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May 25, 1979

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of)
)
PENNSYLVANIA POWER AND LIGHT COMPANY and)
ALLEGHENY ELECTRIC COOPERATIVE, INC.)
)
(Susquehanna Steam Electric Station,)
Units 1 and 2))

Docket Nos. 50-387
50-388

APPLICANTS' FIRST SET OF INTERROGATORIES
TO INTERVENOR SUSQUEHANNA ENVIRONMENTAL ADVOCATES

The Licensing Board's March 6, 1979 Special Prehearing Conference Order provided for discovery requests to be filed by May 25, 1979.

These Interrogatories are filed pursuant to 10 C.F.R. §2.740b which requires that the Interrogatories be answered separately and fully in writing and under oath or affirmation. The Interrogatories are intended to be continuing in nature and the answers should immediately be supplemented or amended, as appropriate, should Intervenor obtain any new or differing information responsive to the Interrogatories. As specified by the Special Prehearing Conference Order, responses must be filed by June 29, 1979.

Interrogatories covering all contentions are being served on each Intervenor, even though only certain Intervenors are the sponsors of each contention. Since all Intervenors are entitled to cross-examination on all contentions at the hearing (see Special Prehearing Conference Order at 4), answers to the Interrogatories by all Intervenors are needed for Applicant to prepare to respond to such cross-examination.

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Interrogatories on Contention 1A

- 1A-1 Describe each aspect in which you contend the assessment of the quantity of radon-222 to be released during the fuel cycle for the Susquehanna facility is inadequate.
- 1A-2 What quantities of radon-222 do you contend will be released during the fuel cycle for the Susquehanna facility?
- 1A-3 For each step in the fuel cycle for the Susquehanna facility, specify the quantities of radon-222 which you contend will be released during that step.
- 1A-4 What are the radiological health effects associated with the quantities of radon-222 which will be released during the fuel cycle for the Susquehanna facility?
- 1A-5 With respect to each of your answers to Interrogatories 1A-1 through 1A-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 1B

- 1B-1 With respect to each isotope (other than radon-222) which will be released from the fuel cycle for Susquehanna,
- a. Identify the isotope;
 - b. Specify the step or steps in the fuel cycle during which such isotope will be released;
 - c. Specify the quantity of each isotope which you contend will be released at each step identified in your answer to Interrogatory 1B-1b above.

- 1B-2 Describe each aspect in which you contend the radiological health effects of isotopes other than radon-222 to be released from the fuel cycle for Susquehanna have been misrepresented and underestimated.
- 1B-3 Describe the radiological health effects of all isotopes other than radon-222 which you contend will be released during the fuel cycle required for the Susquehanna plant.
- 1B-4 With respect to each of your answers to Interrogatories 1B-1 through 1B-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 2

- 2-1 With respect to each radionuclide whose release from the Susquehanna facility you contend will result in residual risks of low-level radiation:
- a. Identify the isotope;
 - b. Specify the quantity of each isotope which will be released;
 - c. Describe the release point or points from the facility for each of the isotopes identified.
- 2-2 Specify the types and magnitude of residual risks of low-level radiation which you contend will result from the release of radionuclides from the Susquehanna facility.
- 2-3 Describe the quantities of chlorine which will be discharged by the Susquehanna facility.

- 2-4 Specify each source from which chlorine will be discharged and the quantities discharged from each source.
- 2-5 What is your estimate of the chlorine concentration in the Susquehanna River immediately downstream of the discharge point during facility operation?
- 2-6 Identify the nearest downstream water supply intake to the Susquehanna facility.
- 2-7 Describe what you believe to be the health effects of chlorine discharged into the Susquehanna River from the facility and the number of such health effects.
- 2-8 Describe what you believe to be the health effects of chlorine in the Susquehanna River other than chlorine discharged from the facility and of chlorine added to drinking water and the number of such health effects.
- 2-9 With respect to each of your answers to Interrogatories 2-1 through 2-8 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 3

- 3-1 What is your estimate of the lifetime fuel requirements for Susquehanna 1 and 2?
- 3-2 What do you contend is the quantity of "known and assured reserves of uranium"?
- 3-3 What do you contend is the quantity of uranium resources in the U. S.?
- 3-4 What is the basis for the statement that the historic growth rate for nuclear generated electricity is about 32% for 1961 through 1977?

