature of the risk in a radiological emergency, the means for communicating specific emergency information at the time of an accident, and the protective actions the public might be asked to take in an emergency at Waterford 3. Dr. Miletì recommended several changes to the brochure text, which were incorporated into the brochure by Dr. Klare. Academic Vita of Dennis S. Miletì, January, 1982, ff. Tr. 4662; Tr. 4655, 4701, 4720-22 (Miletì).

10. The result of this effort is a brochure entitled "Waterford 3 Nuclear Unit Safety Information." Applicant Exhibit 13 is a printer's proof of the brochure. Applicant Exhibit 14 is a color sketch which, when superimposed over the map in the public information brochure, will indicate the color coding for the protective action sections within the plume EPZ. In the final booklet, the map will be sized as indicated in Applicant Exhibit 13, and colored in accordance with Applicant Exhibit 14. Perry, at 3; Klare, at 4; Tr. 4069-70, 4208-10 (Perry).

11. Specified minor changes will be made to Applicant Exhibit 13, before it goes to print, for clarity and accuracy. Tr. 4070-77 (Perry). In addition, the brochure will be published in full color, and the "Chart for the 16 Sections around Waterford 3" -- which identifies evacuation routes, reception centers, and pickup points -- will be color-keyed to the map. Perry, at 3-4.

2. The Purpose of The Brochure

12. The brochure is a pre-emergency document, designed to "prime" the public for the situation-specific emergency information that would be broadcast at the time of a radiological accident. Tr. 4118-19, 4166, 4172-73 (Klare); Tr. 4338 (Perry); Tr. 4589 (Lookabaugh). The most important function of the brochure is to direct the public to turn on their radios and TVs upon activation of the outdoor sirens. Perry, at 1-2, 5; Tr. 4338 (Perry); Tr. 4589 (Lookabaugh).

13. One of Joint Intervenors' witnesses, Dr. Sandra Hunter, a social psychologist, asserted that the purpose of the brochure is to persuade individuals to evacuate in an accident at Waterford 3. Hunter, ff. Tr. 4520, at 1; Tr. 4534 (Hunter). However, Dr. Hunter was unfamiliar with the Commission's emergency planning regulatory scheme, had not read either the onsite or offsite emergency plans for Waterford 3, and had not seen the brochures for any of the other nuclear plants in the nation. Tr. 4474-76 (Hunter). Moreover, Dr. Hunter knew of no civil defense literature or NRC or FEMA documents which would support her view of the purpose of pre-emergency public information materials such as the brochure. Tr. 4535-37 (Hunter). Nor did she know of any emergencies in which evacuations were ineffective, where the ineffectiveness was attributable to the non-persuasive nature of pre-emergency public education materials. Tr. 4537 (Hunter).

14. The primary focus of Dr. Hunter's research is the social and psychological determinants of health habits in children and adolescents -- particularly health habits such as exercise, cigarette smoking, and Type A coronary prone behavior patterns. Tr. 4543 (Hunter); Curriculum Vitae, ff. Tr. 4520. She places great reliance on the work of the social psychologist Howard Leventhal, who also studies factors influencing the adoption of positive health habits, such as good dental hygiene and tetanus inoculation. Tr. 4521-22, 4527-28, 4531-33, 4540 (Hunter). Dr. Hunter would generalize from the findings in this line of research to the situation of a radiological emergency where an evacuation has been ordered. Tr. 4522-23 (Hunter).

15. However, scholars who seek to explain and predict public behavior in emergencies have rejected the "behavior modification" model employed in the work of Dr. Leventhal and Dr. Hunter, in favor of "symbolic interactionism." It is thus inappropriate to attempt to draw conclusions about the factors which will influence public emergency response from findings about the factors which influence the development of good health habits. Tr. 4710-12, 4725-26 (Mileti).

16. The symbolic interactionism construct (as applied to an emergency situation) recognizes that people's perception of reality becomes reality for them, and is what determines their response to the emergency. Tr. 4710-11, 4747 (Mileti). The determinants of public behavior in an emergency are

situational; that is, the public's perception of reality at the time of an emergency is determined largely by the situation-specific perceptions of risk that the public possesses during the emergency, which are shaped by the information disseminated at the time of the emergency. Tr. 4695-96, 4698-99, 4702, 4711, 4776, 4780 (Mileti).

17. Indeed, while experts on emergency response (like Dr. Mileti) intuitively believe that pre-emergency public education must in some measure enhance emergency response, the studies on the subject uniformly indicate that pre-emergency public education has no significant effect on actual behavior in an emergency.^{4/} Tr. 4703-04, 4783, 4799-801 (Mileti). Rather, whatever knowledge people bring to an emergency situation becomes secondary to the information they receive during the emergency. Tr. 4783 (Mileti).

^{4/} This is not to say that pre-emergency information is without benefit. It is a positive effect that those who have read the brochure prior to an accident will recall in an emergency that public officials have planned for such emergencies. They also will recall generally that some responses to an emergency are appropriate and some inappropriate, and that there are sources of official emergency information to which they should turn. This recollection will enhance those people's ability to readily distinguish between official emergency information on the one hand and rumor and misinformation on the other. Tr. 4797-98, 4800-01 (Mileti). At a minimum, while those who have read the brochure prior to an emergency may not recall the specific details of planning in an actual emergency, the information they would receive via emergency broadcasts at the time of the accident would not be completely new to them. Tr. 4119 (Klare); Tr. 4799-800 (Mileti). And, of course, some people may actually refer to the brochure at the time of the emergency. Tr. 4206-07 (Perry); Tr. 4812-14, 4817 (Mileti).

18. Thus, contrary to Dr. Hunter's basic premise, the role of the brochure is not to persuade individuals to evacuate in an accident at Waterford 3. Such a brochure cannot motivate behavior in a future emergency. The role of pre-emergency public education materials, such as the brochure, is informational rather than motivational. The motivation to take any particular protective action is determined by the specific information disseminated at the time of the actual emergency. Tr. 4695-96, 4701, 4820 (Mileti).

