

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY & LICENSING BOARD

In the Matter of

LOUISIANA POWER & LIGHT COMPANY

Docket No. 50-382

(Waterford Steam Electric Station
Unit 3)

Operating License
Application

JOINT INTERVENORS FIRST INTERROGATORIES TO APPLICANT

Under the terms of the September 25, 1979 Stipulation on Discovery Schedule, approved by the Licensing Board on September 28, 1979, Joint Intervenorers hereby file their first set of interrogatories pursuant to the approved Stipulation.

Under 10 C. F. R. Section 2.74b, these interrogatories are to be answered separately and fully in writing and under oath or affirmation and answers must be served on all parties and the Licensing Board.

Each question is to be answered in 5 parts, as follows:

Answer to Question _____:

A) Provide the direct answer to the question.

B) Identify all documents and studies, and the particular parts thereof, relied upon by the applicant, now or in the past, which serve as the basis for the answer. In lieu thereof, at applicant's option, a copy of each document and study may be attached to the answer.

C) Identify by name, title and affiliation each employee or consultant that has the expert knowledge required to support the answer to the question.

D) Explain whether the applicant is presently engaged in or intends to engage in any further research or work which may affect the applicant's

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answer. Identify such research or work.

E) Identify the expert(s), if any, by name, address, employer and position whom the applicant intends to have testify on the subject matter questioned. State the qualifications of each such expert.

INTERROGATORIES FOR CONTENTION NO. 1 -

1-1. What do you calculate to be the actual and percentage difference between actual usage and forecasted power demand (peak loads) of LP and L contained in the following data sources:

a) Estimated peak loads for 1970-1979 from "Questions and Answers to Environmental Report" dated June 11, 1971 (Exhibit 4: AEC Docket 50-382, 50-383).

vs.

b) Actual peak load expressed in ER Table 1.1-10, and including peakloads for 1978 and 1979 ('79 summer peak July 5).

1-2. What reasons do you gave for the discrepancy in actual peaks and the percentage difference, if any?

1-3. What reason, if any, can you give that future projections of power demands as shown in ER Table 1.13 will not be subject to similar discrepancies.

1-4. What is the actual percentage demand growth for LP and L system for 1978-1979 (July 5)?

1-5. How does it compare with LP and L demand projections of 5.6 percent growth from 1978-1980?

1-6. What reasons, if any, can you give that the projected demand growth as outlined in ER 1.1.2.2 (paragraph 2) is correct in light of question #4?

1-7. What do you calculate to be the year by year deviation of the following LP and L data:

a) Estimated power demand of LP and L from 1972-1977 from the Environmental Report Addenda, Table I-B-1, August 11, 1972.

vs.

b) Actual peak load 1972-1977 expressed in ER Table 1.1-10.

1-8. What is the reason for such deviation in Question #7, if any?

1-9. In ER 1.1.2.2.1 the last sentence reads as follows:

"Table 1.1-10 compares the forecast estimate with the actual maximum which occurred in the years 1966-1977." When were each of these forecasts actually made?

1-10. Compute deviation on a year by year basis from the following data sources for Middle South Utilities:

a) Estimated power demand (peak load) for MSU as found in Environmental Report, June 11, 1971 Exhibit 4, AEC Docket 50-382, 50-383.

vs.

b) Actual peak load 1971-1979 — '79 MSU summer peak August 6

1-11. What is the reason for such deviation?

1-12. What reasons, if any, can you give that present projections of power demands will not be subject to similar errors?

1-13. What is the MSU actual peak demand growth for 1978-1979 (August 6)?

1-14. How does this compare with the forecasted 1978-1979 MSU demand growth of 7.7, as stated in the ER?

1-15. What reasons, if any, can you give that demand projections for Middle South Utilities are correct for the decade 1979-1989 in light of the answer to Question #14?

1-16. What is meant by the following ~~as shown~~ as shown on ER Table 1.1-7 (bottom): "Projected peak loads ~~1975-1984~~ are based upon non-

simultaneous loads of SWPP member systems."?

1-17. What is the rationale for basing reserve margins on non-simultaneous demands rather than on simultaneous demands.

1-18. What equations do you use for calculating minimum reserve electrical level on non-simultaneous loads, indicating definitions of all symbols used.

1-19. What was the actual simultaneous percent demand growth for the South West Power Pool for the year 1978-1979 (summer peak)?

1-20. What was the simultaneous peak load for the SWPP in 1978?

1-21. What was the simultaneous peak load for the SWPP in the summer of 1979?

1-22. What is the meaning of the following sentence found in 1.1.1.2 (b): "Conservation efforts cannot be expected to eliminate the need for this additional power."

1-23. What is the meaning of the phrase "electrical conservation efforts which are easily implemented and accepted" as found in ER 1.1.1.2.3 (a)?

1-24. Give details of such conservation efforts.

1-25. Should 'easy acceptance and implementation be the final criteria in light of ER 1.1.1.2.3 (h)?

1-26. Give references for the statement found in ER 1.1.1.2.3. (b): "...this tendency is expected to accelerate."

1-27. Give references for the statement found in ER 1.1.1.2.3 (d): "Most customers are not in the position to contract for long term energy supplies."

1-28. What evidence forms the basis for your assertion that the top 20 energy users in the LP and L area are "not in a position to contract long-term energy supplies."

- 1-29. What evidence exists that the top 20 industrial customers in the Middle South Utilities area are "not in a position to contract for long-term energy supplies."
- 1-30. What evidence exists that the top 20 industrial customers South West Power Pool are 'not in a position to contract for long-term energy supplies.'
- 1-31. What impact does the president's program of 20% solar energy by the year 2000 have upon your assertion found in ER 1.1.1.2.3 (e): "...electricity is the only energy being employed in new homes and businesses."
- 1-32. What are the methods by which LP and L will assist in the implementation of this program.
- 1-33. What do you calculate to be the power needs of LP and L's service area until the year 2000 based on this program.
- 1-34. What is the basis for the following phrase found in ER 1.1.1.2.3 (g): "...it is at the time of family formation that the family traditionally first enters the housing market."?
- 1-35. Justify this view in light of the tightening money market.
- 1-36. What do you assume to be the minimum income necessary for the purchase of a new home, in the LP and L service area?
- 1-37. What is the average income of newly formed families?
- 1-38. Do LP and L's demand projections contain a discount factor for the use of co-generated power and process steam by LP and L's industrial and commercial customers.
- 1-39. Of so, state what amount of discount factor has been applied.
- 1-40. If not, state why no such discount factor has been applied.
- 1-41. State what discount factor for co-generated power you intend to apply for future demand projections.
- 1-42. Identify and state the power usage for 1974-1979 of the twenty

largest customers served in LP and L's service area.