- 3-5 Assuming that the growth rate for nuclear generated electricity would remain at 32% during the 30 year life of Susquehanna 1 and 2, how many commercial nuclear power reactors do you contend will be operating in the U. S. by the year 2000?
- 3-6 Assuming that the growth rate for nuclear generated electricity drops to 15%, how many commercial nuclear power reactors do you contend will be operating in the U. S. by the year 2000?
- 3-7 What do you contend uranium prices will be in 1980, 1985, 1990, 1995, 2000 and 2010 in both constant (i.e., real) and current (i.e., inflated) dollars?
- 3-8 Describe why future increases in uranium prices, if any, are related to "the approximate 400% price rise in the price of uranium fuel in the last 6 years".
- 3-9 Describe why "much uranium for the facility will have to be imported" and specify the total quantities of those imports, the quantities per year, and the price.
- 3-10 With respect to each of your answers to Interrogatories 3-1 through 3-9 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 4A

- 4A-1 Is it your assertion that most or all output of both units will be sold outside Applicants' service area as the units come on line? If so, describe the amount of the output which you contend will be sold and the basis for this assertion.

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4A-2 Is it your assertion that load growth will be consistent with the Very Low growth rate scenario? If so, describe in detail the basis for this assertion.

4A-3 With respect to each of your answers to Interrogatories 4A-1 and 4A-2 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 4B

4B-1 Identify the "latest projections of energy use and requirements" referred to in the contention.

4B-2 Identify all "existing facilities and sources" which you claim can meet the needs of Applicants' customers during the next 30 years and state whether you assume that each such facility and source will continue to be available to meet those needs during the entire 30 year period.

4B-3 With respect to each of your answers to Interrogatories 4B-1 and 4B-2 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 4C

4C-1 Identify each conservation program suggested by Applicants which is "not designed to encourage either meaningful energy conservation or efficient energy use" and explain why each such program does not encourage either meaningful energy conservation or efficient energy use.

- 4C-2 Describe how Applicants encourage reliance on "expensive electrically operated mechanical heating and cooling devices".
- 4C-3 With regard to each conservation program "aimed at encouraging continued electrical energy usage",
- a. identify each such program;
 - b. describe the other forms of energy which you contend are more "efficient . . . for the job at hand"; and
 - c. specify the efficiency and cost of each such other form of energy.
- 4C-4 State all information of which you are aware regarding the cost of "upgrading the thermal insulation in existing residences and commercial buildings in the service area of the Applicants", identify the changes in electricity sales and demand which you contend such upgrading would create, state the time which you contend it would take to perform this upgrade, and state the number and types of buildings in which you contend such upgrading would be performed.
- 4C-5 Describe the "end use efficiencies" and "Second Law Efficiencies" which assertedly should have been discussed in connection with energy conservation, how these "end use efficiencies" and "Second Law Efficiencies" would effect energy conservation, and the economic costs of achieving these "end use efficiencies" and "Second Law Efficiencies".

- 4C-6 Specify the "health benefits of energy conservation".
- 4C-7 With respect to each of your answers to Interrogatories 4C-1 through 4C-6 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 4D

- 4D-1 State the basis for asserting that Applicants have not considered solar energy as an alternative to Susquehanna.
- 4D-2 Describe each form of solar energy which should be considered an alternative to Susquehanna and provide the basis for the statement that each such form is "commonly used".
- 4D-3 For each type of solar energy installation which assertedly has not been considered as an alternative to Susquehanna, specify all information of which you are aware regarding:
- a. the cost of constructing, operating and maintaining each type of installation;
 - b. whether each type of installation requires storage capacity and if so, the capital, operating and maintenance costs of such capacity;
 - c. the number of such installations which would be installed in Applicants' service areas by 1981 and 1983;
 - d. the sales and demand for electricity which such installations would displace.