19. Even assuming it were possible for a pre-emergency brochure to motivate specific behavior in some future emergency, there is significant danger in attempting to do so. Tr. 4700 (Mileti). Dr. Hunter contends that the brochure must arouse in individuals some (unspecified) optimal level of fear, so that those individuals will evacuate in an emergency at Waterford 3. Hunter, at 1-3. But the precise nature of the risk attendant to an actual accident is determined by the specific circumstances of the accident, and the most appropriate behavior in that emergency may be sheltering rather than evacuation. Thus, a brochure which arouses fear to a level which motivates evacuation (assuming such a brochure could be designed) would evoke an inappropriate public response in some circumstances. Tr. 4700 (Mileti).

20. For similar reasons, the practice evacuation of the public urged by Dr. Hunter could be very counterproductive. The extensive body of civil defense literature establishes that

behavior in an emergency is significantly influenced by people's past experience with risks, hazards and disasters. A practice evacuation would necessarily be contrived and could not accurately predict in all significant respects the circumstances of a future actual emergency. Nevertheless, people who participated in an artificial practice evacuation would form experiences and patterns of behavior that they may recall in a future actual emergency, even if those experiences are inapplicable to the actual emergency. Thus, a practice evacuation of the public would increase the likelihood that, in an actual emergency, people would evacuate prematurely or when sheltering (rather than evacuation) is the appropriate response. Hunter, at 4-5; Tr. 4708-10, 4762-63, 4805-06 (Mileti).^{5/}

21. Dr. Hunter also recommended that a survey be conducted to determine fear levels within the plume EPZ, and that several different brochures be prepared reflecting the varying fear levels. Hunter, at 4-5. However, since the brochure is not intended to induce fear in the public in order to motivate behavior in a future emergency, there is no need to conduct such a survey or to prepare several different brochures. Tr. 4700-01 (Mileti).

^{5/} While we dispose of the suggestion of a practice public evacuation on substantive grounds, we further note that the Commission's regulations preclude us from requiring such a practice evacuation. See LBP-82-100, at 20-21.

22. Dr. Hunter also emphasized the importance of communicator credibility in a document intended to motivate behavior, and recommended a study of communicator credibility within the plume EPZ. Hunter, at 1-2, 4. However, given that the brochure is not a motivational tool, there is no need for such a study. Tr. 4707-08, 4806-07 (Mileti). In any event, there is no indication that the brochure is not credible. Indeed, the brochure indicates on its face that it was prepared by state and Parish governments, and researchers have concluded that public officials are perceived as credible sources of emergency information. It is similarly well documented that familiarity generally enhances credibility, so that the informal, friendly tone of the brochure will not detract from its credibility. Nor is there any foundation in logic or research for Dr. Hunter's assumption that there is an inherent inconsistency in a publication that is both official and friendly. Rather, the official nature and friendly tone of the brochure together enhance its credibility. Hunter, at 2; Applicant Ex. 13; Tr. 4706-07 (Mileti).

3. The Content of The Brochure

23. Since the brochure primarily relates to offsite emergency preparedness, FEMA bears primary responsibility for review and evaluation of the adequacy of the brochure. Perrotti, ff. Tr. 4599, at 3. The standards which FEMA uses to evaluate brochures are set forth in NUREG-0654, Criterion G. The information which must be included in the brochure is:

- a. educational information on radiation;
- b. contact[s] for additional information;
- c. protective measures, e.g., evacuation routes and relocation centers, sheltering, respiratory protection, radioprotective drugs; and
- d. special needs of the handicapped.

Lookabaugh, ff. Tr. 4570, at 1-2; NUREG-0654, at 49. See also 10 C.F.R. § 50.47(b)(7); 10 C.F.R. Part 50, Appendix E, § IV.D.2.

24. The educational information on radiation has been condensed from four panels in a previous draft of the brochure to a single panel in the current brochure, eliminating extraneous material not directly related to instructions of what to do in the event of an accident. Lookabaugh, at 2; Klare, at 2. The current brochure describes what radiation is, how Waterford 3 works, and the classes of emergencies (Unusual Event, Alert, Site Emergency, General Emergency) for accidents at nuclear plants. Lookabaugh, at 2; Applicant Ex. 13.

25. The inclusion of the standard classes of emergencies (which were not defined in an earlier draft) is a good addition, since emergency information broadcast at the time of a radiological emergency may use those terms. Lookabaugh, at 2; Tr. 4196-97 (Klare).

26. LNEC and Dr. John Mauro, a certified health physicist who appeared in the earlier hearings before the Board, reviewed the brochure for Applicant from a health physics perspective. Tr. 4334, 4373 (Perry); Curriculum Vitae, John J. Mauro, ff. Tr. 461.

27. In its review of the brochure for educational information on radiation, FEMA placed reliance on the expertise of the NRC. Tr. 4583 (Lookabaugh); Tr. 4615 (Perrotti). In reviewing brochures, the NRC Staff recognizes that the brochures are not intended to be physics textbooks on radiation. Absolute technical accuracy must in some respects be compromised for simplicity, so that the general public can understand and use the information presented. Tr. 4616-17, 4628 (Perrotti). Accord Klare, at 2.

28. The general nature of radiation and the risk it presents have been explained adequately in the brochure before the Board; expanding the brochure to achieve textbook precision would not further enhance the health and safety of the public, but would make the information on radiation more difficult for the general public to understand. Tr. 4616-17, 4625-28 (Perrotti).

29. The educational information on radiation included in the brochure is as comprehensive and clear as the information included in the half dozen other brochures examined by the NRC Staff's reviewer, Mr. Perrotti. Tr. 4605, 4616 (Perrotti). The NRC Staff and FEMA have concluded that the brochure includes sufficient educational information on radiation and meets the provisions of NUREG-0654, Criterion G.1.2. Lookabaugh, at 2; Tr. 4611-12 (Perrotti).

30. The brochure contains a section entitled "Where To Get More Information or Other Help" on a separate panel. This

section directs the reader to call the risk Parish emergency preparedness offices for additional information or for answers to any questions about information in the brochure. The telephone numbers for each of the Parish organizations are listed immediately after their reference in the text of the brochure, and are repeated elsewhere in the brochure.

Lookabaugh, at 3, 4; Applicant Ex. 13. Since accurate and concise information regarding sources of additional information is contained in the brochure, FEMA has concluded that it meets NUREG-0654, Criterion G.1.b. Lookabaugh, at 3. The NRC Staff concurs. Tr. 4622-23 (Perrotti).