1-43. a. What is the basis for MSU's reserve requirement of "16 percent of annual peakload responsibility?" ER 1.1.4.2.

b. Is there any statutory, regulatory or other legal basis for such requirement?

c. If so, state the exact statute, regulation or other basis.

d. Is there any engineering, technical or scientific basis for such requirement?

e. If so, state all pertinent references.

f. What is the present cost to the LP and L system of maintaining a 16% peakload reserve within the system?

1-44. What is the overall historical capacity factor?

1-45. What contracts for uranium fuels do you now have?

1-46. If none, when do you expect to finalize contracts?

1-47. If contracts exist, give details:

a) Length of Contract

b) Pricing arrangements through working life of Waterford 3 (40 years) including any cost escalators.

1-48. What is the percentage of the Fuel Cycle costs as listed in ER Table 8.2-2 that reflects the price of uranium fuel?

1-49. What is the historical relationship between the price of uranium fuel with other parts of the fuel cycle:

a) Milling and mining

b) Conversion

c) Enrichment

d) Fuel preparation and fabrication

e) Reprocessing

- f) Transportation
- g) Waste Management

Show calculations and reference

1-50. What contracts exist for parts of the Fuel Cycle (a-g) listed in question #49?

1-51. If contracts do not exist (or do not extend through the full working life of the plant), justify ER Table 8.2-2?

1-52. Document Fuel Cycle costs from the following parts of the licensing process for Waterford 3:

- a) Application
- b) Construction permit
- c) Issuance of Final Safety Analysis Report and Environmental Report.

1-53. Is this increasing trend properly cost accounted as continuing throughout the life of the plant? Show calculations and references.

1-54. What effect, if any, will uranium cartelization as documented in hearings of the Federal House of Representatives (Subcommittee on Oversight and Investigation, International Uranium Cartel, Y4-In 8/4: 95-39) have on uranium fuel prices throughout the working life of Waterford 3? Show calculations and references.

1-55. What is the maximum credible price of uranium fuel through the working life of Waterford 3? Show calculations and references.

1-56. Which decommissioning alternative as listed in ER Table 5.8-1 has LP and L decided on?

1-57. If this decision has not been made, when is this decision expected to be made?

- a) before OL issuance

- b) before fuel loading
- c) before initial criticality
- d) before commercial operation

1-58. Is the cost of decommissioning figured into ER Table 8.2-2?

1-59. If not, why not?

1-60. What provisions are being made to insure decommissioning costs are not paid by ratepayers or taxpayers of the future? Show calculations and references.

1-61. What decommissioning alternative is available for Waterford 3 in which security would not be necessary? Show references.

1-62. A professional paper from Stanford University (Trace Elements in Reactor Steel: Implications for Decommissioning, John J. Stephens, Jr. and Robert O. Pohl, Report #2882) challenges the major reference of ER Table 5.8-1 (AIF/NESP-009) in regards to the radiological significance in decommissioning of nickel-59 and niobium-94. Do you agree with the findings of Stephens and Pohl? What, if any, are the errors which you attribute the analysis of the Stanford study? Show calculations and references.

INTERROGATORIES FOR CONTENTION NO. 2 -

2-1. The House Government Operators Committee has received evidence which in its report No. 95-1090 indicates that the above capacity factor of large plants is 55%. If Waterford 3 runs at a 55% capacity, what will be the cost per kilowatt hour produced at Waterford 3?

2-2. a) What is the projected capacity factor of Waterford 3?

b) What is the record of Combustion Engineering in meeting its projected capacity? (Include average for all nuclear plants built by Combustion Engineering)

2-3. If Combustion Engineering plants have not met their predicted capacity factor, what is the basis for asserting that Combustion Engineering's Waterford 3 plant will match their predictions?

2-4. The House Committee on Government Operations Report 95-1090 concludes that large plants breakdown more frequently than small plants resulting in greater need for back-up sources of electricity. In the event of a) two weeks; b) four weeks; c) 8 weeks; d) 20 weeks; f) 1 year shutdown of Waterford 3, which plants will supply reserve electricity.

2-5. In the event that one of the plants supplying reserve electricity is also shut-down for 1-3 months which plant will supply the needed electricity.

2-6. a) See p. 31, Government Operations Committee reports 95-1090 cites studies performed at M.I.T. and Harvard which showed that since 1964 nuclear construction costs increased more than 10 times the rise in the consumer price index? If that rate holds true for Waterford 3, what will the costs of Waterford 3 be upon completion?

b) O. Irvin Bapp, one of the authors of the study has stated that capital costs for light water reactors show no sign of stabilizing and are rising at alarming rates? What evidence is there that capital costs of nuclear plants have stabilized?

2-7. a) Explain the factors which led to the 460% cost overrun of Waterford 3, particularly in light of the fact that in the ten years since 1970, the plant cost-overruns are outstripping inflation by 200%.

b) Which factors mentioned above will be likely to continue to cause increased costs?

2-8. David Snow of Mitchell Hutchins, Inc., a New York Investment firm, concluded that domestic mining capacity could not be expanded rapidly

enough to avert a shortage through 1982 and beyond, resulting in the necessity to import foreign uranium. Which countries will supply the uranium shortage?

2-9. Assuming that a uranium exporting cartel begins raising uranium prices in 1980 at the same rate O.P.E.C. has raised oil price 1974-1979, what will be the cost of Waterford 3's uranium in 1985?

2-10. Assuming the above, what would the effect of a shut-down in production of the largest uranium producer (much like Iran) for one year be on the price of uranium?

2-11. The House Government Operations Committee in its Report 95-1090 has received evidence that prudence dictates that no more new reactors be started until "potential resources become known reserves." What increase do you project in known reserves of economically feasible uranium?

2-12. The House Committee on Government Operations Report No. 95-1090, has received evidence that using the unattractive case of \$1000/kw and a twenty per cent capacity factor with no concentration, the busbar cost for alternative generating methods should be somewhat less than nuclear power in 1985. Considering that Waterford 3's costs are already over \$1000/kw -why shouldn't LP and L invest in alternate production methods?

