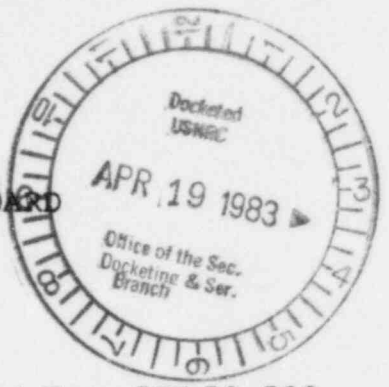
UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of ARIZONA PUBLIC SERVICE COMPANY, et al., (Palo Verde Nuclear Generating Station, Units 1, 2 and 3)	Docket Nos. STN 50-528 STN 50-529 STN 50-530

PETITIONER WEST VALLEY AGRICULTURAL PROTECTION COUNCIL, INC.'S RESPONSE TO JOINT APPLICANTS' FIRST SET OF INTERROGATORIES

Petitioner West Valley Agricultural Protection Council, Inc. (Petitioner), hereby answers, to the extent not objected to, "Joint Applicants' First Set of Non-Uniform Interrogatories to West Valley Agricultural Protection Council, Inc." (Interrogatories). In so answering, Petitioner reserves all its objections, not set forth specifically in response to each interrogatory, as to the relevance or materiality of these interrogatories or any part thereof.

The answers to these Interrogatories are based on the best information presently available to Petitioner. Petitioner reserves the right to supplement or amend these answers.

General Objections

Petitioner asserts and incorporates by reference the following general objections to the Interrogatories in each of its responses as though they were set out in full in each response:

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1. Petitioner objects to interrogatories or portions of interrogatories which seek the disclosure of privileged communications or attorney work product.

2. Petitioner objects to interrogatories or portions of interrogatories which seek specific information on the identities and farming activities of West Valley members as overbroad and irrelevant. Such information would be relevant principally to the question of Petitioner's standing. However, the Licensing Board has already noted that Petitioner's standing to participate in this proceeding cannot be disputed. Licensing Board Memorandum and Order of December 30, 1982 at 11. Moreover, Petitioner does not intend to call any West Valley members as witnesses at the hearing scheduled in this matter.

The potential damage that the Palo Verde Nuclear Generating Station can cause must be measured by looking at all agricultural land in the vicinity of the PVNGS, not just the land owned by West Valley members. Information about area farming activities, including all relevant information concerning the crops and acreage of West Valley members, is available in public documents maintained by the State of Arizona and federal agencies and by the farm bureau. Petitioner is currently compiling this information and will make it available to Joint Applicants as soon as it is compiled. As soon as Petitioner identifies the individuals it intends to call as witnesses to verify that information, it will notify Joint Applicants.

3. Petitioner objects to the length of the time period covered in the Interrogatories, which extends beyond any relevant

time period and would require the compilation of answers having no relevance or probative value to the issues in this action.

4. Petitioner generally objects to these Interrogatories as burdensome and oppressive.

5. Petitioner objects to repeating the cross-references from the Contentions contained in the Petition to the factual analysis in its experts' reports since this cross-referencing is done in the affidavit of Kenneth Berlin submitted by Petitioner in support of its Motion to Intervene.

6. Petitioner objects to answering questions about the Contentions listed in the Petition since by stipulation of the parties, those contentions are no longer included in this proceeding.

Definitions

1. As used herein, PVNGS refers to the Palo Verde Nuclear Generating Station.

2. As used herein, Joint Applicants refers to the Arizona Public Service Company and all other entities with an ownership interest in the PVNGS.

3. As used herein, ER-CP refers to the Environment Report - Construction Permit prepared for the PVNGS.

4. As used herein, ER-OL refers to the Environmental Report - Operating License prepared for the PVNGS.

5. As used herein, EIS-CP refers to the Final Environmental Statement - Construction Permit prepared for the PVNGS.

6. As used herein, EIS-OL refers to the Final Environmental Statement - Operating License prepared for the PVNGS.

7. As used herein, the Golay Report refers to the report prepared for Petitioner by Professor Michael Golay and attached to the Petitioner's Motion to Intervene in this proceeding.

8. As used herein, the Mulchi Report refers to the report prepared for Petitioner by Professor Charles Mulchi and attached to Petitioner's Motion to Intervene in this proceeding.

9. As used herein, the Davis Report refers to the report prepared for Petitioner by Professor Edward Davis and attached to Petitioner's Motion to Intervene in this proceeding.

Answers and Specific Objections

1. In your Petition, you allege that West Valley is a non-profit corporation formed in 1982 by farmers in Maricopa County, Arizona. State the date upon which West Valley was incorporated, and identify the officers and directors of the corporation.

ANSWER: West Valley was incorporated on September 16, 1982. Petitioner objects to the remaining questions in this interrogatory for the reasons set forth in general objection 2.

2. In your Petition, you allege that West Valley has 56 farmer members. Identify the 56 members who comprise West Valley and state, for each, his or her address.

ANSWER: Petitioner objects for the reasons set forth in general objection 2.

3. For each member named in response to the preceding interrogatory, state the precise legal description of the land owned and/or leased and/or operated by such member using UTM or Arizona Coordinate System to describe such property; also state the total number of acres owned and/or operated by each such member.

ANSWER: Petitioner objects for the reasons set forth in general objection 2.

4. For each parcel of property described in the answer to the preceding interrogatory, state whether you claim that such parcel, or any part thereof, will be affected or may potentially be affected by salt drift deposition from the PVNGS. If you claim that only a portion of any parcel listed herein will or may be affected, describe specifically the part thereof which you claim will or may be affected.

ANSWER: Objects for the reasons set forth in general objection 2.

5. For each parcel of property listed in answer to the preceding interrogatory, state the amount of drift per acre which you claim will be deposited thereon on a daily, monthly and annual basis.

ANSWER: Objects for the reasons set forth in general objection 2. Petitioner notes, however, that it has turned over to the NUS Corporation a computer tape of the cooling tower drift model relied upon i the Davis Report. This model must be utilized in conjunction with the analysis of salt emission levels from the

cooling towers and drift and emission levels from the spray and evaporation ponds. Petitioner's preliminary calculations of these and other relevant figures are contained in its experts' reports. Petitioner notes, however, that at this point in time, pending further discovery, it is unable to state the range of drift per acre which it claims will be deposited as a function of distance and direction from the PVNGS and as a function of time. It is, moreover, the legal responsibility of Joint Applicants, not Petitioner, to make this determination. Petitioner will supplement its own analysis as well as its criticisms of the PVNGS drift and emission figures set forth in the EIS-OL after Petitioner has had an opportunity to engage in discovery.

6. Describe the precise method by which the deposition figures given in response to the preceding interrogatory were calculated. Include in your answer all facts, assumptions, and calculations upon which such figures are based.

ANSWER: See response to interrogatory 5.

7. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professors Edward Davis and Michael Golay. The facts on which they will rely are set forth in the answers to these interrogatories and in the Davis and Golay Reports.

8. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 6.

ANSWER: See the Davis, Mulchi and Golay Reports, the bibliographies attached thereto, and the answers to specific interrogatories herein.

9. For each parcel of land described in answer to Interrogatory No. 3, state whether the farmer member of West Valley owns such land, leases it, or farms it under any other form of ownership or control. If the farmer member leases the land described, state the name of the owner/lessor; if the farmer member does not own or lease such property, describe the relationship pursuant to which the farmer member operates the land in question.

ANSWER: Objects for the reasons set forth in general objection 2 and on the ground that the information sought is irrelevant to the subject matter involved in this proceeding and not reasonably calculated to lead to the discovery of admissible evidence.

10. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 9.

11. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 9.

ANSWER: See answer to interrogatory 9.

12. For each parcel of land described in response to Interrogatory No. 3, indicate for each of the last ten years, the percentage of such acreage which was actually planted in crops and further state for each of the last ten years:

(a) The crop(s) which were planted on such acreage, or any part thereof, and the number of acres which were planted in each such crop.