31. The brochure also includes information about protective measures that may be appropriate in a radiological emergency. The evacuation route map and "Chart for the 16 Sections around Waterford 3" (which identifies schools and public transportation pickup points, evacuation routes, and reception centers by section, Parish and community) are clear, comprehensible and accurate. The evacuation map adequately indicates the routes to be used in the event of an evacuation. The color printing of the map does not obscure the roads, route numbers or place names, and should assist residents in identifying their locations. In addition, the section lines on the map in the current brochure go up to the river, eliminating an earlier FEMA concern that individuals on the levees would not be able to identify the section in which they were located. Lookabaugh, at 3; Tr. 4581 (Lookabaugh); Applicant Ex. 13. See

also Tr. 4344-45 (Perry). The brochure also adequately addresses the protective action options other than evacuation, e.g., sheltering and respiratory protection. Tr. 4344-45 (Perry); Applicant Ex. 13. FEMA has concluded that the brochure meets NUREG-0654, Criterion G.1.c. Lookabaugh, at 4. The NRC Staff concurs. Tr. 4622-23 (Perrotti).

32. The brochure also addresses the special needs of the handicapped. In the section entitled "What Are The Actions You Might Need To Take?", the brochure advises all persons who would need special assistance in an emergency to complete the "Special Needs Card" which will be enclosed with the brochure.^{6/} The brochure encourages neighbors to assist those who may have difficulty filling out the card. FEMA has concluded that the brochure satisfies NUREG-0654, Criterion G.1.d. Lookabaugh, at 4. The NRC Staff concurs. Tr. 4622-23 (Perrotti).

33. The NRC Staff and FEMA identified two items for correction. First, the siren testing schedule, correctly set out in the brochure, is inconsistent with the schedule included in the Parish emergency plans. Lookabaugh, at 5; Tr. 4605, 4614 (Perrotti). Resolution of this matter requires a change to the plans, but does not affect conclusions as to the

^{6/} Although the "Special Needs Card" itself was not at issue in the reopened evidentiary hearings, Dr. Klare reviewed the card and made changes to enhance its readability. Tr. 4569 (Churchill).

adequacy of the brochure before the Board. Lookabaugh, at 5. When the necessary minor change to the plans is made, FEMA will review the plans to assure that the correct siren testing schedule is reflected in the revised plans. Tr. 4571 (Lookabaugh). The indicated change to the plans will also resolve the Staff's concerns on this matter. Tr. 4614 (Perrotti).

34. The NRC Staff and FEMA also expressed concern that specific language in the brochure was confusing as to whether -- if an emergency were declared while school was in session -- parents should wait at home for their children or evacuate themselves and assume that the schools would transport the children to the appropriate reception centers. Lookabaugh, at 5; Tr. 4605, 4614 (Perrotti). In response to these comments, the potentially confusing language was deleted, assuaging the concerns of FEMA and the Staff. Tr. 4075-77 (Perry); Tr. 4571-72 (Lookabaugh); Tr. 4614 (Perrotti).

35. Both FEMA and the NRC Staff have essentially "signed off" on the brochure. Tr. 4622-23 (Perrotti); Tr. 4904-05 (Cassidy). With the indicated change to clarify parents' actions with respect to school children, FEMA has concluded that the brochure as a whole satisfies the criteria of NUREG-0654. Lookabaugh, at 4-5. Similarly, given the indicated corrective actions, the NRC has no reservations about the adequacy of the brochure. Tr. 4622-23 (Perrotti).

36. Dr. Klare, who has reviewed the brochures currently in use for all operating nuclear plants in the nation, also reviewed the Waterford 3 brochure with respect to four types of information -- what could happen in the event of an emergency, how the public would be notified, who might be affected, and what actions the public might be asked to take. Tr. 4083, 4118-19, 4310 (Klare). Dr. Klare found that the brochure presented the specified information very well -- at least as well as the other brochures he reviewed, and better than most. Tr. 4310 (Klare).

37. As discussed above (see paragraph 9), Dr. Mileti also reviewed the content of the Waterford 3 brochure, and concluded that the brochure before the Board provides adequate information about: (a) the nature of the risk which might be presented in an emergency, Tr. 4696-97, 4722-23, 4794 (Mileti); (b) the official emergency public information system which would be activated in the event of an emergency, Tr. 4697-98 (Mileti); and (c) the actions the public might be asked to take in an emergency, Tr. 4698 (Mileti).

38. Dr. Hunter was concerned that "fear is underplayed" in the brochure, so that the message of the brochure might be "totally discounted." Hunter, at 3, 4. However, Dr. Mileti does not believe that the brochure "underplays" the risk involved in a radiological emergency. Taken as a whole, the brochure will not cause the public to take a radiological accident or protective actions less seriously than they should,

such that their ability or willingness to take protective actions might be compromised. Rather, the very existence of a brochure -- entitled "Safety Information" -- discussing the possible need for evacuation of such a large area appropriately emphasizes the risk involved. Tr. 4701, 4793 (Mileti).

39. It is extremely important to appropriate response that, during an accident, the public have a clear idea of the precise nature of the risk presented. However, the best time to provide such precise information is at the time of the accident, when the exact nature of the actual risk presented is known. Tr. 4787-88 (Mileti). To graphically detail in the pre-emergency brochure the full range of health effects of radiation overexposure might well overstate the actual risk presented in some future actual emergency, and might cause the public to engage in inappropriate behavior. Tr. 4793-94 (Mileti). A pre-emergency brochure should only provide general information about the nature of the risk that may be presented in an emergency, to help the public understand the reasoning behind the actions they may be asked to take. Tr. 4791-92 (Mileti). The information provided by the Waterford 3 brochure is more than adequate in this respect. Tr. 4794 (Mileti).