4D-4 With respect to each of your answers to Interrogatories 4D-1 through 4D-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 5

- 5-1 Which models used by Applicants to calculate individual and population radiation doses do you contend are inaccurate and obsolete?
- 5-2 Identify the milk transfer coefficient for iodine which you assert Applicants use.
- 5-3 Identify the factors which convert alpha particle dose in rads to rems which you assert Applicants use and where Applicants use these factors.
- 5-4 Identify the factors which "underestimate the radiation effect, on a per rad basis, for the very low energy beta and gamma radiations" which you assert Applicants use and where Applicants use these factors.
- 5-5 Identify any authorities, other than the cited Health Physics articles, which support the contention.
- 5-6 With respect to each of your answers to Interrogatories 5-1 through 5-5 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 6

- 6-1 Describe the "areas in which persons may be exposed to radiation doses in excess of those permitted by existing radiation exposure standards for the general public and Protective Action Guides".

- 6-2 Identify each of the "narrow roads" in the vicinity of the site for which you contend the emergency plan fails to account adequately.
- 6-3 Identify all other roads in the vicinity of the site which you contend could not be used for evacuation.
- 6-4 Describe each respect in which the emergency plan fails to account adequately for narrow roads.
- 6-5 Identify the "adverse weather conditions" in the vicinity of the site for which you contend the emergency plan fails to account adequately and specify the frequency with which those conditions can be expected to occur.
- 6-6 Describe each respect in which the emergency plan fails to account adequately for adverse weather conditions.
- 6-7 Specify the "assigned functions" of the Office of Radiological Health in the event of an emergency.
- 6-8 Identify any record (including documents, tape recordings, etc.) which include the statement by the Director of the Office of Radiological Health cited in paragraph b. of the contention.
- 6-9 Describe why the Office of Radiological Health will not be able to fulfill its assigned functions.
- 6-10 Assuming that the Office of Radiological Health will not be able to fulfill its assigned functions, what effect do you believe such a failure would have on implementation of Applicants' emergency plan?

- 6-11 Describe the "radiation-hazard safeguards" which you contend are needed to protect local emergency units, specify the level of radiation exposure against which these units must be protected, and describe the accidents or situations which could cause these units to receive such exposures.
- 6-12 Describe the type of "training" which you contend is necessary for the local emergency units.
- 6-13 Describe each aspect in which information in the emergency plan is "insufficient" concerning training of or the adequacy of radiation-hazard safeguards to protect local emergency units.
- 6-14 With respect to each of your answers to Interrogatories 6-1 through 6-13 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 7(a)

- 7(a)-1 Specify all information of which you are aware regarding the nature and magnitude of each of "the dynamic forces realized during blowdown".
- 7(a)-2 Specify all information of which you are aware regarding the strength of the pressure suppression containment structure to withstand each of "the dynamic forces realized during blowdown".
- 7(a)-3 Specify all information of which you are aware regarding the strength of the pressure suppression containment structure which would be sufficient to withstand each of "the dynamic forces realized during blowdown".

- 7(a)-4 With respect to each of your answers to Interrogatories 7(a)-1 through 7(a)-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 7(b)

- 7(b)-1 Describe the circumstances of which you are aware in which cracking of stainless steel piping in BWR coolant water environments has occurred, including the location of cracking, the types of coolant water environments, and the types of stainless steel.
- 7(b)-2 Explain why the circumstances described in your answer to Interrogatory 7(b)-1 will be applicable to the Susquehanna facility.
- 7(b)-3 Describe all measures which you believe would prevent or avoid cracking of stainless steel piping in BWR coolant water environments.
- 7(b)-4 With respect to each of your answers to Interrogatories 7(b)-1 through 7(b)-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 7(c)

- 7(c)-1 Identify all instances of which you are aware in which BWR core spray nozzles have cracked.
- 7(c)-2 Specify all information of which you are aware regarding the circumstances in which cracking of BWR core spray nozzles has occurred, including the types of materials which cracked, the location of the cracks, and the environment to which the material which cracked was exposed.