2-13. The House Committee on Government Operations Report No. 95-1090 cites a Dow Chemical Co. study that the U.S. industry could meet 1/2 of its electrical needs by 1985 by co-generation. Assuming that is true in Louisiana (explain why not and what factors indicate if not) in a) 1985; b) 1987, c) 1989, what will the need be for power from Waterford 3 in LP and L's area? How does that projection compare with LP and L's estimates?

2-14. What would the effect of a 20% drop in electrical demand by 1990

have on the need for Waterford 3's electricity?

2-15. a) What persons or firms are responsible for estimating LP and L's power needs?

b) Are these persons (firms) still employed by LP and L?

c) What facts indicate that these personnel (firms) are significantly more accurate than they were in 1970?

2-16. a) What means do you plan to utilize to increase the operating efficiencies of Waterford 3?

b) What research is being performed by you or within the industry to increase the operating basis efficiency of Waterford 3?

c) What discounts has applicant employed in calculating the operating basis efficiency of Waterford 3?

d) What research is being performed by you or within the industry to increase the inefficiencies caused by steam generator degradation.

e) What discount has applicant employed in calculating the inefficiencies caused by steam degradation?

INTERROGATORIES FOR CONTENTIONS NO. 8/9 -

8/9-1. What studies have you done to identify all environmental pollutants (e.g. chemicals, pesticides, or radiation), known or suspected to be carcinogens, that exists within the Emergency Planning Zone (ingestion pathway) of Waterford 3.

8/9-2. If you have not done such studies, when will such identification be performed and made part of these proceedings?

8/9-3. Have you traced these environmental pollutants through the ecological chain; and listed those changes that occur naturally through time?

8/9-4. Have you estimated the exposure of the population to the

environmental pollutants listed above for the year 1982:

- a) one mile from Waterford 3
- b) two miles
- c) 5 miles
- d) 10 miles
- e) 20 miles
- f) 30 miles
- g) 40 miles
- h) 50 miles

8/9-5. Have you estimated exposure of population to the pollutants listed above at distances a thru h as listed in question #4 for the following years:

- a) 1983
- b) 1990
- c) 2000
- d) 2010
- e) 2020
- f) 2030

9/9-6. Have you calculated the cumulative or synergistic effects of the radiation that will be released from Waterford 3 as stated in ER Table 5.2-9, in combination with the pollutants listed above?

8/9-7 Dr. J. A. Dipado, working at the National Cancer Institute in Bethesda, Md., wrote in 1976: "Combinations of chemical carcinogens with irradiation indicate that enhancement of transformation (from normal cells to cancer cells) follows an x-ray-type of insult. In some respects, there are similarities to in vivo experimental results in that small or relatively small doses of radiation, when combined with chemical carcinogens, enhance the malignancy, whereas large doses may have opposite effects. The

enhancement of transformation by X-ray or X-ray type agents appears to be independent of the type of second (chemical) carcinogen used".

(a) What is LP and L's estimate of the number of additional cancers which will occur in each of the River Parishes due to the enhanced malignancy of existing chemical carcinogens which low-level radiation from Waterford 3 will bring about? Give estimates for each 5 years of operation and for 10 years after operations have ceased.

(b) How long after plant operations and routine radioactive emissions begin do you calculate it will take for the effects of radiation upon the carcinogenicity of local pollutants to begin to be felt by the doubly exposed population? Is there a longer or shorter latent period for appearance of cancers when radiation is applied simultaneously with chemical carcinogens?

(c) Does LP and L plan to monitor regional cancer incidence for the purposes of determining the extent to which low-level radiation might/has increased that incidence?

(d) Does LP and L plan to conduct actual field observations on this subject over the next 5-40 years? Does LP and L plan to begin baseline cancer incidence/mortality studies anytime soon, in order to have "control"/baseline data to compare to future studies?

8/9-8. The occurrence of some break, or gap, in chromosomal deoxyribonucleic acid molecules (DNA) is generally understood to be the initiating event in human and animal oncology.

Halogenated hydrocarbons and other chemical agents isolated from the air and from Mississippi River water within 50 miles of Taft, La., are known to cause such genetic damage as leads to cancer; specifically, lung, thyroid, stomach, intestinal, and bladder cancer. In fact, the River

Parishes have the highest cancer mortality rates in the U.S. according to the EPA.

Since ionizing radiation is also known to cause leukemia, cancers and genetic defects, what is LP and L's estimate of the total/cumulative number of new (a) thyroid cancers, (b) stomach and intestinal cancers, (c) lung cancers — that will occur within 50 miles of the Waterford 3 site by 1995? By 2015?

8/9-9. In 1977 H. F. Kraybill, of the National Institutes of Health, advised that "the adverse effects of pollution, including tumors, have been observed in finfish and shellfish for some time. Unknown is the carcinogenic effect of the interaction of chemicals in the water environment with respect to synergism and inhibition or their multiplicative effect on other carcinogens in the environment. The ingestion of contaminated fish would have to be considered in this context."

Another researcher, John E. Till, at Oak Ridge National Laboratory, published this statement in 1978: "A quantitative analysis of uptake of ²³⁸Pu(IV) citrate by carp eggs indicated that plutonium is accumulated in the egg and reaches a concentration factor of approximately 4 at hatching (72 hours after exposure begins)".

Thousands of tons of catfish (a type of carp) and sheepshead are taken commercially from the Taft, La., vicinity annually.

Oysters, one of La. major seafood crops, are known to concentrate radioactive cesium in their bodies by a factor of over 200 times. All seafood has high concentrations of iodine and South Louisiana incorporates a larger proportion of seafood in their diets than do most populations.

(a) How will the combined effects of chemical pollutants and radio-

active elements concentrated in the bodies of finfish and shellfish affect humans who ingest the usually large proportion of seafood in their diets common to Louisiana?

(b) How many additional stomach and intestinal cancers—two of the most common types in Louisiana already—might result from contact with doubly contaminated seafood ingested 2 or 3 times weekly? How many cancers do you estimate would occur within 10 years; within 30 years throughout South Louisiana?

(c) How many additional thyroid cancers do you estimate will result from the ingestion and retention of I-131 in a seafood diet already carrying chemical carcinogens which might enhance the effects of internal radiation exposure to the thyroid gland?

(d) Considering that the existing chemical carcinogens in the Mississippi River could be more carcinogenic by the presence of, and/or enhance the carcinogenicity of I 131 absorbed in the human thyroid, would it not be of some contraceptive advantage to distribute potassium iodide on a regular basis in the River Parishes, or among the La. seafood-eating population at large, in order to preclude any synergistic interaction between the known carcinogenic agents?