4. The Readability of The Brochure

40. Dr. Klare reviewed an earlier draft of the brochure, and made changes to improve its readability without affecting its basic content. The term "readability" refers to the quality of presentation and style of writing which make a

document easy or hard for a reader to understand. The types of changes made by Dr. Klare include:

- * Making the format more "open," by using lists in place of continuous text, where possible.
- * Making the sentences more comprehensible by limiting the ideas in each and by using parallel grammatical constructions.
- * Shifting certain material within the document to present related concepts closer to each other. This reduces the need to search for related information, and thus makes it easier for readers to get desired meanings.
- * Removing certain material because it was not essential to the goals of a safety document and was significantly more difficult than other material.
- * Repeating certain key information in a standard format so that readers might store it in long-term memory or locate it readily in the document in an emergency.
- * Using common words whose meanings are most likely to be known to readers with limited education and vocabulary.
- * Using concrete (as opposed to abstract) wording to convey ideas and actions readers could picture.
- * Limiting the distance between referents and the terms they refer to, thus removing potential ambiguity.
- * Modifying the style by using active rather than passive voice in many sentences.
- * Modifying the approach by using a personal style directed to the reader, rather than an impersonal style.

- * Drawing, where possible, upon readers' existing knowledge ("prior knowledge") to make material more familiar.
- * Asking readers to be active during reading by suggesting places to turn to, checks to be made, and essential information to be marked on the brochure.
- * Asking readers to follow a worked-out example from a chart to help them get the correct information for their own use.

Klare, at 2-3.

41. Joint Intervenors' "readability" witness, Ms. Sharon Duplessis, agreed that the changes made by Dr. Klare were "positive," but asserted that other changes should be made too. Duplessis, ff. Tr. 4419, at 2, 6. Ms. Duplessis initially questioned the selection of a folder/brochure format (rather than a leaf-turning booklet), characterizing the brochure as "cumbersome." Tr. 4446 (Duplessis). However, the folder/brochure format is typical of the emergency public education materials prepared for nuclear plants, Tr. 4326 (Perry), and -- even when fully opened -- the brochure is only about the size of a page of newspaper, and is smaller than a standard road map. The chief advantage of the folder/brochure format is that the map and chart included in the brochure can be presented very large. Tr. 4326-27, 4360 (Klare). If the Waterford 3 emergency public education material were to be presented in a smaller, leaf-turning booklet (as suggested by Joint Intervemors), the map and the chart would necessarily be smaller and more difficult to read. Tr. 4363 (Klare).

42. Ms. Duplessis favored numbering the pages of the brochure. Duplessis, at 2. However, as a reader goes through the brochure, reference forward or back to specific pages is not necessary. The only time a reader needs to turn from the normal reading sequence is to open the brochure, to consult the map and chart. Tr. 4823 (Klare). Thus, people will not have difficulty opening the brochure and reading through it, in the absence of page numbers. Tr. 4327 (Klare). In fact, the addition of page numbers would actually be confusing to readers, particularly when the brochure is fully opened; it is questionable how one would number the panels of the opened brochure. Tr. 4327, 4822-23 (Klare). None of the emergency public education folder/brochures for other nuclear plants have numbered pages. Tr. 4822 (Klare).

43. Ms. Duplessis was generally critical of the reading sequence of the brochure, but made few specific suggestions. Duplessis, at 2-3. On the basis of one of her specific comments, the panel headed "What Radiation Is" was moved to the far left of the folded page on which it appears, so that the panel "What Radiation Is" precedes the three panels captioned "Emergency Action Plans." Duplessis, at 3; Tr. 4075 (Perry). This change is a very useful one. Now, a reader will read about plans in sequence, going from the last heading under "Emergency Action Plans" -- "What If You Are Told To EVACUATE?" -- to inside the document, to continue with "What To Do If You Are Told To Evacuate." Tr. 4824 (Klare). This is a more natural reading sequence. Tr. 4841 (Klare).

44. The reading sequence of the brochure is now a very good one. The first thing a reader opening the brochure encounters is the summary section "What To Do If You Hear The Outdoor Sirens"; thus, even if the reader doesn't read the entire document, the key information has been presented. Alongside the summary section is "A Message To Our Neighbors and Friends" which, because of its official nature and friendly tone, encourages readers to continue. The remainder of the document can then be read in the natural and expected sequence. "Where To Get More Information Or Other Help" should logically be at the back of the brochure, just as it is. Tr. 4824-25 (Klare).

45. Ms. Duplessis also criticized the use of headlines in the brochure. In particular, she expressed concern that the number of headlines in the brochure would make it difficult to locate the "vital information" in the brochure. She advocated that the information in the brochure be divided into only a few major categories with a few major headings. Duplessis, at 3-4. However, great care was exercised in the selection of headlines for the brochure. Each headline sets off a small unit of text, and is quite descriptive of the content of that text. Tr. 4827 (Klare). Thus, since material is presented in small units with appropriate headings, readers will be able to locate information in the brochure with no difficulty. Tr. 4849 (Klare).

46. There is no reason to label as "Summary" the panel headed "What To Do If You Hear The Outdoor Sirens," as

Miss Duplessis recommends. See Tr. 4450-51 (Duplessis). She is concerned that, unless the panel is so labeled, a reader may read the entire brochure before he realizes that the first panel was a summary. Tr. 4451 (Duplessis). Such a possibility is an asset, not a liability; that is, identifying the panel as a "Summary" might induce some readers to read only the summary panel, whereas they might otherwise read the entire brochure before realizing the content was concisely summarized at the beginning. In any event, the present heading is very action-oriented, and descriptive of the precise content of the panel. Thus, the present heading will draw people to the information on the panel better than would the heading "Summary." Tr. 4826-27, 4853 (Klare).

47. Ms. Duplessis further asserted that headline sizes in the brochure are not appropriately indicative of the relative import of textual material. In particular, she alleged that, in some instances, subtopic headlines appear in larger and bolder type than the associated main topic. Duplessis, at 3-4; Tr. 4446-47 (Duplessis). However, Dr. Klare exercised great care in the layout of the brochure, exercising his judgment in considering factors such as headline size and headline importance. Tr. 4827 (Klare). While slightly larger headline type is generally used to distinguish a major topic from a subtopic, Tr. 4849 (Klare), large type is, in some instances, deliberately used in a subheading, for emphasis. Tr. 4856-57 (Klare). Slight differences in headline size do not

significantly affect where readers look, Tr. 4848-49 (Klare), and differences in headline size are relatively insignificant where headlines are not on the same page or panel. Tr. 4849-50 (Klare).