(b) For each crop identified in response to subpart (a) of this interrogatory, state the approximate date upon which each crop was planted, the approximate leaf-out date of such crop and the harvest date thereof.

(c) Define the yield (in pounds, bales, bushels, etc. per acre) of each crop planted on each of the parcels of property described in response to Interrogatory No. 3.

(d) As a continuation of the preceding subparts of this interrogatory, state the market price per harvest unit of the crops identified in subpart (a) above, for each parcel of land listed in response to Interrogatory No. 3.

(e) With respect to the information provided in subpart (d) of this interrogatory, state the individual or entity to whom the crop(s) or any part thereof was sold, the date upon which the crop was sold and the means by which the sales price was established.

ANSWER: (a) Object for the reasons set forth in general objections 2, 3 and 4.

(b) See answer to (a) above. Generally, however, the following information is provided for the crops which are grown in the vicinity of the PVNGS.

Crop	Approximate Date Planted	Approximate Leaf-Out Date	Approximate Harvest Date
Cotton	Early March	7-14 Days after Planting	November
Alfalfa	Permanent Crop		
Cantelope Type Melons	Early March	7-14 Days after Planting	July
Grapes	Permanent Crop	Beginning March	July (continues to grow until 1st winter frost)
Grains	December	7 Days after Planting	June
Winter Vegetables	September	7-10 days after Planting	Varies throughout winter months and in April

(c) See answer to (a) and (b) above.

(d) See answer to (a) above.

(e) See answer to (a) above. Petitioner further objects to this interrogatory on the ground that it seeks confidential business information that is irrelevant to the subject matter involved in this proceeding and that it is not reasonably calculated to lead to the discovery of admissible evidence.

13. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the

specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Objects for the reason set forth in general objection 2. As indicated in general objection 2, however, Petitioner will gather relevant information on crops and acreage likely to be affected by salt drift from the PVNGS and will identify the individuals who will verify that information.

14. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 12.

ANSWER: Currently none of the documents Petitioner plans to use to gather information on crops and acreage is in Petitioner's possession. All, however, are contained in public files. As soon as Petitioner reduces any such documents to its possession, it will amend this answer.

15. For each parcel of property listed in response to Interrogatory No. 3, and for each crop which you claim was grown thereon during the past ten years, identify the irrigation method used for each such crop and the frequency with which such crop was irrigated. Your answer should include, but not be limited to, the total quantity of water applied per acre per day, per month, and per growing season, and the source of the irrigation water.

ANSWER: Petitioner objects to this question on the grounds set forth in general objections 2, 3 and 4 and on the ground that it seeks confidential business information that is irrelevant to the subject matter involved in this proceeding and not reasonably calculated to lead to the discovery of admissible

evidence. Joint Applicants objected successfully to the consideration of any water quantity issues, such as those set forth in this interrogatory, during this proceeding.

16. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 15.

17. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 15.

ANSWER: See answer to interrogatory 15.

18. Describe the water quality (i.e., the content in parts per million (ppm)) for the irrigation water referred to in Interrogatory No. 15, of any minerals, nutrients, or other solids, including--but not limited to--salt; further state the source of your information regarding the water quality described herein.

ANSWER: See answer to interrogatory 15. If this issue again becomes relevant in this proceeding, Petitioner will supplement its answer.

19. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 18.

20. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 18.

ANSWER: See answer to interrogatory 18.

21. For each crop planted on each parcel of property described in response to Interrogatory No. 3, and for each of the last ten years, identify any and all crop and/or soil treatments applied to the crop at any time during its growing season. Your answer should include, but not be limited to, a description of all herbicides, pesticides, fertilizers, soil leaching practices, etc., administered to the crop and/or to the soil, and a description of the phase of the crop's life at which such practices were administered. Further include in your answer, the purpose of such practice, the method of administration, the frequency thereof, and the approximate cost of each administration.

ANSWER: Petitioner objects to this question on the grounds set forth in general objections 2, 3 and 4 and on the ground that it seeks information that is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence.

22. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 21.

23. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 21.

ANSWER: See answer to interrogatory 21.

24. Your Petition alleges that West Valley members produce ninety six million dollars' ($96,000,000) worth of agricultural products per year. Describe in precise detail the method by which you arrived at the $96,000,000 figure and the year or growing season(s) to which such figure applies. Also state the alleged value of crops grown by each farmer member for each of the last ten years, or by his predecessor if the farmer member has not owned, leased or operated his land for the last ten years.

ANSWER: Petitioner objects to this question for the reasons set forth in general objections 2, 3 and 4. The allegation referred to in the Petition is relevant only to the standing issue which has been resolved in Petitioner's favor.

25. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 24.

26. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 24.

ANSWER: See answer to interrogatory 24.

27. Your Petition (paragraph 1, pg. 2) alleges that all West Valley members are located "within the area likely to be affected" by salt deposition. Give the legal description, the owner of each parcel thereof, and the total acreage included, in your definition or calculation of the area which you claim will be affected.

ANSWER: See answer to interrogatories 5 and 24.

28. Contention I.A.(i) of the Petition alleges that a "recent study" has shown that the "sampling method" utilized by the vendor in determining the drift ratio of the recirculating water in the cooling towers "can easily be in error by greater than 100 percent." Identify the recent study to which you are referring, the author thereof, the date of its preparation and the precise conclusions set forth therein which you claim support the above allegation.

ANSWER: That study is identified in the Golay Report, p. 10.

29. Define the sampling method which you claim was utilized by the vendor and which you allege can result in the error of greater than 100 percent.

ANSWER: No claim is made concerning the sampling method utilized by the vendor as the method used is unknown. However, it is alleged that isokinetic sampling methods can have errors greater than 100% (i.e., a factor of two) when measuring low drift fluxes.

30. Identify each and every fact, premise, theory or conclusion upon which you rely to support the allegation that the

vendor's sampling method can result in a drift ratio which can be in error by greater than 100 percent.

ANSWER: No claim is made concerning the sampling method utilized by the vendor as the method used is unknown. The statement which is made concerning isokinetic sampling systems is based upon Professor Golay's experience in conducting a comparative assessment of drift measurement methods in which various devices were tested in a spectrum of simulated environments. It was found that isokinetic systems had the greatest difficulties in sampling low drift cases, while light scattering and sensitive surface systems performed best in such situations.

31. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Michael Golay. The facts on which he relies are set forth in the responses to these interrogatories and in the Golay Report.

32. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 30.

ANSWER: See W.J. Glantschnig, F.R. Best and M.W. Golay, "Comparison of Methods for Measurement of Cooling Tower Drift, Conf. Paper," American Power Conference, Chicago, Illinois, April, 1983. W.J. Glantschnig, F.R. Best and M.W. Golay, "Experimental

Comparison of Cooling Tower Drift Measurement Methods," Electric Power Research Institute Report, in press (1982).

33. Describe in detail the sampling method which you allege should have been used in order to reduce or eliminate the potential error which you allege in contention I.A.(i).

ANSWER: No statement is made that the methods used for determination of the PVNGS drift rate are in error as it is impossible to make a meaningful statement regarding an unknown experimental method. In a low drift situation the sensitive surface and light scattering class of methods would be expected to provide more accurate results--especially if used in combination--than would isokinetic sampling methods.

34. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Michael Golay. The facts on which he relies are set forth in the responses to these interrogatories and in the Golay Report.

35. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 33.

ANSWER: See answer to interrogatory 32.

36. Contention I.A.(ii) alleges that the sampling methods utilized in determining the drift ratio failed to recognize wind effects within the fill and drift elimination system.

Describe precisely the wind effects which you claim were not recognized and further describe the precise manner in which you claim such wind effects will impact upon the drift ratio.

ANSWER: See Golay Report, p. 12.

37. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Michael Golay. The facts on which he relies are set forth in the responses to these interrogatories and in the Golay Report.

38. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 36.

ANSWER: See Golay Report. See also Hekobus, "Air-Tunnel Model Study of Fort Martin Cooling Tower, Marley Research and Development Division Technical Release No. 108, The Marley Cooling Tower Co. (1965); and J. Chan and M.W. Golay, "Comparative Performance Evaluation of Current Design Evaporative Cooling Tower Drift Eliminators," Atmospheric Environment, Vol. 11 (1977), pp. 775-781.