8/9-10. The Yale Journal of Biology and Medicine published this comment (Richard Wilson, Harvard University): "...If there is already so much of a pollutant that cancers produced by it are common, an additional dose of this pollutant or any dose of a pollutant which gives cancer by the same mechanism produces an effect linear in the incremental dose."

(a) Assuming that radiation causes cancer by a similar mechanism as chemical agents in Louisiana, and assuming "and effect linear in the incremental dose," how many additional cancers do you calculate can be

expected to result from the additive effects alone of ionizing radiation in South Louisiana?

(b) Does LP and L anticipate that the electricity from Waterford 3 will attract more industries, and thus more pollutants, to the Taft Vicinity? How would this affect the public health?

8/9-11. The state of Louisiana Department of Health and Human Resources, Tulane Medical School and Tulane School of Public Health and Tropical Medicine recently reported, "...to attempt to define the risk of lung cancer associated with residential proximity to industry by type in Louisiana, lung cancer deaths occurring between 1960-1975 in residents of 20 parishes were compared to controls matched on age, race, sex, year of death and parish of residence. The results demonstrate that residential proximity to chemical and petroleum industries makes a significant contribution to the lung cancer mortality in Louisiana."

(a) Since virtually all studies regarding exposure of the lungs to radiation (from either external X-rays or from radionuclides inhaled) as a cause of lung cancer, what effect do you calculate would these combined carcinogens have on the population of South Louisiana? What effect would exposure to radiation from inhaled radio-nuclides particles have upon individuals who already have lung cancer?

(b) How many chemical industries operate in a 10 mile radius of Waterford 3, or emit effluents within a 10 mile radius? A 20 mile radius?

(c) How many petroleum industries operate or emit effluents reaching within a 10 mile radius of Waterford 3. 20 miles?

(d) How many lung cancer deaths does LP and L anticipate would occur within 10 miles of the plant site within the next 5, 10, 20 years, assuming Waterford 3 operation?

(e) How many chemical and/or petroleum industry plants does LP and L anticipate to be in operation in its entire service area in 1982? in 1995?

(f) What does LP and L calculate the accumulated effects of 20 years worth of low level radiation to do in combination with 20 years worth of accumulated chemical carcinogens to the lung cancer mortality rate in Louisiana?

(g) How many Waterford 3 employees do you anticipate will live within 10 miles of petroleum or chemical plants?

8/9-12. A 1977 report from Harvard University states that "the studies of childhood cancers caused by X-rays during pregnancy suggest that the infant fetus is 5-10 times as sensitive as an adult, even taking the linear dose effect relation-ship for the adult, and there may be no threshold for a fetus although one develops later for an adult. We should expect the same effects to occur from chemicals, and they may even be more important since the inhibitory mechanism before the chemical gets to the cells may also be absent in utero."

(a) Since fetuses are more vulnerable to genetic damage and/or carcinogenic effects at both chemicals and low level radiation, how many non-fatal birth defects can be expected to occur annually within a 10 mile radius of Waterford 3 due to the cumulative effects of chemical agents and radiation exposure to pregnant women from all pathways for the duration of 9 months pregnancies? How many spontaneous abortions can be expected to occur within the first trimester? How many stillbirths? How many cases of childhood death non-specific immunological incompetence at ages 6 months - 5 years?

(b) How many cases of leukemia and/or other childhood cancers can be expected to result in offspring of women residing within 20 miles of

Waterford 3 during 9 months of pregnancy? Report for children up to 14 years of age, and assume continued exposure to both chemical agents and ionizing radiation between ages 0-14?

(c) How many women does LP and L expect to employ at the Waterford 3 site who would be permitted to receive occupational levels of exposure to ionizing radiation?

(d) How many employees at Waterford 3 site will live with 10 miles of petrochemical plants?

8/9-13. Many studies have documented the synergism between cigarette carcinogens and low level radiation. Smokers exposed to low level radiation die of lung cancer at a higher rate than those non-smokers exposed and at higher rate than smokers not exposed.

(a) What is the average cigarette consumption per day among smokers living within a 5 mile radius of Waterford 3?

(b) How many individuals living within 5 miles of Waterford 3 also live within 10 miles of a chemical and/or a petrochemical industrial site?

8/9-14. Since residents of South Louisiana along the Mississippi River are already at high risk for lung, stomach, intestinal, bladder and pancreatic cancers, they are likely to need/want diagnostic X-rays more frequently than would members of a population having less cause to monitor themselves for cancer. The concentration of chemical carcinogens in the air, the surface water, and the ground water through-out this region is the probable cause of the high cancer incidence which, in turn, is the reason ~~irr~~radiation would need to be applied to this population more frequently than to other, perhaps healthier, populations.

(a) What do you calculate to be the total annual exposure to ionizing radiation (dose) from Waterford 3 (all pathways), all diagnostic sources, and

"background" radiation to be for the residents of the area?

b) Does your calculation take into consideration the unusually high number of sources for this particular population.

(c) Since the presence of chemical carcinogens responsible for bladder, intestinal and stomach cancers occurring frequently in this area, would necessitate diagnostic X-rays of the lower abdomen, and would expose gonads and reproductive organs to more radiation than it usually does. Does LP and L expect the whole body irradiation from all pathways from Waterford 3 to have any greater effect upon the fertility, genetic damage, birth defects, and incidences of cancers of the testicles, cervix, or ovaries? 8/9-15. In 1978 Photochemistry and Photobiology published report "Radiation Activation of Carcinogens and the Role of OH and O₂". One mechanism of the synergism between chemical carcinogens and radiation is suggested by the following statement: "In the cell, O₂ generated biochemically or radiationchemically might exhibit a high probability of activating carcinogens, even though present in low concentrations."

(a) Since elimination of the carcinogens already present is unlikely, is there any known means of blocking or precluding the oxygen activation of carcinogens by radiation? In other words, is there any "antidote" for this reaction, should Waterford 3 release sufficient amounts of radiation to initiate it?

(b) What chemicals which have been identified or are suspected at being carcinogenic in South Louisiana have been tested for likelihood of radiation activation? What were the results?

(c) Has LP and L tested all chemical effluents from Waterford 3 operations for possible radiation-initiated activation which could result in functioning as carcinogens? What were the results?

d) How would releases of unusually large amounts of radiation affect the occurrence/frequency of this reaction?