48. Though not centered over the entire block of text, the headline "Emergency Action Plans" is the main topical heading for the three panels of material that follow. Tr. 4849, 4871 (Klare); Applicant Ex. 13. The main heading is only slightly larger than the headlines for the subtopics, but the present placement and size of the main heading will not interfere with the understanding of the document. Tr. 4872 (Klare); Applicant Ex. 13. Nevertheless, there is no reason why the size of type of the main heading could not be increased relative to the size of type of the subheadings, though it is better to leave the main heading at the beginning of the panels than to center it over all three. Tr. 4872 (Klare). The Board therefore recommends that the headline "Emergency Action Plans" be slightly increased in size, to emphasize the relationship between the main topic and the associated subtopics.

49. While the heading "Emergency Action Plans" appears in larger type than the summary headline "What To Do If You Hear The Outdoor Sirens," the two headlines are not on the same panel, so that the relative sizes of the headlines will not confuse readers. Tr. 4849-50 (Klare). Nevertheless, it would not detract from "What To Do If You Hear The Outdoor Sirens" to make that headline as large as the headline "Emergency Action

Plans." Tr. 4851-52 (Klare). Indeed, increasing the size of type used in the headline "What To Do If You Hear The Outdoor Sirens" will enhance the eye-catching ability of the summary panel relative to the panel on the right, "A Message To Our Neighbors and Friends," which presently has a much larger headline. Tr. 4873 (Klare); Applicant Ex. 13. The Board therefore recommends that the headline "What To Do If You Hear The Outdoor Sirens" be enlarged to the size of the headline "Emergency Action Plans."

50. The headline "What Are The Actions You Might Need To Take?" refers to the panel which follows, which includes the topics "What If You Are Told To PROTECT YOUR BREATHING?," "What If You Are Told To SHELTER IN PLACE?," and "What If You Are Told To EVACUATE?" Tr. 4877 (Klare). While the relative sizes of these headlines would not confuse readers, the relationship between the main heading and the three subheadings might be made more clear by enlarging the size of type of the main heading or, alternatively, by somehow emphasizing the word "actions" in the main heading -- for example, by the use of a bolder face type. Tr. 4878-79 (Klare). The Board so recommends.

51. Ms. Duplessis generally criticized the length of the brochure, and Dr. Hunter questioned whether the public would read it at all. Tr. 4431, 4446 (Duplessis); Hunter, at 4. However, health and safety is the single topic of the highest interest to readers. Tr. 4177-78, 4187-89 (Klare). The very

title of the brochure -- "Safety Information" -- and the emphasis on safety in the text of the document will motivate the public to read the brochure. Tr. 4177, 4189 (Klare).

52. Ms. Duplessis' only specific suggestions with respect to the length of the brochure challenged the utility of repetition in the document. Duplessis, at 4. She acknowledges that repetition is often a sound teaching tool. Duplessis, at 4; Tr. 4431 (Duplessis). She further notes that many basic education texts state as a general principle that repetition may be especially helpful with learners who exhibit low levels of achievement. Tr. 4432-33 (Duplessis). She nevertheless asserts that repetition in the brochure here only adds to the wordiness of the document, and makes it more difficult for the reader to disembed important facts. Duplessis, at 4. She is particularly concerned that the length of the brochure will deter someone with a very low basic sight vocabulary of 100 to 150 words from reading the document. Tr. 4431 (Duplessis). This latter concern is of little moment. An individual with such a limited sight vocabulary would read somewhere between the preschool and second or third grade level, Tr. 4434-35 (Duplessis), and could not read this brochure with comprehension anyway, even were he not deterred by its length. Tr. 4115-18 (Klare).

53. Contrary to Ms. Duplessis' opinions, the repetition in the brochure is desirable, and does not adversely affect readability; rather, it enhances readability. Tr. 4827-29,

4868-69 (Klare). The information which is repeated -- particularly the emergency broadcast radio and TV stations -- is the most important information in the brochure. Tr. 4361, 4363, 4868-69, 4870-71 (Klare). Thus, repetition is used to reinforce concepts presented. Lookabaugh, at 4; Tr. 4583-84 (Lookabaugh).

54. The repetition of material such as the emergency broadcast radio and TV stations assures that casual scanners will be exposed to that information, even if they don't read the entire brochure. Tr. 4350, 4355-56, 4868-69 (Klare). Repetition of key information also assists low ability readers who may encounter the information in one context and be unable to understand it, but comprehend it in a second, slightly different context. Tr. 4355-56 (Klare). Repetition also makes it possible for material to pass into long-term memory (so that it may be recalled in time of emergency). Tr. 4351, 4868-69 (Klare). And, of course, the repetition in the summary section of information that appears elsewhere in the brochure provides an easy reference at the time of an emergency. Tr. 4355-56 (Klare).

55. In any event, the amount of repetition in the brochure is relatively limited, does not add significantly to the number of words people must read, and does not make the document significantly longer. Tr. 4827-29, 4870 (Klare). Moreover, studies of eye movements indicate that people need less time to read repeated information than is required for

newly-presented information. Tr. 4827-29, 4860-61 (Klare). Even weighing any advantages of a shorter document with fewer words against the use of repetition, the repetition of key information is still the favored approach. Tr. 4870-71 (Klare).

56. Ms. Duplessis also complained that the terms "reception center" and "pickup point" are not clearly defined before they are used in context in the brochure. Duplessis, at 4-5; Tr. 4443-44 (Duplessis). She concedes that the definitions of the terms are implied by their use in context in the brochure, Tr. 4444, 4458-60 (Duplessis), but advocates the use of dictionary-type definitions: "A reception center is . . ." and "A pickup point is . . ." Tr. 4443-44, 4459-60 (Duplessis). The insertion of such definitions would only add words to the brochure, and is not necessary. Tr. 4864 (Klare).

57. Studies on the meanings of terms people are likely to know even at low educational levels indicate that 86% of fourth graders know "center" as "place where many people gather," even in the absence of contextual clues. Tr. 4830-31, 4833, 4858-59 (Klare). Similarly, the term "pickup" is likely to be known by over three-fourths of sixth graders, even without supporting contextual material. Therefore, in Dr. Klare's opinion, the definitions of "pickup point" and "reception center" will be clear to virtually all readers of the brochure. Tr. 4830-31, 4833 (Klare).