39. Contention I.A.(iv) alleges that the ER, EIS and sampling methods utilized in determining the drift ratio failed to measure "water distribution canal drift losses." Describe in detail the drift losses which you claim will arise from the water

distribution canal and the precise manner in which such losses will contribute or otherwise affect the drift ratio.

ANSWER: See Golay Report, pp. 12-13. Any such drift losses would contribute to the drift ratio by adding to the total mass of salt-laden droplets carried away from the cooling tower.

40. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Michael Golay. The facts on which he relies are set forth in the responses to these interrogatories and in the Golay Report.

41. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 39.

ANSWER: See Golay Report; S. Chandraseklian, Hydrodynamic and Hydromagnetic Stability, Dower Publications Inc. (1981), pp. 481-486.

42. Contention I.B.(iii) alleges that studies at the Chalk Point, Maryland power plant showed a "sizeable increase" in salt deposition occurring after the plant had been in operation for six years. Identify each and every fact, premise, theory or conclusion and describe all data and information, which you allege supports that allegation. Your answer should include, but not be limited to, a description of the makeup water quality, tower operation, meteorology (including temperature and icing

conditions), deposition pattern and all other pertinent data which you claim contributed to or otherwise affected tne increase in the salt deposition which you allege occurred after six years of operation.

ANSWER: See Mulchi, C.L. 1981. "Cooling Tower Effects on Crops and Soils". Post Operational Report No. 6, Md. Dept. of Nat. Resources - Power Plant Siting Program. University of Maryland, Water Resources Research Center, College Park. PPSP-CPCTP-36 (hereinafter referred to as Cooling Tower Effects, Post Operational Report).

This report summarizes the final year of the monitoring program of the cooling towers at Chalk Point. As shown on Table 8, p. 19, the difference in sodium and chloride deposition at 1.6 km vs. 9.6 km would lead one to conclude that the power plant was definitely contributing to the salt deposition at 1.6 km. During preoperation, the difference averaged 0.14 kg/ha/month. During the period 1975-1980, the difference averaged 0.09 kg/ha/month. During 1980-81, the sixth year of Unit 3 operation, the differences were 0.86 kg/ha/month. These averages were based on triplicate monitors located at 4 sites with 1.6, 4.8 and 9.6 km radii, respectively, or 36 samples per month for 12 months.

Subsequent verbal reports brought to Professor Mulchi's attention problems that the Unit 3 tower at Chalk Point was experiencing with the drift eliminators remaining in place which would have lowered tower efficiency to trap saline aerosol particles.

43. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Charles Mulchi. The facts on which he relies are set forth in the responses to these interrogatories and in the Mulchi Report.

44. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 42.

ANSWER: See Answer to interrogatory 42.

45. Contention I.B.(iv) describes certain cooling tower deterioration problems which you claim will affect salt emissions. Identify each and every "problem" which you claim will affect such changes and describe the precise manner in which such problems will contribute to or otherwise affect the salt emissions.

ANSWER: The general class of deterioration problems concerns alteration of the cooling tower geometry due to operational stresses, corrosion, and other factors. Such alterations may change the gas flow distribution and/or droplet generation, entrainment and capture behavior with consequent effects upon the drift rate. See also answer to interrogatory 42.

46. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the

specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professors Michael Golay and Charles Mulchi. The facts on which they rely are set forth in the responses to these interrogatories and in the Mulchi and Golay Reports.

47. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 45.

ANSWER: Relevant examples of cooling tower deterioration are cited in A. Roffman, "The State of the Art of Saltwater Cooling Towers for Steam Electric Generating Plants," WASH-1244 U.S. Atomic Energy Commission (1973) (hereinafter cited as Roffman, 1973).

48. Contention I.C. alleges that the cooling tower drift model utilized at PVNGS underpredicts salt deposition to off-site properties by a factor of ten or more. State each and every fact, theory, premise or conclusion upon which you rely to support that allegation.

ANSWER: Petitioner relies on the statement in the ER-CP §3.6.2 that the cooling tower drift model may be incorrect by a factor of 10, and on the Davis Report.

49. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professors Edward Davis and Michael Golay. The facts on which they rely are set forth in the answers to these interrogatories, in the Davis and Golay Reports, and in the ER-CP.

50. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 48.

ANSWER: The relevant documents are identified in the Davis and Golay Reports and in the answers to these interrogatories.

51. Contention I.C.(iii) alleges that the predictions for the PVNGS do not exhibit the "usual salt deposition patterns." Describe what you claim are "usual" salt deposition patterns and further describe the precise manner in which you claim the PVNGS predictions deviate from such patterns.

ANSWER: See Davis Report, p. 12, item 3. It is highly unusual for the salt deposition to increase at a distance of seven miles from the cooling tower. It generally peaks very close to the tower and then decreases monotonically with distance. See Davis Report, ref. 6, p. IV-24 and following pages. See also, Final Environmental Statement Indian Point No. 2, U.S. NRC Docket No. 50-247 August 1976, pp. 5-22 (hereinafter FES Indian Point), which gives a pattern for a circular mechanical draft tower. Cooling Tower Environment - 1974, Proceedings of a Symposium, March 1974, U.S. Energy Research and Development Administration, 1975 (hereinafter Cooling Tower Environment), has several papers which show this usual pattern, e.g., Schnecker, Wilbur, and Shefner (p. 478), Pena and Husler (p. 582), and Roffman and Grimble (p. 593).

52. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: Professor Edward Davis. The facts on which he relies are set forth in the answers to these Interrogatories and in the Davis Report.

53. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory no. 51.

ANSWER: See references identified in interrogatory 51.

54. Describe all data, reports, statistics, or other information upon which you rely to support your definition of the "usual pattern" referred to in contention I.C., including all meteorological data, predictive documentation, tower operating characteristics and field verification which supports your contention.

ANSWER: See references identified in interrogatory 51. These provide results of other modeling computations and measurements which indicate the described pattern.

55. Contention I.C.(ii) alleges that the PVNGS model cannot be applied to the Palo Verde region and be expected to provide accurate results without some "verifying experience." Describe precisely what you mean by the term "verifying experience" and further describe the manner in which you claim such verification would contribute to the accuracy of the model.

ANSWER: "Verifying experience" means field measurements of deposition from cooling tower drift under similar climatic conditions which can be compared to model predictions and thus verify that the model does adequately predict deposition rates under those conditions. There are several parameters in the mathematical relations used in drift models (such as the FOG model) which can be adjusted to make predictions agree with measurements (e.g., plume rise parameters; drift droplet evaporation coefficients). Most models are adjusted with experience obtained in more humid, temperate climates (e.g., eastern U.S.). Model parameters may be quite different for the arid Palo Verde site.

56. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

57. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 55.

ANSWER: See Davis Report, ref. 6, p. III-5 and following pages. See Studies on Mathematical Models for Characterizing Plume and Drift Behavior from Cooling Towers, Vol. 3, prepared by University of Illinois and Argonne National Laboratory for Electric Power Research Institute, January 1981 (hereinafter Studies on Mathematical Models).

58. Contention I.C.(iv)(a) alleges that the PVNGS model assumes that drift droplets are released "too high." State each and every fact, theory, premise or conclusion upon which you base that allegation, and further describe the elevation at which you claim such release would be more accurate.

ANSWER: See Davis Report, p. 12, item 4. The FOG model used in the PVNGS study makes droplet released computations at only 15 downwind distances from the tower. Hence, droplets that should have been released closer to the tower are held and carried higher in the rising plume to the next computation point. This results in droplets being released too high above the ground and causes an underprediction of salt deposition. To alleviate this difficulty the computations should be done for much closer downwind distances.

59. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

60. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 58.

ANSWER: See Davis Report, ref. 4, which describes the manner in which the FOG model does calculations.