(e) The report links this radiation mediated carcinogen activation to cancer. "There activated carcinogens can subsequently react with target nucleophises to produce a chemical change, as in the genetic material of the cell, which ultimately may trigger the cell to become neoplastic".

What would LP and L calculate to be the results of increased numbers of radiation-mediated chemical changes in cell DNA among members of the high cancer risk population living within 20 miles of Taft?

(f) What, if any segments of the population do you calculate could be expected to experience more neoplastic changes than others? it increase the numbers of tumors individuals would have over, say, a 30 year period?

(g) How is the likelihood of this radiation-mediated carcinogenesis going to affect the health of Waterford 3 employees who might live near sources of chemical carcinogens?

(h) Since the chemical carcinogens burden already present in this area has proved sufficient to elevate the lung cancer mortality rate to the highest level in the U.S. today, and since radiation is likely to enhance the effects of a broad spectrum of chemical carcinogens (many not identified or controlled by EPA), would LP and L nevertheless encourage siting of new industries within 20 miles of Taft, La.? What industries? What is the expected health result of having the member industries increase as the amount of radiation emmissions increases or accumulates, over time?

8/9 10. The U.S. Department of Energy contracted studies which showed in 1978 that "results of the antibody precipitation curbes indicated that inhaled plutonium induced a significant functional decrease in the primary antibody response of exposed dogs." Other studies have implicated virus

and bacteria as possibly carcinogenic agents whose carcinogenicity appears to be enhanced by most exposure to radiation.

(a) What viruses/bacteria common within 10 miles of Taft have been tested for possible coordination of effects with radiation?

(b) What diseases known to be caused by bacteria or viruses are excessively prevalent in 10 area? What effect would radiation have on the effectiveness of these viruses/bacteria, i.e. by decreasing the antibody level? On the occurrence of diseases caused by these agents?

8/9-17. Long-term health effects usually associated with low-level radiation are leukemia, cancer and genetic damage.

C. A. Kelsey, of the University of New Mexico, cites 1975 mortality rates from cancer to be 1700 deaths and from 1 rem of radiation to be 9 deaths per year per million people in the U.S.

(a) If these figures indicate proportional death rates, how many deaths per rem of radiation (total number) would LP and L expect to occur per year per million people living within 20 miles of Waterford 3?

(b) How many deaths per rem of radiation do you calculate for people living within 5 miles of Taft, La? The Kelsey article states that 3.6 minutes/millirem and about 9 minutes per cigarette are reasonable life shortening factors for comparing risks.

8/9-18. In the first of two related reports issuing from the National Cancer Institute (1976), gamma radiation exposure was shown to enhance cell transformation incidence due to ultraviolet radiation exposure. In 1977 it was shown "that a major cause of cancers of the skin was ultraviolet irradiation, most of it being delivered by sunlight exposure...our maps of melanoma showed a very marked southern predominance...you have a fairly linear relationship, increasing latitude with decreasing risk."

(a) If gamma radiation exposure to the skin can be expected to enhance the effectiveness of ultraviolet radiation exposure in causing skin cancers (which are already prevalent) in southern latitudes, how many total cases (not individuals) of skin cancer would LP and L expect to occur within 5 miles of Waterford 3 annually. How many occurred in 1977? How many expected in 1997?

(b) What is the actual, measured "background" dose of ultraviolet radiation per year/per person within 5 miles of Waterford 3? Converted into rems, how does this compare to LP and L's anticipated additional dose from all pathways? If present UV is enough to cause "a very marked southern predominance" of melanoma incidence, how many additional melanomas can be expected from an additional dose of radiation?

(c) Assuming a very modest UV carcinogenicity enhancement of only 15%, how many additional melanomas/year would result from exposing this population to both UV radiation and gamma doses?

8/9-19. Local and national epidemiological studies have identified chloroform as being present in the lower 200 miles of the Mississippi River in significant amount. Chloroform is well-known as a carcinogen of generalized effect.

(a) With these two facts firmly established, and with numerous medical basis for suspecting synergism between chemical carcinogens and radiation, would LP and L fund/initiate medical research projects to determine what effects such synergism might have upon the already elevated cancer incidence and mortality rates in South Louisiana? Does LP and L plan to initiate such research early enough to obtain resulting data before Waterford 3 will go into operation?

(b) Is such a synergism likely to occur among fish, shellfish,

crustaceans? What would expected results be how would ingestion of such animals affect humans?

8/9-20. Besides known or suspected chemical carcinogens originating from industrial sites, certain herbicides and insecticides used in the agricultural region surrounding the Waterford 3 site, are likely to be carcinogens and/or could be significantly carcinogenic in synergistic radiation from Waterford 3.

(a) What chemicals are associated with agriculture (commercial and "garden") within a 20 mile radius of Waterford 3?

(b) Have any been tested for synergism?

(c) What do you calculate to be the probability that otherwise harmless doses of these chemicals would become significantly carcinogenic in the presence of low-level radiation?

(d) How would agricultural workers within 20 miles be affected?

(e) How would those who eat the treated products and live within 20 miles be affected?

INTERROGATORIES FOR CONTENTION NO. 12 -

12.1 What trucking company do you now have contracts with for the transportation of spent fuel or other radioactive materials?

12-2. What do you take to be the responsibilities of LP and L in case of an accident involving spent fuel or other radioactive materials?

12-3. What are the possible routes of cargoes involving spent fuel or other radioactive material in the operation of Waterford 3?

12-4. Who is responsible for informing the public about the hazards of transporting spent fuel or other radioactive material to and from the Waterford 3 area?

INTERROGATORIES FOR CONTENTION NO. 17 -

- 17-1. Give estimates of 1982 population in St. Charles Parish of the residential and transient populations. Analyze by annular sectors of 22 1/2° out to the boundary of St. Charles Parish.
- 17-2. Indicate fluctuations in this total population throughout the year.
- 17-3. Repeat process for 1983, 1990, 2000, 2010, 2020, 2030.
- 17-4. What is the minimum amount of time available to evacuate people in St. Charles Parish assuming 'worst possible' accident scenario? Show calculations and references.
- 17-5. Based on the traffic capacities of egress routs, calculate the minimum time possible to evacuate all the people from St. Charles. Assume peak population of residents and transients. Perform calculation for 1982, 1983, 1990, 2000, 2010, 2020, and 2030.
- 17-6. By what means will people be informed of a radiological emergency?
- 17-7. Does this include people without electronic media (radio, T.V., etc.) and/or an ability to read?
- 17-8. Does this include the deaf, the blind, the sick, the elderly, and the infirm?
- 17-9. By what means will people be instructed on the correct evacuation procedures?
- 17-10. Does this include people without electronic media (radio, T.V., etc.) and/or an ability to read?
- 17-11. By what means will people without automobiles evacuate?
- 17-12. Does this include people who are physically impaired, sick, elderly, or infirmed? In other words, does this include people who would not be able to gather at a central evacuation point?
- 17-13. When will the people of St. Charles Parish know both the correct

warning signals and the correct evacuation procedures?