58. Readers would thus likely know the meanings of "pickup point" and "reception center" even out of context; presenting the terms in context will help further. Tr. 4864-65 (Klare). The respective functions of "pickup points" and "reception centers" are suggested by the use of the terms in context in the brochure. Such use in context is a good way to give readers meanings of terms; it is, in fact, the way the meanings of most terms are learned. Tr. 4863 (Klare). Generally, functional definitions (such as those used in the brochure) are preferable to formal, dictionary-type definitions. Tr. 4830 (Klare). The terms "pickup point" and "reception center" are clearly functionally defined in the brochure, and should present no problem to readers. Tr. 4829-31, 4858-60, 4863 (Klare); Applicant Ex. 13.

59. Ms. Duplessis criticized the size of the type used in the brochure chart as being too small. Duplessis, at 5. However, the evidence is quite clear (according to a number of studies) that there is no correlation between visual acuity and type point size on the one hand, and comprehension on the other, except where the very finest (i.e., two point) type is concerned. Tr. 4205 (Klare). The type used in the chart is not too small. The evidence is especially clear that fine type is relatively far more detrimental to readability when used in block text than in non-block text, e.g., the chart. In addition, the chart is in bold-face type, which further assists readers. Thus, readers with normal or corrected vision will be

able to read the chart with no difficulty. Tr. 4205-06
(Klare).

60. Ms. Duplessis further asserted that the chart "remains black and white, not color coded and coordinated with the matching map." Duplessis, at 5. This is untrue. The brochure will be published in full color, and the chart will be color-keyed to the map. Perry, at 3-4.

61. Ms. Duplessis also expressed concern that the use in the chart of the multi-syllabic terms "communities," "evacuation" and "reception" will make the chart too difficult for many readers. Duplessis, at 5; Tr. 4411-12 (Duplessis). These terms are commonly used in conjunction with emergency planning. It is therefore not advisable to attempt to substitute other words for these terms; rather, the standard terms should be used for the sake of consistency. Tr. 4832-33 (Klare). Moreover, the term "community" is known as "people living together" by more than three-fourths of fourth-graders, even in the absence of contextual material. Similarly, the term "reception" is never used alone in the brochure, but is always associated with the term "center." "Center" is widely understood, even out of context, as a "place where many people gather." Similarly, "evacuation" is functionally defined, and used extensively in context throughout the brochure. Accordingly, the use of these terms in the chart should present no difficulty for the bulk of brochure readers. Tr. 4833 (Klare).

62. Ms. Duplessis believed that the use of the term "and" in the chart column heading "Schools and Pickup Points" was unnecessarily confusing, since it suggested that schools and pickup points are two entirely different things, contradicting the statement in the text of the brochure that all schools are pickup points.^{7/} Duplessis, at 5. To eliminate any potential confusion on this point, that column heading was changed to "Schools and Other Pickup Points." Tr. 4071-72 (Perry). But there is another concern as well. Despite the brochure's explicit instructions to parents not to go to schools within the plume EPZ to pick up their children in an evacuation, the caption "Schools and Other Pickup Points" might confuse parents and mislead them into thinking that they are supposed to pick up their children at their schools. Tr. 4874-77 (Klare). The Board therefore recommends that the heading be changed to simply "Pickup Points." Such a change should also assuage Ms. Duplessis' concern.

63. Ms. Duplessis further asserted that the explanation of how to use the chart does not appear adjacent to the chart, but rather is placed "alongside the map under the unsuitable title 'Try This Example.'" Duplessis, at 5. The information about the use of the chart is actually repeated twice -- first in steps 1 through 5 under "Follow These Steps For Using The

^{7/} The word "schools" was included in the heading to emphasize that all schools are pickup points. Tr. 4879-80 (Klare).

Chart," where the steps are appropriately captioned with reference to the use of the chart. Only then is the use of the chart illustrated, for clarity, under "Try This Example." In addition, since a reader must use the map and the chart together, it would not be productive to move the instructions alongside the chart. The explanatory material on how to use the chart is clearly presented, and its placement will not confuse readers. Tr. 4831-32, 4846-47 (Klare).

64. Ms. Duplessis considered many features of the map in the brochure to be "clearly informative." She was concerned, however, that the pickup points (as represented by dots on the map) did not stand out from other information on the map, and that the locations of specific pickup points would be unclear since the dots were not individually identified on the map and intersecting streets are not marked on the map. Duplessis, at 5-6. But, before the hearing commenced, risk Parish officials had independently made a decision to replace the dots by specifically identifying each pickup point on the map through the use of numbering and a special symbol. Tr. 4296-98 (Perry). Dr. Klare indicated that a triangle would be an appropriate symbol to distinguish pickup points. Tr. 4296 (Perry). Therefore, to make it easier to find specific pickup points on the map, each will be numbered individually on the chart, with each number inside a triangle. The corresponding numbers (also inside triangles) will be placed in the proper locations on the map. The text of the brochure has been

modified to indicate that the pickup points are now individually numbered. Tr. 4072-74, 4294, 4297-98, 4315 (Perry).

65. The addition of numbered triangles to represent individual pickup points on the map and the chart generally resolved Ms. Duplessis' concern about the identification of specific pickup points, though she questioned the size of the type to be used. Tr. 4437 (Duplessis). The symbol to be used to represent the pickup points on the map and the chart will be the same, though the size may differ (i.e., may be larger on the map). Tr. 4300 (Perry). The triangle on the chart will probably be approximately the same size as the type on the chart, which presents no problem to readers. Tr. 4294 (Perry); Tr. 4205-06 (Klare). Nevertheless, if -- when the actual layout of the final brochure is done -- it is difficult to read the numbered triangles, an adjustment will be made to ensure that the symbols are readable. Tr. 4311 (Perry).

66. While Ms. Duplessis agreed that the numbered triangles would help readers quickly identify specific pickup points, she maintained that intersecting streets must also be marked on the map, to assist people driving to pickup points. Duplessis, at 6; Tr. 4438-40 (Duplessis). This concern reflects a misperception of the use of pickup points. People who lack transportation would walk to the pickup points nearest their homes. They will be picked up by public transportation, not by individuals driving to the pickup points. These pickup

points are major local landmarks. Persons living in the neighborhood would know where these particular points are, so that it is unnecessary to add more streets and street names to the map to aid in the location of pickup points. Tr. 4835-56 (Klare).