61. Contention I.C.(iv)(b) alleges that the PVNGS model fails to consider "turbulent diffusion" of the drift droplets. State each and every fact, theory, premise or conclusion upon which

you base that allegation; include in your answer a precise description of the turbulent diffusion which you claim should have been included in the model, and the manner in which such diffusion affects the drift deposition which is the subject of this contention.

ANSWER: See Davis Report, pp. 12-13, item 5. The FOG model does not consider turbulent diffusion of drift particles (see Davis Report, ref. 4). In addition to a simple gravitational settling of the drift, the model should also include particles reaching the ground through turbulent motion of the atmosphere. This is usually computed assuming the drift is dispersed in the vertical direction according to a normal distribution using the Pasquill-Gifford-Turner dispersion coefficients. This process causes the drift to spread around the gravitational settling trajectory so that some drift reaches the ground at much shorter distances than would occur otherwise. This increases the deposition rate.

62. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

63. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 61.

ANSWER: See Davis Report, ref. 6, p. III-4.

64. Contention I.C.(iv)(d) alleges that the PVNGS model fails to consider the "effect of plume trapping by elevated temperature inversions." Describe precisely and in detail the effect which the alleged plume trapping has on the dispersion and disposition of the drift which is the subject of this contention. Include in your answer the source, frequency, and other relevant characteristics of the elevated temperature inversions which you allege cause or contribute to plume trapping.

ANSWER: See Davis Report, p. 13, item 6. The PVNGS model allows the cooling tower plume and the entrained drift to be carried aloft unimpeded by any elevated temperature inversions. Such inversions, layers of stable air, can actually stop the plume rise and cause any remaining drift to be released at that point. This would increase salt deposition rates.

Such temperature inversions are well-known phenomena, typically occurring in the hours following sunrise. Their frequency and persistence depend on the meteorology of the specific site.

65. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

66. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 64.

ANSWER: See Davis Report, ref. 5.

67. Contention I.C.(v) alleges that salt drift predictions for the PVNGS are low compared to "another study" of a "similar tower." Describe the study to which you are referring and state the precise factual conclusions contained therein which you claim support your allegation that the PVNGS predictions are low, including comparisons of drift deposition as a function of distance from the respective towers.

ANSWER: See Davis Report, p. 11, item 1. The study referred to was done to analyze the environmental impact of a circular mechanical draft tower very similar in design and operating characteristics to those being installed at PVNGS. However, the PVNGS towers are predicted to cause considerably less salt deposition as a function of distance even though a direct scaling of the referenced study to PVNGS conditions would indicate that the PVNGS results should be 74 times greater during the summer months (an increase of 1.5 in drift rate, 5.5 in water salinity; thus 1.5 x 5.5 x 9 towers = 74).

68. As a continuation of the preceding interrogatory, describe the "similar tower" referred to and include each and every similarity which you claim contributes to or facilitates a valid comparison of the drift deposition predictions for such tower to the drift deposition predictions for PVNGS.

ANSWER: See Davis Report, p. 18 for Palo Verde tower characteristics. See Davis Report, ref. 5, p. II-8 for the referenced study characteristics. The heat load on the towers is nearly equal. The flows and other characteristics are similar.

Hence, for defining the model inputs the towers are close equivalents.

The primary differences are the drift droplet size distributions that are assumed and the very different climates of the two sites.

69. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

70. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 68.

ANSWER: See Davis Report, refs. 1, 5, p. II-8 and IV-3, and 10.

71. Contention I.C.(ii) uses the term "vastly different" in reference to the climatic conditions at Palo Verde. Describe the specific climatic or meteorological factors which you allege are significant to the ability of a drift model to accurately predict salt drift deposition. Include in your answer the magnitude or scope of the differences in these significant climatic parameters that you claim would make a model with verifying experience in one region unacceptable in terms of its predictive accuracy in another climatic region.

ANSWER: Of particular importance are the temperature and relative humidity of the site. These affect plume buoyancy,

and hence its rise, as well as the evaporation rate of drift water droplets. Model parameters set to control these processes at a humid, temperate site can be significantly different than those required to cause proper model performance at a hot, arid site such as PVNGS. The model is particularly sensitive to dry out of droplets to salt particles that will occur much more frequently at PVNGS than at other sites where verifying experience, and model tuning, has been obtained.

72. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

73. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 71.

ANSWER: See Davis Report, ref. 1; Studies on Mathematical Models, supra; Cooling Tower Environment supra, especially Dina and Hosler, p. 573; Schrecker, et al., p. 455; Laskowski, p. 598; and Israel and Overcamp, p. 614. Cooling Tower Environment, 1978 Proceedings. A Symposium on Environmental Effects of Cooling Tower Emissions. May 2-4, 1978. Maryland Dept. of Nat. Resources, Power Plant Siting Program, University of Maryland Water Resources Research Center. PPSP-CPCTP-22 (hereinafter Cooling Tower Environment, 1978), especially Borg, et.

al., p. III-1; Jain and Kennedy, p. II-13; Moore, et. al., p. III-231. Roffman, 1973, supra.

74. Contention I.C. (vi) alleges that a "properly conducted salt drift analysis" would show the PVNGS model to be unreliable by a factor of from ten to seventy. Describe in detail each and every step, facet, assumption and component of the properly conducted salt drift analysis which you claim would show the PVNGS model to be unreliable.

ANSWER: The facts on which petitioner relies are set forth fully in contention I.C. See more detailed responses to Interrogatories relating to the subjects referred to in interrogatory I.C., including interrogatory 48.

75. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: All Petitioner's experts.

76. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 74.

ANSWER: See Davis Report, ref. 2; EIS-OL.

77. Contention I.D.(i) alleges that "at times" the cooling tower salinity of the Palo Verde cooling towers will be "higher than assumed in the model." With reference to that allegation, state:

(a) The "times" at which, or during which, you allege the cooling water salinity of the tower will be higher.

(b) Each and every fact upon which you base your determination or calculation of such "times".

(c) The salinity levels which you claim will occur, and the magnitude by which they will exceed those levels assumed in the model. State each and every fact upon which you based this allegation.

(d) Describe what you claim to be the causes of the higher salinity concentrations referred to in subpart (c) above, and the duration of the higher levels that you allege will be experienced.

ANSWER: (a) The PVNGS model assumes the Palo Verde cooling towers will increase the salt content about 15x that found in the tower makeup water which would result in tower salinity valves in the range of 15,000-18,000 ppm. Anything which influenced the salinity of the tower makeup water would affect the average salinity of the circulating water. The "at times" statement was in reference to factors which would increase the salinity levels in the tower makeup water. Several possibilities include:

1) General water shortages for the city of Phoenix resulting in less water use and hence increases in the salinity of waste treatment water supplying the plant.

2) Possible disruptions in water supply from the city resulting in the use of groundwater to supply the towers.

The salinity of the groundwater is in the order of 3-5x the salinity of the waste treatment water.

3) Disruption in the water supply such as a broken main pipe from the waste treatment plant, which could force APS either to use groundwater, close down the plant or conserve available water in the storage area. One way to conserve water is to increase the cycles of concentration above 15x in the cooling towers.

4) General changes in the water supplies to the city of Phoenix could increase the salinity of the waste treatment water supplying the power plant. The city may have to switch to alternate sources of water during emergency condition.

5) Salt drift from the cooling towers into the water storage area will increase the salinity of the tower makeup water. The power plant has a large water storage area. Mechanical draft towers have high drift deposition near the towers. Also, salt blowing from the blowdown discharge collection area could also increase the salinity of the water in the storage area.

6) The changes in environmental conditions both daily and seasonally will likely vary the average salinity levels in the tower.

(b) See answers to (a).