- 7(c)-3 Explain why the circumstances described in your answer to Interrogatory 7(c)-2 will be applicable to the Susquehanna facility.
- 7(c)-4 With respect to each of your answers to Interrogatories 7(c)-1 through 7(c)-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 7(d)

- 7(d)-1 Explain why reliance on "probabilistic numbers, as 10^{-7} per year, is unwise and unsafe".
- 7(d)-2 Describe each Anticipated Transient Without Scram for which you contend the Susquehanna facility's "ability... to survive" has not been demonstrated.
- 7(d)-3 Describe the manner in which the Susquehanna facility would not be able to "survive" each Anticipated Transient without Scram identified in your answer to Interrogatory 7(d)-2 above.
- 7(d)-4 With respect to each of your answers to Interrogatories 7(d)-1 through 7(d)-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 8

- 8-1 State specifically in what way you contend Applicants have failed to adequately demonstrate compliance with the Standard Review Plan §5.3.3, Reactor Vessel Integrity, Part II.6.
- 8-2 What do you contend is the nature and magnitude of the "thermal shock of cool ECCS water after blowdown" on the reactor pressure vessel?

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- 8-3 What do you contend is the maximum "thermal shock of cool ECCS water after blowdown" which the Susquehanna reactor pressure vessels could survive without cracking?
- 8-4 What do you contend will be the temperature of the "cool ECCS water" entering the reactor pressure vessel after blowdown?
- 8-5 Describe the nature, location, magnitude and extent of cracking which you contend will occur to the reactor pressure vessel as a result of "the thermal shock of cool ECCS water after blowdown".
- 8-6 With respect to each of your answers to Interrogatories 8-1 through 8-5 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention ?

- 9-1 State specifically the manner in which you contend the monetary and health costs identified by the Applicants for decommissioning the Susquehanna facility are understated.
- 9-2 Describe what you contend will be the monetary and health costs of decommissioning the Susquehanna facility. State the monetary cost in both constant (i.e., real) and current (i.e., inflated) dollars and state the year or years in which you estimate decommissioning will occur.
- 9-3 State the basis for your assertion that the monetary costs of decommissioning will be "at least equal to the cost of construction". Identify the method of decommissioning to which the assertion refers.

- 9-4 Identify the "industry-sponsored study" to which the contention refers and explain why that study is "obviously biased".
- 9-5 Identify and quantify the "new occupational or environmental hazards" which you contend are associated with the decommissioning of a large nuclear power facility.
- 9-6 Describe the "serious radiation hazards, particularly for workers" which you contend will result from decommissioning.
- 9-7 Describe the reasons for concluding that Applicants are financially unqualified to assume the monetary costs of decommissioning.
- 9-8 With respect to each of your answers to Interrogatories 9-1 through 9-7 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 10

- 10-1 Specifically identify those structures, systems, and components important to safety that you contend have not been adequately protected against the effects of rail accidents on site.
- 10-2 Specify all information of which you are aware regarding the manner in which the rail lines on site are not adequately designed to assure that accidents affecting structures, systems and components important to safety will not occur.
- 10-3 Describe each type of rail accident on site which you contend would impact safety structures, systems and components.