67. In sum, the map in the brochure is not confusing. It is quite clear, large and uncluttered. It contains the essential information and certainly is easier to use than a standard road map. The addition of more streets and street names to the brochure map would only add unnecessary detail and make the map more difficult to read and confusing. Tr. 4834-35 (Klare).

68. The brochure explains, "Your children may live within ten miles of Waterford 3, but go to a school farther away. If they do, plan to pick them up at the school yourself." Applicant Ex. 13. In light of this statement, it was suggested that readers be instructed not only to locate their children's reception center on the chart (as is presently the case), but also to locate their children's school on the map, to determine from the map whether their children's school is within ten miles of the plant. However, it is not necessary to direct readers to locate their children's school on the map. The brochure states unequivocally that all schools are pickup points. Therefore, the chart's listing of pickup points includes a complete listing of schools within ten miles of Waterford 3. In addition, all schools will be indicated by

numbered triangles on the map, within the perimeter of the color sketch defining the area within ten miles of Waterford 3. Parents will therefore know from the map and the chart whether the school their children attend is within ten miles of the plant. Tr. 4293-94, 4303-06 (Perry).

69. An elaboration on the instruction about children attending school outside the EPZ could be framed, if necessary. But, in the two risk Parishes, there is only one school outside the EPZ. Tr. 4307 (Perry). And parents are likely to know where their children's schools are anyway. Instructing readers to locate their children's school on the map might encourage them to go to the school in an evacuation, which is an inappropriate response where the school is within the EPZ. Tr. 4324-25 (Klare). Therefore, for emergency planning reasons, it would be counterproductive to add the suggested instruction. Moreover, such an instruction would of necessity add more detail to the brochure and, depending on the wording used, could negatively impact readability. Tr. 4325 (Klare).

70. Ms. Duplessis broadly criticized the brochure, alleging that it failed to take into consideration the characteristics of the people of the Acadiana parishes, to which the brochure is addressed. However, she had no specific recommendations or criticisms of the brochure in this respect, and the only illustrations she offered involved the use of vernacular. Tr. 4444-45 (Duplessis). And even Ms. Duplessis does not recommend that the brochure be written in the vernacular. Tr.

4445 (Duplessis). People who speak in the vernacular generally learn to read standard American English. Tr. 4321-22, 4328 (Klare). Thus, even people who speak in the vernacular would not find material written in the vernacular easier to read, particularly to the extent variant spellings were involved. Tr. 4322 (Klare). Indeed, writing the brochure in the vernacular would be a serious mistake. A number of studies indicate that the use of the vernacular in written material can be offensive even to those who speak in the vernacular. Therefore, it is better to write in standard English, even though the intended readers may use the vernacular in their speech. Tr. 4322 (Klare).

71. Dr. Klare has visited Louisiana a number of times over a period of years, and has travelled through the rural areas as well as the cities. Tr. 4080, 4853-54 (Klare). Moreover, Dr. Klare has had extensive experience working with readers and writers from across the South. See, e.g., Tr. 4322-24 (Klare). In revising the brochure, Dr. Klare was sensitive to the particular ethnic and cultural characteristics of the population for which it is intended. Although, in his expert judgment, it is preferable not to use the vernacular generally, he took local usage into consideration in the selection of certain terms (resulting, for example, in a change from "wetlands" in an earlier draft of the chart to "swamp" in the brochure now before the Board). Tr. 4327-28 (Klare). And, of course, representatives of the State of Louisiana, as well

as the local Parishes, reviewed the brochure at each stage in its development, and substantially rewrote portions of it. Tr. 4121, 4128-29, 4131 (Perry). Thus, all persons involved in the development of the brochure are cognizant of the unique cultural characteristics of the risk Parishes.

72. Joint Intervenors also challenged the decision to print the brochure in English only. That decision was reached by consensus of the local government officials, in the early Spring of 1982. Tr. 4265-66, 4319-20 (Perry). According to 1980 census data, 99.3% of the people 18 years or older in St. Charles Parish speak English well or very well. Similarly, 99.5% of the people 18 years or older in St. John Parish speak English well or very well. Tr. 4277-79 (Perry). The census data thus confirms the judgment of the local officials.

73. Using the Fry Readability Graph, Dr. Klare conducted a complete analysis of all textual material in the brochure.^{8/}

^{8/} Ms. Duplessis also analyzed the brochure using the Fry Graph, though she misused the Graph. Tr. 4420 (Duplessis); Tr. 4837 (Klare). Where a sampling methodology is used, Fry recommends sampling three 100-word passages. If there is little variation in the reading difficulty of those samples, they are averaged together. If there is significant variation, one continues sampling. Tr. 4428 (Duplessis). However, the validity of the sampling method depends on the random selection of sample passages. Tr. 4837 (Klare). Ms. Duplessis picked at least one, and possibly more, samples purposefully -- not randomly -- to indicate difficulty. Tr. 4837, 4865-66 (Klare); Tr. 4421-26, 4428-29 (Duplessis). One cannot obtain a meaningful average value from so few passages unless the passages are selected randomly. Tr. 4837-38, 4865 (Klare).

In any event, Dr. Klare and Ms. Duplessis are in agreement that an analysis of an entire document is a more accurate measure of its readability than a sampling methodology. And, as

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Tr. 4115, 4839 (Klare). The overall document, based on his complete analysis, is at the sixth grade level, close to the fifth grade level. The sections range from the most difficult sections, "What Radiation Is" and "Radiation Emergencies," at approximately the seventh grade reading level, to the summary box -- "What To Do If You Hear The Outdoor Sirens" -- at the fourth grade level, close to the third grade level. Tr. 4115-18 (Klare).

74. In his work on the brochure, Dr. Klare placed relatively little reliance on educational attainment data, because his goal was to rewrite the brochure to as low a level as possible, consistent with and appropriate for the information contained in the document. Thus, he did not aim for the average reading level for the two risk Parishes. The average reading level is much higher than the level of the brochure. Tr. 4111-12, 4175, 4320-21 (Klare). In Dr. Klare's opinion, far over half of the adult population of the risk Parishes -- approaching 90% -- will comprehend the brochure. This judgment is based on the readability of the document, and 1970 and 1980 census data. Tr. 4156, 4160-61, 4313 (Klare).