17-14. When can this be tested in a full scale evacuation?

17-15. How often will this be retested?

17-16. Will an independant ad hoc group be allowed to 'grade' the evacuation procedure on objective criteria?

17-17. How effective would a radiological warning be if given between 1 a.m. and 4 a.m.?

17-18. When can this be tested in a full scale evacuation procedure?

17-19. What is the evacuation procedure in the case of inclement weather?

17-20. Supply cost/benefit analysis on the dangers involved in evacuating during a heavy storm or a tornado as opposed to the dangers from radioactive poisoning during the 'worst possible' accident. Show calculations and references.

17-21. Who makes the decision on this type of evacuation?

17-22. Analyze the command structure for each shift at Waterford 3?

17-23. Who declares an on-site emergency for each shift?

17-24. Who declares an off-site emergency for each shift?

17-25. Does one individual on each shift have the ability to initiate a full-scale evacuation?

17-26. What criteria is used to declare an on-site emergency?

17-27. What criteria is used to declare an off-site emergency?

17-28. List evacuation procedures for schools and/or agreements between the State of Louisiana and schools potentially affected by radiological emergencies detailing evacuation procedures.

17-29. What provisions are established for reuniting families if children are in school, and parents are at home or at work?

17-30. What plans does LP and L have for handling congestion or traffic

accidents during a radiological accident. Give details of manpower and machine requirements. Give details of roadblock locations.

17-31. What will be the most likely traffic patterns in case of a full scale evacuation? What is the probability that any one route will be blocked or unavailable. Show calculations and references.

17-32. What alternate routes exist, if for some reason main evacuation routes are blocked or unavailable?

17-33. Will factories, plants and businesses be instructed on evacuation procedures as to the following:

a) Best evacuation route.

b) Ways to keep fuel or equipment from contributing to an accident.

c) Notifying employees not to attempt to retrieve their children or families until they are out of the emergency zone.

17-34. If not, why not?

17-35. Give plans to provide food, shelter, and clothing to evacuees.

17-36. When will these plans be in place?

17-37. What plans exist for organizing volunteer rescuers?

17-38. Will contaminated people be forcibly stopped from entering non-contaminated areas?

17-39. Will non-contaminated people be forcibly stopped from entering their own contaminated homes?

17-40. What do you assert to be the liability of LP and L towards a person who refuses to evacuate?

17-41. Do plans exist for decontaminating large numbers of people?

17-42. Where will this decontamination take place?

17-43. What provisions exist for seasonal population increases due to tourist/sports arena events or other recreational activities?

- 17-44. What is the number of trained personnel immediately available to treat and handle radiation victims.
- 17-45. Will they be available for the first full-scale evacuation of St. Charles Parish?
- 17-46. Where will they be located?
- 17-47. What plans exist for at least two hospitals outside the zone of contamination to treat radiation victims.
- 17-48. How many hospitals are there in St. Charles Parish.
- 17-49. Does each hospital have a general air-conditioning system that can be disconnected to prevent contamination?
- 17-50. If the hospitals and clinics become contaminated, what plan exists for evacuation of patients and life-support equipment?
- 17-51. When can this plan be tested for adequacy?
- 17-52. Will hospitals be allowed to refuse to treat radiation victims?
- 17-53. Under what legal authority?
- 17-54. Give the number and type of radiation monitoring equipment at area hospitals.
- 17-55. Indicate what particles this equipment will measure: alpha, beta, or gamma.
- 17-56. What training will be given to hospital personnel who will handle this equipment?
- 17-57. What special radio frequencies will be set aside for hospitals, monitors teams, public health officials, civil defense, Governor's office, NRC?
- 17-58. When will these groups have equipment in standby for activating the communication systems?
- 17-59. What special routes will emergency response units will take to

reach the reactor?

17-60. What plans exist to prevent the emergency teams from being caught up in the rush hour traffic?

17-61. When can this be tested?

17-62. Where will an Emergency Operations Center?

17-63. Extrapolating from the 1978-1979 growth demand, what is the projected need for power in 1980, 1985, 1990, 1995 and 2000?

17-64. What military bases exist within St. Charles Parish.

17-65. What will be the role of the military in the case of a contamination of St. Charles Parish.

17-66. What are the locations of prisons, houses of detention, orphanages, or other state institutions within St. Charles Parish.

17-67. What specific plans will be made for the evacuation of all these institutions.

17-68. Will helicopters be available for monitoring the movement of the radioactive plume?

17-69. How will such helicopteers be equipped to engage in radiation monitoring?

17-70. How quickly can they be dispatched?

17-71. Will personnel be available on helicopter with training in tracking and monitoring a radioactive plume?

17-72. What do you anticipate to be the gasoline needs for the full scale evacuation of St. Charles Parish?

17-73. How does this estimate compare with the probable gasoline available within St. Charles Parish?

17-74. Is there provisions for the storage and distribution of the difference?

- 17-75. What plans exist for helicopters to assist in the evacuation of the injured?
- 17-76. What contracts are there for helicopters to be available when needed?
- 17-77. What time period is planned for the feeding, sheltering, and clothing of evacuees?
- 17-78. What plans are available for the monitoring of water, vegetables, and livestock in the contaminated zone?
- 17-79. What plans are available for the monitoring of contaminated water downstream of the reactor?
- 17-80. What plans are available for emergency health and sanitation services in St. Charles Parish and in evacuation zones?
- 17-81. Where will the center for the disposal of emergency evacuation funds be located?
- 17-82. What local, state or federal agency is responsible for the dispersal of these funds?
- 17-83. What criteria will be utilized for re-entry of evacuees into their homes?
- 17-84. Who makes this decision?
- 17-85. What plans will be implemented for law enforcement in evacuated zones?
- 17-86. What special precautions will law enforcement officers who are attempting to prevent vandalism need to take?
- 17-87. What is the response time of parish officials in implementing an evacuation procedure?
- 17-88. What type of training does the state police, parish police, and fire officials have in radiological emergencies?