- 10-4 With respect to the "significant [rail] accident" which has "already occurred":
- a. identify and describe this accident;
 - b. describe how this accident indicates that safety structures, systems and components are inadequately protected against the effects of rail accidents on site.
- 10-5 With respect to each of your answers to Interrogatories 10-1 through 10-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 11

- 11-1 Describe each aspect in which you contend Applicants have failed to provide adequately for safe on-site storage for periods of up to 10 to 15 years of:
- a. spent fuel;
 - b. low-level radioactive wastes.
- 11-2 State the manner in which Applicants' proposed storage of spent fuel and low-level radioactive wastes on site creates an "unreasonable risk upon the health and safety" of Intervenors or others.
- 11-3 State specifically in what manner Applicants' storage plans violate the Commission's standards for protection against radiation in 10 C.F.R. §§20.1 and 20.105(a).
- 11-4 With respect to each of your answers to Interrogatories 11-1 through 11-3 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 12

- 12-1 Explain specifically in what manner the design of the Susquehanna facility fails to solve the "problem of flow-induced vibration in the core, thereby creating in-vessel sparger failure."
- 12-2 Specify all information of which you are aware regarding all instances in which flow-induced vibration in a reactor core has caused in-vessel sparger failure.
- 12-3 State the manner in which you contend an in-vessel sparger failure at the Susquehanna facility would "create an unreasonable risk of harm to the health and safety of petitioners and their private property".
- 12-4 State specifically in what manner an in-vessel sparger failure at the Susquehanna facility would "violate the Commission's standards for protection against radiation in 10 C.F.R. §§20.1 and 20.105(a)".
- 12-5 With respect to each of your answers to Interrogatories 12-1 through 12-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 13

- 13-1 State specifically the ways in which Applicants have not responded adequately to or complied with NRC's Notice of Violation issued by letter of May 10, 1978.
- 13-2 With respect to your answer to Interrogatory 13-1 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 14

- 14-1 Identify the capacity factors used by Applicants in their cost-benefit balance.
- 14-2 Describe why the capacity factors identified in your answer to Interrogatory 14-1 above are "over-optimistic".
- 14-3 Identify the capacity factors which you believe Applicants should have used in their cost-benefit balance and explain why these capacity factors should have been used.
- 14-4 What specific aspects of the design, construction or operation of the Susquehanna facility do you contend will render the facility incapable of producing the amount of electricity predicted by Applicants?
- 14-5 With respect to each of your answers to Interrogatories 14-1 through 14-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 15

- 15-1 With respect to "the exposure to radiation of maintenance workers and workers working on Unit 2 of the station while Unit 1 is in operation"
- a. state the maximum annual exposure and average annual exposure which you contend maintenance workers will receive;
 - b. state the total cumulative exposure (in man-rems) which you contend all maintenance workers will receive annually;

- c. state the maximum annual exposure and average annual exposure which you contend will be received by workers working on Unit 2 of the station while Unit 1 is in operation;
- d. state the total cumulative exposure (in man-rems) which you contend will be received annually by workers working on Unit 2 while Unit 1 is in operation.

- 15-2 Specify the sources and types of radiation which will cause the radiation exposures to maintenance workers and workers working on Unit 2 while Unit 1 is in operation.
- 15-3 Specify the types and magnitudes of health effects which you contend will be caused by the radiation exposures to maintenance workers and workers working on Unit 2 while Unit 1 is in operation.
- 15-4 Identify and quantify all factors which you considered in contending that radiation exposure to workers working on Unit 2 achieved by delaying Unit 1 operation until Unit 2 construction is completed would be "as low as is reasonably achievable" as required by 10 CFR §20.4(c).
- 15-5 With respect to each of your answers to Interrogatories 15-1 through 15-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 16

- 16-1 Identify the radioactive isotopes which will be present in the "seventy million gallons of radioactive water to

be vented daily from the Susquehanna facility's cooling towers".