(c) Salinity records show variability in the salinity of the waste treatment water from the city. Professor Mulchi personally examined those records at the Buckeye Irrigation Co. Office during his visit in August, 1982 and found a variation of 10-20% was not uncommon, with much higher variation observed

for several entries. Petitioner makes no claim at this time concerning specific salinity levels that will occur.

d) The likely causes are addressed above. Duration would likely depend on the extent of the emergency in each situation. A broken pipe might be repaired in a few days; however, other types of disruption in the supplies of water to the city could last months or years. For example, water shortages in California in the 1970's lasted several years. Water is the lifeblood of the farming enterprises in the western states in general and near Palo Verde in particular. A prolonged shortage of water to that area would likely alter the supplies of water to all parties--city, agriculture and Palo Verde. Salinity levels are generally increasing in the area due to continued heavy water usage in the region. Therefore, there will likely be cases, as discussed above, where the 15,000-18,000 ppm. average cooling tower salinity levels used in the models will not be representative of values in the circulating water.

78. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

79. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 77.

ANSWER: a) Buckeye Irrigation Co. records.

b) Records at the Phoenix Wastewater Treatment Plant.

80. Contention I.D.(ii) alleges that records from the Buckeye Irrigation Company show that some water samples taken from the Phoenix sewage effluent which will be utilized at the PVNGS contain twice the salt content listed in the ER and the EIS. Describe each and every "record" which you are relying on to support that allegation and further state:

(a) The date upon which each and every sample referenced in such records was collected.

(b) The person or persons responsible for the collection of the sample.

(c) The collection methods utilized to obtain the samples.

(d) The tests, calculations, or other methods used to determine the salt content of such samples.

(e) The precise location at which such samples were drawn from the Phoenix Sewage effluent.

ANSWER: Petitioner objects to this request on the grounds that the records are not in Petitioners' possession and the information contained in those records is equally available to Joint Applicants. It is Petitioners understanding that the records were obtained from samples collected near the canal inlet where the Buckeye Irrigation Co. obtains water from the city.

81. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the

specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43. When Petitioner identifies additional people, it will supplement its answer to this interrogatory.

82. Identify each and every document which refers or related in any way to the facts set forth in your answer to Interrogatory No. 80.

ANSWER: The records are on file in the office of the Buckeye Irrigation Co. and at the Phoenix Wastewater Treatment Plant.

83. Contention I.D.(iii) alleges that the cooling water source is likely to change over the life of the plant. State each and every fact, theory, premise or conclusion upon which you rely to support that allegation.

ANSWER: Objects on the ground this contention is no longer included in this proceeding.

84. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 83.

85. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 83.

ANSWER: See answer to interrogatory 83.

86. Contention I.D.(iii) alleges that the change to which that contention refers wi' lead to "much higher initial salt concentrations" than shown in the model. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation including specifically the magnitude of the concentration which you allege will result.

ANSWER: See answer to interrogatory 83.

87. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 83.

88. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 86.

ANSWER: See answer to interrogatory 83.

89. Identify each and every fact, calculation, study, test, or other pertinent data upon which you rely to support the allegation in contention I.E.(i) that blow off from the evaporation ponds will average 23,000 pounds of salt per day.

ANSWER: The facts on which petitioner will rely are contained in the Davis report.

90. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the

specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 52.

91. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 89.

ANSWER: The relevant documents are identified in the Davis report.

92. Identify each and every fact, study, test, calculation, or other pertinent data upon which you rely to support the allegation in contention F that the salt deposition from spray ponds may exceed the deposition from the cooling towers.

ANSWER: The facts on which petitioner relies are set forth in the Golay report.

93. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31.

94. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 92.

ANSWER: The relevant documents are identified in the Golay report.

95. Contention I.F.(ii) alleges that the ER unrealistically expects refueling intervals for each tower to be

one month per year when experience at most other similar stations has shown that a larger value would be more realistic. Identify each and every station to which that allegation refers, the dates of refueling outages at each such station and the "larger value" which you allege would be more realistic for refueling intervals.

ANSWER: Object on the ground that it would be burdensome and oppressive to answer this interrogatory since the number of LWR plants which have had refueling outages longer than one month per year is too great to list here, particularly in the format requested. Further, Petitioner does not propose a more realistic value for a typical refueling interval, rather those preparing the relevant Environmental Statement must do so as part of their obligation in preparing a meaningful statement.

96. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31.

97. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 95.

ANSWER: As an example of sources documenting the duration of refueling shutdown outages experience at other plants see D.C. Bley, "Light Water Reactor Productivity Improvement," Ph.D. Thesis, MIT Department of Nuclear Engineering (1979), pp. 348-365.

98. Identify each and every fact upon which you rely for your selection of the "larger value" referred to in contention I.F.(ii).

ANSWER: See answer to interrogatory 95.

99. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31.

100. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 98.

ANSWER: See answer to interrogatory 95.

101. Identify each and every fact, theory, premise or conclusion upon which you rely to support the allegation in contention I.F.(iii) that the drift distributions from the spray ponds are unreliable and that the vendor's drift source term and drift transport model can be expected to be seriously in error by as much as a factor of ten. Include in your answer each and every study, test, calculation, report, or other source of pertinent data which supports such allegation.

ANSWER: The drift droplet size distributions were not specifically given in the ER-OL, EIS-CP, or EIS-OL. The drift rate of 27 gpm (0.1% of circulating flow) is typical in the trade (see Cooling Tower Environment, supra, p. 591). Modeling of drift deposition from spray ponds is subject to the same difficulties

associated with modeling tower emissions; thus the modeling accuracy is "order of magnitude" or "factor of ten".

Moreover, without information regarding how the vendor formulated a drift source estimate it is impossible to make a statement regarding the quality of that estimate. No such information is available to us pending discovery. The burden of proof in this case lies with the vendor, not with Petitioners.

102. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31 and 52.

103. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 101.

ANSWER: See Davis Report, ref. 1, 2, 3, 4, and 9; Golay Report p. 31; Cooling Tower Environment, supra; W. Wang and R.W. Porter, "Experimental Study of Bank Aerodynamics of Atmospheric Spray Cooling Systems," Illinois Institute of Technology Report TR-77-3 (1977); S. Chaturvedi and R.W. Porter, "Effect of Air-Vapor Dynamics on Interference Allowance for Spray-Cooling Systems," Illinois Institute of Technology Report TR-77-1 (1977).

104. Define the term "drift ratio" as used in contention I.G.(i).

ANSWER: "Drift ratio" refers to the amount of water being carried out of the cooling tower by the air flow as water

droplets (not vapor) compared to the total amount of circulating water in the tower. It is expressed as percent of circulating water (e.g., 0.0044% for the PVNGS).

105. Describe each and every item or component of cooling tower deterioration to which you refer in contention I.G.(ii) and which you claim will affect the drift ratio utilized by the Applicant. Include specifically the date upon which you claim ech such component or item of deterioration can be expected to begin, the magnitude of such deterioration, the precise aspect of the tower which you claim will suffer such deterioration, and the precise manner in which such deterioration will contribute to or otherwise affect the drift ratio.

ANSWER: See interrogatory 45. It is impossible to specify in detail when or which components will fail over cooling tower life. However, because of the wear and tear of routine operations such component alterations must be expected, with a planning allowance being made for such eventualities.

106. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31.

107. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 105.

ANSWER: See answer to interrogatory 47.

108. Identify each and every fact, theory, premise or conclusion upon which you rely to support the allegation in contention I.G.(i) that drift ratio measurements may be in error by a factor of more than 100 percent.

ANSWER: See Golay report p. 10 and answer to interrogatory 29.

109. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 31.

110. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 108.

ANSWER: See answer to interrogatory 29.

111. Identify each and every fact, theory, premise or conclusion upon which you rely to support the allegation in contention I.G.(iii) that the cooling tower drift model may be in error by a factor of ten to seventy or more.

ANSWER: See answer to interrogatory 74.

112. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 75.

113. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 111.

ANSWER: See answer to interrogatory 76.

114. Contention II.A. alleges that in other situations where cooling tower emissions might have had the potential to adversely affect surrounding croplands, other applicants have conducted "careful assessments" of the impact of the cooling towers on such crops. Identify each and every report, test, measurement, calculation, prediction, or other pertinent data which you allege is a component of such a "careful assessment".

ANSWER: See Mulchi report and references cited in Berlin affidavit attached to Petition to Intervene.

115. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

116. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 114.

ANSWER: See answer to interrogatory 114.