- 17-89. What emergency training is planned for state and parish officials before Waterford 3 goes into commercial operation?
- 17-90. What agreements exist with contiguous states on:
- a) emergency help
 - b) monitoring of ingestion pathway
- 17-91. List all parish and state agencies with responsibilities in case of a radiological accident at Waterford 3. List their responsibilities, their contact person (in other words, who calls them), and their response time.
- 17-92. Give estimates of the 1982 population within 20 miles of Waterford 3 summing the residential and transient populations. Analyze by annular sectors of 2 1/2° out to the 20 mile limit.
- 17-93. Indicate fluctuations in this total population throughout the year.
- 17-94. Repeat process for 1983, 1990, 2000, 2010, 2020, 2030.
- 17-95. What is the minimum amount of time available to evacuate people within 20 miles from Waterford 3 assuming LB-LOCA (Large Pipe Break). Show calculations and references.
- 17-96. What is the minimum amount of time available to evacuate people within 20 miles from Waterford 3 assuming a Class 9 accident. Show calculations and references.
- 17-97. Based on the traffic capacities of egress routes, calculate the minimum time possible to evacuate all the people within 20 miles of Waterford 3. Assume peak populations of residents and transients. Perform calculations for 1982, 1983, 1990, 2000, 2020, 2020, and 2030.
- 17-98. How and when will the people within 20 miles of the plant know both the correct warning signals and the correct evacuation procedures?
- 17-99. When can this be tested in a full-scale evacuation?
- 17-100. How often will this be re-tested?
- 17-101. When can the radiological warning and evacuation procedures be

tested in full-scale between 1 a.m. - 4 a.m.?

17-102. What changes will be necessitated in the evacuation procedures in the case of storm or other types of severe weather, such as tornado, hurricane, or flood?

17-103. What do you calculate to be the risks encountered in evacuating during a heavy storm (hurricane) or tornado as opposed to the dangers from radioactive poisoning during DB-LOCA (Large Pipe Break). Show calculations and references.

17-104. Analyze the command structure for each shift at Waterford 3.

17-105. Who can declare an on-site emergency for each shift?

17-106. Who declares an off-site emergency for each shift?

17-107. Who decides the relative risks of evacuation in the case of heavy storm (hurricane) or tornado?

17-108. Does one individual on each shift have the ability to initiate a full scale 20 mile evacuation procedure?

17-109. If not, list sequential command steps to reach the point of calling a full-scale 20 mile evacuation procedure?

17-110. In what period of time can this sequence of command steps be taken?

17-111. When can this be tested in an unplanned exercise?

17-112. Give complete responsibilities of the following persons in the case of a 20 mile evacuation is called. (1) Superintendent of shift; (2) Superintendent of Waterford 3; (3) President of LP and L; (4) Head of radiological unit for the DNR; (5) Governor of Louisiana; (6) Head of Nuclear Regulatory Commission.

17-113. Give the location of all schools within 20 miles of Waterford 3.

17-114. What evacuation procedures will be provided for schools?

17-115. What provisions are established for reuniting families if children are in school, and parents are at home or at work?

17-116. Give plans for handling congestion or traffic accidents during a radiological emergency? Give details of manpower and machine requirements. Give details of roadblock locations.

17-117. Analyze traffic patterns in case of a full scale evacuation procedure and give probability that any one route will be blocked or unavailable. Show calculations and references.

17-118. Give alternate routes if for some reason the main evacuation route is blocked.
zone?

17-119. Where will an Emergency Operations Center be located in the event of a contamination of a 20 mile radius around Waterford 3.

17-120. In what locations in the LPZ will potassium iodide be located? Potassium iodide is used as an agent to prevent the absorption of radioactive iodine into the thyroid gland.

17-121. The National Council on Radiation Protection and Measurements has concluded that iodine propylaxis must be administered 3 or 4 hours after the beginning of exposure to radioactive iodine. When will the capability to administer potassium iodide be sufficient for the population within the LPZ to receive a dose within this time restriction?

17-122. When can this be tested?

17-123. In what locations will potassium iodide be located within a 20 mile radius of Waterford 3?

17-124. Will there be sufficient material to administer it to the population?

17-125. Will there be sufficient medical personnel to supervise?

- 17-126. Where will potassium iodide be located within the Greater Metropolitan New Orleans Area?
- 17-127. What specific plans exist for Greater Metropolitan New Orleans in New Orleans for a serious nuclear incident?
- 17-128. Mayor Ernest Morial has stated that 900,000 people could be sheltered for two weeks within 321 different shelter areas. Where will these shelter areas be located?
- 17-129. What preparations for nuclear emergency will be permanently available at these shelters?
- 17-130. Will these shelters be available for inspection by citizens? If so, when?
- 17-131. What preparations are being made to monitor the water in the Greater Metropolitan New Orleans Area in the event of an accident at Waterford 3?
- 17-132. What preparations are being made to monitor the food supply in the GMNOA in the event of a nuclear accident?
- 17-133. Will the shelters that Mayor Morial alluded have sufficient sanitation facilities for its assigned number of people for two weeks?
- 17-134. Will the sanitation facilities be sufficient if the city water supply is contaminated? What do you rely on as the basis for your answer?
- 17-135. What training of police, fire and health officials of the GMNOA will be given to prepare them for handling radiological emergencies?
- 17-136. List all equipment available for the handling of radiological emergencies.

INTERROGATORIES FOR CONTENTION NO. 19 -

- 19-1. At what point in the licensing procedure must the fuel element assembly guide wear problem be resolved?

- 19-2. List all research being done on this problem.
- 19-3. Give timetable for the resolution of this problem.
- 19-4. Give precise technical definition of what is meant by the 'resolution of a problem'. Give references.
- 19-5. Is it possible that a problem is only 'partially resolved'?
- 19-6. What is meant by 'partially resolving' a problem?
- 19-7. Give a history of problems that have been presented to the Congress as 'resolved' and additional research work has, in fact, been done on them.

INTERROGATORY FOR CONTENTION NO. 20 -

- 20-1. At what point in the licensing procedure will the problem of solid waste process control be 'resolved'.