75. Based on the proportion of change from 1970 to 1980 for the adults (age 25 and over) who had completed eight years

(Continued)

noted above, Dr. Klare performed such a complete analysis of the brochure. Tr. 4426-27 (Duplessis); Tr. 4838 (Klare).

of schooling, it is estimated that in 1980, only approximately 7.2% of St. Charles Parish adults and 9.6% of St. John Parish adults had completed fewer than five years of school.^{9/} Tr. 4251 (Klare). This represents a significant improvement over 1970, when the corresponding census figures for St. Charles and St. John Parishes were 11.8% and 17.2%, respectively. Tr. 4249 (Klare). The 1980 estimates thus can be expected to be overestimates of the population now unable to read the brochure, since it is 1983, not 1980, and the trend to literacy illustrated between 1970 and 1980 will have continued. Tr. 4186, 4255, 4258 (Klare). Dr. Klare's "best educated guess" is that considerably fewer than 10% of the risk Parish adults will be unable to read the brochure. Tr. 4357 (Klare).

76. Even if Dr. Klare had had the 1980 census data on educational attainment at the time he revised the brochure, he would not have done anything differently. He had already decided to write the brochure at the most readable level possible, consistent with accurate presentation of the specified information. Tr. 4320-21 (Klare). Dr. Klare does not believe that it would be appropriate to attempt to reduce further the readability level of the document, since message content begins to be affected. While a few minor modifications may merit consideration, Dr. Klare does not think that the

^{9/} There are, of course, many children now in school, as well as recent graduates under the age of 25, whose educational attainment is not accounted for in census data.

brochure could be improved to make it readable to a larger number of readers than can currently read it. Taken as a whole, the brochure is as readable as possible (consistent with the information being presented), and will be readable by a very, very large segment of the public. Klare, at 4; Tr. 4843 (Klare).

77. It is important to recognize that a given adult's inability to read even the summary section of the brochure does not mean that the individual will not learn of the information in the brochure. Tr. 4163, 4254-55, 4356-57 (Klare). Not only other adults but also children in the household, as well as neighbors and friends, can be expected to help those who cannot read, by reading the brochure to them. Tr. 4163-66, 4254-55, 4356-57 (Klare). The brochure itself expressly encourages those who can read to read the brochure to those who cannot. Applicant Ex. 13, "A Message To Our Neighbors and Friends"; Tr. 4254-55, 4356-57 (Klare). And the subject matter of the document -- health and safety -- makes it very likely that other members of a household will make sure that any members who cannot read get the necessary information. Tr. 4165 (Klare).

78. Joint Intervenors have painted the brochure as a matter of "life and death." See, e.g., Tr. 4163, 4165 (Groesch); Hunter, at 2; Tr. 4460 (Duplessis). This characterization is gross over-dramatization. As discussed in paragraph 17 above, research on low-probability events uniformly

indicates that pre-emergency public education has no significant effect on emergency response. Rather, it is the information disseminated at the time of an actual emergency which is determinative. Thus, individuals who cannot or will not or, for whatever reason, have not read the brochure will not be at greater risk than the rest of the community in the event of an emergency at Waterford 3, provided that the emergency warning information disseminated at the time of the emergency is adequate. Tr. 4703-04 (Mileti). The Board has already approved the public alert and notification system for use in an emergency. See LBP-82-100, at 16-18, 41-45.

79. Based on the foregoing findings, the Board finds that the emergency public information brochure for distribution within the Waterford 3 plume EPZ is adequate, and meets the requirements of 10 C.F.R. § 50.47(b)(7) and 10 C.F.R. Part 50, Appendix E, § IV.D.2, as well as the criteria of NUREG-0654.

III. CONCLUSIONS OF LAW

The Board has considered all of the evidence submitted by the parties and the entire record of this proceeding. Based on the Findings of Fact set forth herein, which are supported by reliable, probative and substantial evidence in the record, this Board, having decided all matters in controversy with respect to Joint Intervenors Contention 17/26(1)(a), concludes that, pursuant to 10 C.F.R. § 2.760a and 10 C.F.R. § 50.57, the Director of Nuclear Reactor Regulation should be authorized to

issue to the Applicant, upon making requisite findings with respect to matters not embraced in our Partial Initial Decisions, and subject to the resolution of the conditions imposed in the Order of the first Partial Initial Decision, LBP-82-100 (as modified by our "Memorandum and Order (Re Applicant's Motion For Reconsideration or Clarification)" of December 14, 1982), a license authorizing operation of the Waterford Steam Electric Station, Unit 3.

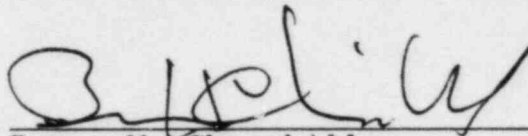
IV. ORDER

IT IS HEREBY ORDERED, pursuant to the Atomic Energy Act of 1954 and the Commission's rules and regulations, based on the Findings of Fact and Conclusions of Law set forth in this Partial Initial Decision, and subject to the conditions set forth in the Order of the first Partial Initial Decision, LBP-82-100 (as modified by the "Memorandum and Order (Re Applicant's Motion For Reconsideration or Clarification)" of December 14, 1982), the Director of Nuclear Reactor Regulation is authorized, upon making findings on all other matters specified in 10 C.F.R. § 50.57(a), to issue to Applicant Louisiana Power & Light Company a license authorizing full power operation of the Waterford Steam Electric Station,

Unit 3, for a term of not more than forty (40) years, at steady-state power levels not to exceed 3560 megawatts thermal.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE



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Dated: March 14, 1982

APPENDIX A

DIRECT TESTIMONY RECEIVED INTO EVIDENCE

<u>Applicant's Testimony</u>	<u>Following Transcript Page</u>
Applicant's Testimony of Ronald J. Perry On Emergency Public Information Brochure	4066
Applicant's Testimony of George R. Klare On Emergency Public Information Brochure	4100
Academic Vita of Dennis S. Mileti January, 1982	4662
 <u>NRC Staff's Testimony</u>	
Testimony of Donald J. Perrotti On The Applicant's Public Information Brochure	4599
 <u>FEMA Testimony</u>	
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APPENDIX B

EXHIBITS

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
)
LOUISIANA POWER & LIGHT COMPANY) Docket No. 50-382
)
(Waterford Steam Electric)
Station, Unit 3))

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