117. Contention II.A. alleges that there is a "far greater risk" of crop damage in the instant situation. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation.

ANSWER: See Mulchi Report.

118. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

119. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 117.

ANSWER: See Mulchi Report and references cited therein.

120. Identify the data used to establish the history of rain events in the PVNGS region to which you refer in contention III.A.(i).

ANSWER: The general patterns for rain events were determined from information provided in the APS environmental reports for PVNGS.

121. Define the term "PVNGS region" as used in contention III.A.(i).

ANSWER: The area surrounding the PVNGS.

122. Contention III.A.(i) alleges that it is "unlikely" that the rain events in the PVNGS region would remove salts accumulated on crop leaves. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation.

ANSWER: From an examination of the annual precipitation totals for the Palo Verde region, it seems that the total rainfall per rain event is low. For some rain events the amount of water will be ample to wash the salts from the crop foliage; however, on average, this is unlikely.

The Chalk Point region in Maryland has 40-50 inches of precipitation per year with the growing season periods having rainfall totals which average 0.98, 0.88, 1.2, 1.3 and 1.0 inches per week for May, June, July, August and September, respectively. Jour. of Env. Qual. 10:541-547, 1981 (hereinafter JEQ 10, 1981). During July 1977 rainfall totals averaged 0.5 inches per week, an amount comparable to rainfall in the Palo Verde region. In research studies simulating cooling tower drift conducted during 1977, salt buildup was observed on leaves of corn and soybeans treated with salt deposition water in the range of 2 to 6 lbs./acre per week. Since the rainfall amounts and frequencies for the Palo Verde region resemble the July 1977 data for Maryland, it would not be unreasonable to infer that salt buildup may occur on plant foliage in the Palo Verde region. For example, during Professor Mulchi's visit to the Palo Verde region of August 9-12, 1982, the region experienced several rain events of brief duration and intensity which would have been recorded in the eastern U.S. as "trace" precipitation. Although no measurements were made of these events, in Professor Mulchi's professional judgment none of these storms would have washed the foliage free of salts.

123. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the

preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

124. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 122.

ANSWER: Jour. of Env. Qual. 10, 541-547; 1981, supra; EIS-OL; Armbruster, J.A., and C.L. Mulchi. Response of Corn and Soybeans to Soil vs. Foliar Applied Salts of Cooling Tower Origin. Submitted to Jour. of Env. Qual., Q-231, In Review. (hereinafter JEQ-Q-231).

125. Your contention III.A.(ii) claims that the climatic conditions at the PVNGS will "wet the leaves of crops in a manner" that will dissolve much of the salt deposited on the leaves. Describe precisely the manner in which you claim the climatic conditions will effect such dissolution, and further identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation.

ANSWER: See Mulchi Report and answer to interrogatory 122.

126. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

127. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 125.

ANSWER: See Mulchi Report and references cited therein.

128. Contention III.A.(ii) uses the phrase "much of the salt". Describe precisely what is meant by that phrase and further describe the precise manner in which you arrived at the level or figure which you claim will be dissolved.

ANSWER: The phrase "much of the salt" refers to water soluble salts dispensed by the cooling towers. See Chalk Point Studies referenced by Dr. Mulchi.

129. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

130. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 128.

ANSWER: See Mulchi Report and documents referenced therein.

131. Identify each and every fact, theory, premise or conclusion upon which you rely to support the allegation in contention III.A.(ii) that climatic conditions will cause movement and concentration of salt along the leaf margins. Further,

identify the characteristics and causes of such movements and concentrations.

ANSWER: Dr. Mulchi's observations of the injury patterns along the margins of leaves exposed to simulated saline aerosol drift indicate that salts may accumulate around the edges. See Mulchi, et al., "Cooling Tower Effects on Crops and Soils," Preoperational Report. Md. Dept. of Nat. Resources. Power Plant Siting Program, Univ. of Md., Water Resources Research Center, College Park, Md. PPSP-CPCTP-6 (hereinafter Cooling Tower Effects, Preoperational Report), inside cover page; Francis B.A. "Effects of Simulated Saline Cooling Tower Drift on Woody Species." Md. Dept. of Nat. Resources Power Plant Siting Program. PPSP-CPCTP-17, 1977 (hereinafter Francis, 1977), at p. 17, Figures 4B and 4C. During drought conditions or during periods with "trace" rainfall events, leaves can become moist from either rainfall or dew formations. The wax coatings on the leaves cause reduced surface tension, with gravity thus causing droplets to migrate to the edges of the leaves of certain plants. If there is salt on the leaf surface, it will likely be dissolved and transported in the droplet. As heat from the sun causes the moisture to evaporate from the leaf, the salt concentration becomes higher along the edges of the leaves.

Drought stress may also explain necrosis. Symptoms of salt deposition stress resemble those of drought stress. The cause of the symptoms may therefore be difficult to identify. Symptoms of drought stress are enhanced by salt deposition. The mechanism is as follows: sodium entering the leaf during drought stress or high saline aerosol deposition disrupts normal moisture

relationships. Since the leaf margins are the most distant portions of the leaves from the vascular system supplying moisture from the roots, the supply of moisture to these portions become insufficient to sustain the cells along the margins and results in their death. This reduction in photosynthetic area may adversely affect crop productivity. See JEQ-Q-231, supra.

132. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

133. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 131.

ANSWER: a) The Cooling Tower Effects, Preoperational Report, supra;

b) Francis, 1977, supra;

c) JEQ-Q-231, supra;

d) Salisbury, F.B., and C. Ross. Plant Physiology. Wadsworth Publishing Co. Inc., Belmont, Calif. 1969;

e) Meyer, B.S., D.B. Anderson and R.H. Bohring. Introduction to Plant Physiology. D. Van Nostrand Co. Inc., Princeton, N.J. 1960;

f) Evans, L.T. Crop Physiology. Cambridge Univ. Press London, 1975;

g) Maas, E.V., and R.H. Nieman. 1978. "Physiology of Plant Tolerance to Salinity." In Crop Tolerance to Suboptimal Land Conditions. American Society of Agronomy, Madison, Wis. (hereinafter Maas and Nieman, 1978).

134. Define the terms general "chlorosis" and "necrosis" as used in your contention III.A.(ii).

ANSWER: Chlorosis: Webster's Seventh New Collegiate Dictionary, G.&C. Merriam Co., Springfield Mass. 1963. p. 146 defines as: "2. a diseased condition in green plants marked by yellowing or blanching." Cooling Tower Effects, Preoperational Report, supra, defines as: "the yellowing or blanching suggest a loss of the pigment chlorophyll in localized areas in the leaf."

Necrosis: Webster's Dictionary, supra at p. 565 defines as: "localized death of living tissue." Cooling Tower Effects, Preoperational Report, supra, defines as: "brown, dead tissue in spots and along leaf margins."

135. Identify each and every fact, theory, premise or conclusion upon which you rely to support the allegation in contention III.A.(i) that movement and concentrations of salts along the leaf margins will cause chlorosis and necrosis. Include in your answer the precise manner in which you claim such movements and concentrations will result in chlorosis and necrosis.

ANSWER: See answer to interrogatory 131; Jour. of Env. Qual. 12:127-32, 1983 (hereinafter JEQ 12, 1983); Francis, 1977, supra.

136. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the

preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

137. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 135.

ANSWER: (a) Cooling Tower Effects, Preoperational Report, supra;

(b) Francis, 1977, supra;

(c) JEQ 12, 1983, supra;

(d) Armbruster, J.A. "Response of Corn (Zea May L.) and Soybeans (Glycine max L. Merr.). To Saline Aerosol Drift From Brackish Water Cooling Towers." Md. Dept. of Natural Resources - Power Plant Siting Program, Univ. of Md. Water Resources Res. Center, College Park, Md. PPSP-CPCTP-31, 1979 (hereinafter Armbruster 1979);

(e) Mulchi, C.L., and J.A. Armbruster. "Effects of Salt Sprays on the Yield and Nutrient Balance of Corn and Soybeans." In Cooling Tower Environment, supra;

(f) JEQ-Q-231, supra;

(g) Expanded Task II Report: "A Pilot Study Using Remote Sensing to Detect Vegetation Stress Around a Cooling Tower." Contract No. AT(29-24)-0365. U.S. Nuclear Regulatory Commission INTERA Environmental Consultants, Inc., Houston, Texas, 1978 (hereinafter Expanded Task II Report).