INTERROGATORIES FOR CONTENTION NO. 21 -

- 21-1. What is the total damage that the maximum possible flood could do to the intake and discharge structures in the Mississippi?
- 21-2. Give the sequence of events that would lead to a core melt if the first step in the sequence is 'damage to intake and discharge structures'.
- 21-3. Give sequence of events that would lead to a Class 8 incident if the first step in the sequence is damage to the intake and discharge structures.
- 21-4. Give approximate cost of flood related damage to the intake and discharge structures assuming maximum possible flood.
- 21-5. Describe damage to normal plant operation resulting from damage to intake and discharge structures.
- 21-6. What provision has LP and L made for the following necessities which would arise out of a medical emergency affecting one (or more) essential control room personnel, under isolation/flood conditions:
- (a) Who will assume the victim's control room duties?
 - (b) What will the psychological effect of a co-worker's

on-site for 2-4 days due to flood conditions?

(g) What provisions can LP and L make to reassure both personnel and their families of each other's well being (or medical condition) during flood conditions in which both the plant and the personnel's residences are flooded? How would lack of knowledge of one's family in a flood affect an operator?

21-8. What physical examinations does LP and L give essential control room personnel? How often? What criteria of physical stress does an operator have to demonstrate the capacity to withstand? (Treadmill Test, for instance).

21-9. a) What psychological examinations do essential control room personnel undergo?

b) What psychological stress tests must these personnel pass?

c) How much psychological stress can be associated with the personnel's knowledge that incorrect execution of their duties could result in their death and/or the death of thousands of people nearby?

d) How much psychological stress can be associated with being separated from one's home?

e) How much psychological stress can be associated with the knowledge of being isolated from the duration of a flood?

f) In what tests or simulated circumstances do they demonstrate capacities to endure stress?

21-10. a) Are all essential (and non-essential) control room personnel informed pointedly that they may be isolated from their families, from medical aid, and from other plant personnel in the event of a flood?

b) Are they psychologically prepared for 24-72 hours of isolation under conditions of excessive stress?

medical/physical distress upon other control room personnel?

(c) Who will attend to victim's first aid/personal needs?

(d) Can a single operator competently handle two sets of duties (i.e. his job and the victim's job)? For how long?

(e) Are all control room personnel trained in first aid? Are first aid materials in the control room?

(f) Would it be possible for control room staff to maintain all functions if more than one of them were medically disabled? Under these circumstances, would anyone be available to administer first aid to 2 victims simultaneously?

(g) What could be done for a control room person who has a heart attack under these stress conditions?

21-7. Especially in conjunction with hurricane conditions, flood condition may effectively isolate the plant personnel for 48 hours or longer. Has LP and L provided for these necessities of relatively long-term flood damage/isolation?

(a) Food and regularly replaced drinking water — enough for two weeks?

(b) Relief personnel for sleeping schedules?

(c) Who will man essential control room posts of duty over 48 hours, while some personnel sleep, if one (or 2) persons are ill or injured?

(d) Are there provided adequately shielded quarters for personnel sleeping?

(e) Are sanitary facilities convenient to control room and accessible even under extreme emergency/security measures?

(f) What is the expected effect of fatigue on the performance/alertness of control room personnel who might have to remain

c) Are their families prepared for this separation during a regional flood emergency?

21-11. a) What is the probability of young/inexperienced control room personnel deserting their posts under stress, or for the purpose of assisting in their families evacuation?

b) What is the likelihood of one (or more) control room operators experiencing some temporary nervous or mental lapse in capacity?

21-12. a) What provision has LP and L made to evacuate all personnel from Waterford 3's site in the event that the levee in that spot breaks and the reactor is 12 hours away from "cold shutdown"?

b) Will all personnel be evacuated?

c) Should general evacuation be recommended by emergency authorities?

21-13. How will relief personnel, NRC officials, or other advisors get to Waterford 3 control room should a plant emergency occur simultaneously with maximum flood conditions?

21-14. How will control room personnel evacuate to avoid radiation contamination should a plant accident occur simultaneously with maximal flood conditions?

21-15. a) What would happen if the primary entrance way into containment structures were opened during maximal flood conditions?

b) If it had to be opened for a medical emergency or to evacuate Waterford 3 personnel? What would LP and L's policy priority be?

INTERROGATORIES FOR CONTENTION NO. 22 -

22-1. Give name of all companies, corporations, or individuals that do concrete-related inspection.

22-2. List all reportable events in construction of Waterford 3 that deals

with concrete related structures.

22-3. List all NRC or AEC inspections or investigations dealing with problems with concrete related structures at Waterford 3.

22-4. With respect to FSAR, page 3.8-2, against what specific external missiles is the concrete Shield Building designed to protect?

22-5. With respect to FSAR, page 3.8-37, and with reference to §3.5.1.1 (Internally generated missiles — outside containment) please advise:

(a) How many temperature detectors could become internal missiles and their weight;

(b) How many valve stems could become internal missiles and the weight of each;

(c) The restraints on valve stems so that they do not become missiles, how many such valve stems there are, and the weight of each;

(d) How many bolted bonnets there are which may become internal missiles;

(e) How many main steam safety relief valves there are, the size of each, and the weight of each.

22-6. With respect to FSAR 3.5-8, did any tests of the concrete compressive strength show any valves less than 4,000 psi? If so, please advise where these results were obtained as by a location on the structure itself.

22-7. Which formula was used to calculate the minimum concrete wall thickness necessary to prevent penetration by cylindrical missiles, i.e., was the Ballistic Research Laboratory Formula (BLR) or the National Defense Research Council (NDRC) Formula. In your answer, please advise whether this calculation was made before or after the concrete was poured.

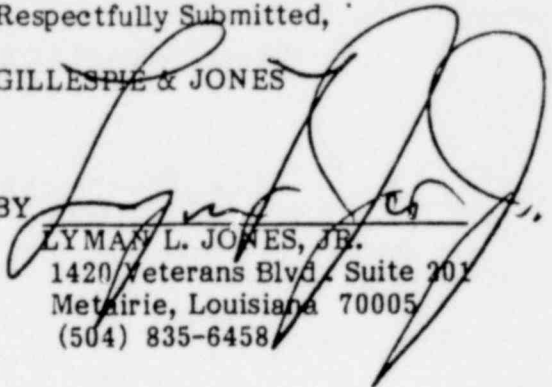
22-8. With respect to FSAR page 3.5-13 the NDRC Formula predicts no

missile penetration of the Shield Building Wall by Disc No. 3, which is described as the most penetrating missile. Please advise what prediction is made using the BLR Formula.

Respectfully Submitted,

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