- 16-2 Specify the quantities and concentrations of each of the isotopes identified in your answer to Interrogatory 16-1 on the "seventy million gallons of radioactive water to be vented daily for the Susquehanna facility's cooling towers".
- 16-3 By what mechanism will the isotopes identified in your answer to Interrogatory 16-1 enter evaporated water from the cooling towers in the quantities and concentrations specified in your Answer to Interrogatory 16-2.
- 16-4 With respect to the "economic threat to the dairy industry in the East-Central area of Pennsylvania":
- a. state the geographic boundaries of the "East-Central area of Pennsylvania";
 - b. describe the nature of the "economic threat";
 - c. quantify the magnitude of the "economic threat".
- 16-5 With respect to each of your answers to Interrogatories 16-1 through 16-4 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 17

- 17-1 Describe the type or types of "noise pollution" which you contend would be produced by the UHV transmission lines associated with the Susquehanna facility and quantify the level of such "noise pollution".
- 17-2 With respect to the "electrical shock from flashover" which the contention states would be caused by the UHV

transmission lines associated with the Susquehanna facility:

- a. define what is meant by "flashover";
- b. describe how "flashover" would occur;
- c. describe how electrical shock would be caused by "flashover";
- d. identify by whom, and the conditions in which, such an electrical shock would be received;
- e. specify what you contend would be the magnitude of such electrical shock;
- f. identify all instances of which you are aware where such shock has occurred.

17-3 Specify the extent to which you contend the Susquehanna UHV transmission lines would create television and radio interference including the magnitude of such interference and the maximum distance from the transmission lines at which such interference would occur.

17-4 With respect to the "strong electrostatic and electromagnetic fields that adversely affect living organisms along the UHV transmission right-of-way and beyond":

- a. define what is meant by "strong";
- b. describe the adverse effects which would be caused;
- c. identify all instances where such effects have been observed;
- d. identify those "living organisms" which would be adversely affected;
- e. define what is meant by "beyond" and state the maximum distance at which you contend the "strong

electrostatic and electromagnetic fields" would have an adverse effect.

- 17-5 With respect to the asserted injuries caused by the generation of "dangerous levels of ozone":
- a. define the levels of ozone that you contend are "dangerous";
 - b. specify the "levels of ozone" which you contend will be generated by the Susquehanna UHV transmission lines;
 - c. describe the "injury to vegetation" which you contend will be caused by the levels of ozone generated by the Susquehanna UHV transmission lines;
 - d. describe the "harmful effects on human health" which will be caused by the levels of ozone generated by the Susquehanna UHV transmission lines;
 - e. identify all instances of which you are aware in which such "injury to vegetation" and "harmful effects on human health" have been observed.

17-6 With respect to each of the phenomena discussed in the contention (i.e., noise pollution, electric shock from flashovers, radio and television interference, electromagnetic and electrostatic fields, and ozone), describe the difference in magnitude and impact which would be caused by use of lines in the range of 138,000 - 230,000 volts maximum as compared with the Susquehanna UHV transmission lines.

17-7 Specify all information of which you are aware regarding the lowest level at which each of the phenomena discussed in this contention will adversely affect human health or (if applicable) vegetation and the lowest level at which such adverse effects have been observed for each such phenomenon.

- 17-8
- a. State whether you believe that placing the transmission lines for the Susquehanna facility underground (using compressed gas as an insulator) would be justified on cost-benefit basis.
 - b. If the answer to Interrogatory 17-8(a) is yes:
 - i. what do you contend would be the economic cost of building the UHV transmission lines for Susquehanna underground using compressed gas as an insulator;
 - ii. identify all environmental impacts which you contend would be caused by such underground lines;
 - iii. identify all UHV transmission lines which have been built and operated underground using compressed gas as an insulator.

17-9 With respect to each of your answers to Interrogatories 17-1 through 17-8 above, answer General Interrogatories 1 through 4.

Interrogatories on Contention 18

- 18-1 Would the (1) selective foliage application of Krenite (2) selective foliage application of a mixture of equal

parts Weedone 2,4-DP and either Amdon 101 or Tordon 101, or (3) selective basal application of a mixture of equal parts of Weedone 170 and Banvel 520, have any of the adverse health and safety effects referred to in the contention, or any other adverse effects?