138. Describe the significance of "leaf margins" in connection with your assessment of potential salt damage to crops.

ANSWER: The use of the words "leaf margins" refers to general locations where foliar salt injury symptoms first appear on plants such as soybeans and dogwoods. With corn, it was the tips of leaves, with symptoms then extending along the leaf margins. Death of tissue along the margins reduces the leaf area which reduces the area available for photosynthesis. This disruption of normal metabolic processes may lead to loss of productivity. The magnitude of the yield losses will totally depend on the circumstances and crop involved.

With soybeans, the plants showing chlorotic and necrotic tissue along the margins lost yields according to the function:

$$Y = 103.5 - 1.73X$$

where: Y = % of nontreated controls

X = kg/ha/wk salt deposition.

Correlation of leaf injury with salt deposition rates equalled n = 0.83 and correlation of leaf injury with grain yields equalled r = -0.33.

With corn, the relationship between yields and salt deposition was:

$$Y = 97.9 - 1.94X$$

where: Y = % of nontreated controls

X = kg/ha/wk salt deposition rate.

Correlation of leaf injury symptoms with salt deposition rates equalled r = 0.71; however, correlations of grain yields with leaf injury equalled only r = -0.44.

In both cases, the symptoms were closely correlated with salt deposition rates but poorly correlated with final yields.

With crops such as tobacco, where the quality of the leaf is the most important factor, no leaf symptoms appeared following salt application up to 22 kg/ha/wk yet the burning quality was substantially reduced. See JEQ-Q-231; JEQ 12, 1983, supra.

139. In addition to the leaf margins which you claim will be damaged by the potential salt drift deposition, are there any other portions of the plants (i.e., leafs, stems, roots, etc.) that you allege are subject to plant degeneracy or disease as the result of salt deposition. If your answer to this interrogatory is in the affirmative, please state:

(a) Each and every part or portion of such plants which you claim are subject to deterioration or disease.

(b) The precise disease or other deterioration which you claim may or can be caused by salt deposition.

ANSWER: Most of the foliar injury has been to the leaves. Leaves on the lower half of the soybean canopy suffered the most injury; however, the leaves on the upper half of the canopy in corn exhibited the most injury. The symptoms have been previously described. See JEQ 10, 1981, supra.

The stems and roots appeared not to be injured; however, plant heights in corn were reduced. The overall growth of the soybeans was stunted. From aerial photos taken at several times during the growing season for several years, the salt spray treatments delayed canopy expansion and ground coverage.

The growth of tobacco was unaffected by salt treatments suggesting that some crops may not show any growth effects.

140. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

141. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 139.

ANSWER: a) JEQ 10, 1981, supra;

b) JEQ 12, 1983, supra;

c) Mulchi, C.L., and Armbruster, 1975. "Effects of Salt Spray on the Yield and Nutrient Balance of Corn and Soybeans." In Cooling Tower Environment, supra;

d) JEQ-Q-231; supra;

e) Expanded Task II Report, supra;

f) Armbruster, 1979, supra.

142. Contention III.A.(iii) alleges that studies at Chalk Point, Maryland showed much higher injury to crops during a drought year than had been observed during previous years. Identify the precise study, and each factual conclusion contained therein, upon which you rely to support the allegation of this contention.

Answer: See answers to interrogatories 122, 131 and 143.

143. Contention III.A.(iv) alleges that the salt accumulation on leaves resulting from the operation of the PVNGS would cause plants to exhibit symptoms of general drought stress. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation. Include specifically the level of accumulation which you believe is necessary to cause plants to exhibit symptoms of general drought stress; further describe precisely what is meant by the term "general drought stress," and the manner in which such stress affects or impacts upon the plant.

ANSWER: Salt stress studies conducted on corn and soybeans over the period 1973-1978 identified numerous cases in which plant symptoms resembled drought stress symptoms in plants not being treated with salts. The symptoms include necrosis along margins of lower leaves of soybeans and tips and edges of corn leaves. The development of corn ears (cobs and grain) in salt stressed plants resembled development in drought stressed plants. In general, the ears were poorly developed, with reduced lengths and incomplete grain development. See JEQ-Q-231, supra.

"General drought stress" may be described as suboptional plant growth due to moisture deficiency. See JEQ-Q-231, supra; JEQ 10, 1981, supra.

Petitioner is unable at this time to state the level of accumulation necessary to cause plants to exhibit symptoms of drought stress. Determining that fact is the responsibility of

Joint Applicants and the NRC Staff. Petitioner will review the crop study now being conducted by Joint Applicants upon its completion to determine the answer to this question. However, rates of salt deposition necessary to cause these symptoms is not as important as the total accumulation of salts on leaves. See JEQ 10, 1981, supra.

144. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

145. Identify each and every document which refers or relates in any way to the facts set forth in your answers to Interrogatory No. 143.

ANSWER: See answer to interrogatory 141 a, b, c, d, e and f.

146. Describe the specific difference, if any, between "general drought stress" and the condition which you claim will result from salt deposition.

ANSWER: See answers to interrogatories 131 and 143.

147. Can injury caused by "general drought stress" be distinguished from injury caused by salt deposition? If your answer to this interrogatory is in the affirmative, describe the

specific differences in the injuries or conditions, and further describe each and every test, calculation, or measurement which is used to determine the source of a particular plant's injury or disease.

ANSWER: See answers to interrogatories 131 and 143; JEQ-Q-231, supra.

148. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

149. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 147.

ANSWER: See JEQ-Q-231, supra.

150. Contention III.B.(i) states that "recent studies" have established that aerosol deposition of salts from cooling towers can harm agricultural crops. Identify each and every "recent study" to which that contention refers, including the authors, dates of preparation, and each and every fact recited therein which you claim supports the allegation of contention III.B.(i).

ANSWER: See answer to interrogatories 114, 122, 138, 143, 151 and references cited therein.

151. Contention III.B.(i)(b) states that certain studies have established that aerosol salt deposition can harm a "variety of crops" at "comparatively low levels," and that "high enough deposition levels" can harm virtually all crops. With reference to that allegation, state:

(a) The crops included in your definition of the "variety of crops" which you claim can be damaged by comparatively low levels of salt deposition. For each and every crop listed, identify the facts, theories, premises, or contentions upon which you rely to support the allegation that such crop can be so damaged, including each and every study, report measurement, or test upon which you rely.

(b) Define the phrase "comparatively low levels" in the context of each specific crop alleged to be harmed.

(c) Define the phrase "high enough deposition levels" which you allege can harm "virtually all crops."

ANSWER: (a) Actual reseach on saline aerosol deposition on crops is very limited--soybean (Glycine Max L.), corn (Zea Mays L.), tobacco (Nicotiana tobaccus L.), beans (Phaseolus vulgaris L.), sweet corn (Zea Mays L.), and potato (Solanum tuberosum L.). Corn, soybeans, tobacco, beans and lettuce appear the most sensitive. Salt deposition rates in the range of 2 to 4 lbs/a/wk under east coast conditions caused significant effects.

The test was conducted at locations such as the Boyce Thompson Inst. at Ithaca, New York, and at the University of Maryland, College Park, Maryland. State of the art equipment was used for greenhouse or field studies, etc. See Silberman, D.H. and

D.C. McCune, 1978. "Some Factors Affecting the Response of Plants to Simulated Cooling Tower Saline Mist." In Cooling Tower Environment - 1978, supra.

In addition, a preliminary field study was conducted at the University of Maryland and cool season vegetables lettuce (Lactuca sativa), onion (Allium cepa), cabbage (Brassica oleracea), radish (Raphanus rativus), strawberry (Fragaria spp.), peas (Pisum sativum), potatoes (solanum tuberosum), and broccoli (Brassica oleracea) (C.L. Mulchi, unpublished).