- 18-2 If you have answered Interrogatory 18-1 affirmatively, state specifically the health and safety effects from each of the herbicides which you contend will occur.
- 18-3 Explain specifically the relationship between the use of the herbicides referred to in Interrogatory 18-1 and the health and safety effects you identified in answer to Interrogatory 18-2.
- 18-4 Identify all specific instances of which you are aware where there have been any adverse health or safety effects from the use of the herbicides referred to in Interrogatory 18-1.
- 18-5 To the extent that you have identified any instances in answer to Interrogatory 18-4, state whether the circumstances of use in these instances involved the same mixtures as those referred to in Interrogatory 18-1. In your answer, state the frequency and method of application that was involved in any instances identified in answer to Interrogatory 18-4.
- 18-6 State specifically any environmental impacts, other than those identified elsewhere in your answers to Interrogatories 18-1 - 18-5, which you believe may occur from the use of the herbicides referred to in Interrogatory 18-1.

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18-7 If you have identified effects in answer to Interrogatory 18-6, explain specifically why such effects would be expected to occur in conjunction with the use of such herbicides.

18-8 With respect to each of your answers to Interrogatories 18-1 through 18-7 above, answer General Interrogatories 1 through 4.

Interrogatory 19

- 19-1 With respect to each individual whom you intend to call as a witness in this proceeding:
- a. Identify by name and address each such individual,
 - b. State the educational and professional background of each such individual, including occupation and institutional affiliations, publications and papers;
 - c. Identify the contention as to which each such individual will testify;
 - d. Describe, to the extent known, the nature of the testimony which may be presented by each such individual;
 - e. Identify by court, agency, or other body, proceeding, date and subject matter all prior testimony by each such individual.

GENERAL INTERROGATORIES

1. Is your answer based upon one or more documents*? If so:
 - a. Identify each such document on which your answer is based.
 - b. Identify the information in each document on which your answer is based.
 - c. Explain how such information provides a basis for your answer.

2. Is your answer based upon any type of study, calculation, or analysis? If so:
 - a. Describe the nature of the study, calculation, or analysis and identify any documents which discuss or describe the study, calculation, or analysis.
 - b. Who performed the study, calculation, or analysis?
 - c. When and where was the study, calculation, or analysis performed?
 - d. Describe in detail the information that was studied, calculated, or analyzed.

*For the purpose of these General Interrogatories, "document" means all writings and records of every type in the possession, control or custody of Intervenor, including but not limited to memoranda, correspondence, reports, surveys, tabulations, charts, books, pamphlets, photographs, maps, bulletins, minutes, notes, diaries, speeches, articles, transcripts and all other records, written, electrical, mechanical or otherwise.

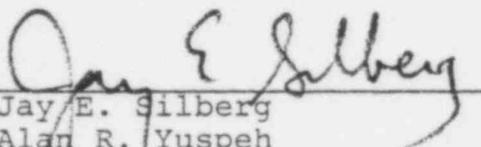
"Documents" shall also mean copies of documents even though the originals thereof are not in the possession, custody or control of Intervenor.

- e. What were the results of such study, calculation, or analysis?
 - f. Explain how such study, calculation, or analysis provides a basis for your answer.
3. Is your answer based upon research? If so:
- a. Describe all such research and identify each document discussing or describing such research.
 - b. When and where was the research conducted?
 - c. By whom was the research conducted?
 - d. Explain how such research provides a basis for your answer.
4. Is your answer based upon conversations, consultations, correspondence or any other type of communications with one or more individuals? If so:
- a. Identify by name and address each such individual.
 - b. State the educational and professional background of each such individual, including occupation and institutional affiliations.
 - c. Describe the nature of each communication with each such individual, when it occurred, and identify all other individuals involved.
 - d. Describe the information received from each such individual and explain how it provides a basis for your answer.

- e. Identify each letter, memorandum, tape, note or other record related to each conversation, correspondence, or other communication with such individual.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

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Dated: May 25, 1979