(b) For the east coast, "comparatively low levels" would be as stated above (2 to 4 lbs/a/week) where corn yields were observed to be reduced. These values may be lower in low rainfall areas such as Palo Verde, where total accumulation may be the significant factor.

(c) "High" is a relative term and would certainly have to be defined for each species under review. Also, rainfall patterns and intensities would be important in each case. "High" for one environment may not be "high" for another depending on the circumstances. The highest rate we used at Chalk Point in Maryland was 20 lbs/a/week which injured the three crops being investigated in the study--corn, soybeans, and tobacco. With over 40 million pounds of salts projected to be released from Palo Verde over the next decade, with the low rainfall amounts for the region, some crops will likely be affected. Certainly further investigation is needed to identify and quantify these situations for that arid

environment. The results from other studies are indicators of the potential for injury.

152. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

153. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory no. 151.

ANSWER: a) Maas, E.V., and G.J. Hoffman, 1977. "Crop Salt Tolerance - Current Assessment." ASCE J. Irrig. and Drainage Div. 103:115-134;

b) Petolino, J.F., and J.A. Leone, 1980. "Saline Aerosol: Some Effects on the Physiology of Phaseolus vulgaris." Ecology and Epidemiology, 70:229-231;

c) Hindawi, Ibrahim J., L.C. Raniere and J.A. Rea, 1976. "Ecological Effects on Aerosol Drift From a Saltwater Cooling System." EPA-600/3-76-078. U.S. Envir. Prot. Agency, Office of Res. and Dev., Corvallis, Oregon;

d) McCune, et al., 1977. "Studies on the Effects of Saline Aerosols of Cooling Tower Origin on Plants." Jour. of Air Pollution Control Assoc. 27:319-324;

e) JEQ 10, 1983, supra;

f) JEQ 12, 1983, supra;

g) Silberman, D.H. and D.C. McCune, 1978. "Some Factors Affecting the Response of Plants to Simulated Cooling Tower Saline Mist." In Cooling Tower Environment - 1978, supra.

154. Contention III.B.(i)(c) states that certain studies have established that a generating station much smaller and utilizing less saline water than PVNGS caused extensive salt damage to native plants growing in similar climactic and soil conditions. With reference to that allegation, state:

(a) The name and location of the generating station to which the above allegation refers, including the factual basis upon which you allege that such station was "much smaller" than PVNGS.

(b) Each and every fact, theory, premise or conclusion upon which you rely to support the allegation that such station utilized less saline water than PVNGS, including the precise amount (in terms of both water volume and salinity concentrations) of saline water that you claim was utilized.

(c) The precise nature and extent of the "extensive salt damage" referred to in contention III.B.(i)(c).

(d) The native plants which you allege were damaged.

(e) Each and every fact upon which you rely to support the allegation that the plants damaged by the allegedly smaller station referred to in contention III.B.(i)(c) were grown in similar climatic and soil conditions. Your answer should include, but not be limited to, a description of the meteorological data upon which you rely to support the claim that the climatic

conditions were similar, and a description of the soil types which you claim were similar.

ANSWER: See Mulchi Report.

155. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

156. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 154.

ANSWER: See Mulchi Report.

157. Contention III(B)(iii) alleges that salt injury to cotton could cause a reduction in the number of bolls per plant and thus a reduction in crop yields. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation, including specifically in your answer, the following:

(a) The nature and level of salt injury which you claim would be necessary to effect a reduction in the number of bolls per plant.

(b) The precise reduction in the "number of bolls" per plant that you claim would be caused by such injury.

(c) The precise reduction, by percentage or by yield per acre, which you claim would be caused by such salt injury.

ANSWER: Studies are needed to determine how cotton will be affected by aerosol salt deposition.

The references to reductions in the numbers of bolls and the quality of lint, etc. are based on general statements about the growth and productivity of the cotton plant as described in: Martin, J.H., W.H. Leonard and D.L. Stamp, 1976. "Cotton." In Principles of Field Crop Production, MacMillan Publishing Co., Inc., New York, New York. Apparently, cotton has the ability to adapt to unfavorable environmental stress by "shedding" bolls. Since leaves close to the bolls supply photosynthate which is needed for cellulose synthesis, factors which alter the metabolic activities of the leaves may alter this quality of the lint.

If foliar salt deposition damages the leaves of cotton in a manner similar to the way it damages the leaves of corn and soybeans, one could expect to see reductions in photosynthesis, reductions in leaf areas and reductions in general growth of the plants. Each of these factors could lead to general reductions in yield and lint quality. However, studies may demonstrate cotton tolerance to foliar salts, in which case one would likely not observe effects on yields and quality. See Maas and Nieman, 1978, supra.

158. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

159. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 157.

ANSWER: a) Maas and Nieman, 1978, supra;

b) McArthur, J.A., J.D. Hesketh and N.D. Baker, 1975. "Cotton." In Crop Physiology by L.T. Evans (ed.). Cambridge University Press, England, pp. 297-325, supra;

c) Martin, J.H., W.H. Leonard and D.L. Stamp, 1976. "Cotton." In Principles of Field Crop Production. MacMillan Publishing Co., Inc., New York, New York, pp. 812-846, supra.

160. Contention III(B)(ii) further alleges that salt injury would result in a reduction in leaf area caused by necrosis induced salt injury, reducing the photosynthetic capacity of the plant and reducing the plant's ability to assimilate cellulose fibers. Identify each and every fact, theory, premise or conclusion upon which you rely to support that allegation, including specifically, any tests, studies, or calculations upon which you rely to suport said allegation.

ANSWER: See answer to interrogatory 157.

161. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

162. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 160.

ANSWER: See answer to interrogatory 159.

163. Contention III(C) alleges that salt deposition from the PVNGS will occur at levels sufficient to cause harm to surrounding agricultural crops. State precisely the level of salt deposition which you allege is "sufficient to cause harm," and the precise nature of the harm which you allege will be caused. Identify each and every fact, theory, premise or conclusion upon which you rely to support this allegation.

ANSWER: Petitioner is unable at this time to state the precise level of salt deposition sufficient to cause harm to surrounding agricultural crops. Determining that fact is the responsibility of the Joint Applicants and the NRC Staff in the ER-OL and EIS-OL. Petitioner will review the study now being conducted by Joint Applicants to determine the answer to this question and will comment on its accuracy.

164. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to 163. Professor Mulchi is Petitioner's expert on agriculture.

165. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 163.

ANSWER: See answer to interrogatory 163.

166. Identify the studies to which you refer in contention III.C.(i). Include in your answer the identification of the "certain plants" which were the apparent subject of such study; further identify the specific meteorological data upon which you rely to support the allegation that a heavy rainfall washed all salt from the crops on the average of once a week.

ANSWER: See answer to Interrogatory 114. Joint Applicants are referred to the referenced study for their contents.

167. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 43.

168. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 166.

ANSWER: See answer to interrogatory 166.

169. Contention III.C.(ii) alleges that in the area surrounding the PVNGS, deposition levels of 2-4 lbs. per acre per week will occur near the plant. Define precisely the area which you include in your definition of "near the plant." Identify each and every fact, theory, premise and conclusion upon which you rely

to support the allegation that levels of 2-4 lbs. per acre per week will occur in such area.

ANSWER: Petitioner's initial estimates of salt drift deposition from the PVNGS cooling towers are set forth in the model utilized by Professor Davis and described in the Davis Report. A computer tape of the Davis drift deposition model has been turned over to NUS and can be run by NUS to determine Davis' salt drift estimates.

170. Identify each person having knowledge, or claiming to have knowledge, of the facts set forth in your answer to the preceding interrogatory. As to each such person, state the specific facts concerning which they have knowledge or claim to have knowledge.

ANSWER: See answer to interrogatory 51.

171. Identify each and every document which refers or relates in any way to the facts set forth in your answer to Interrogatory No. 169.

ANSWER: See answer to interrogatory 169.

172. Contention III(C)(iii) uses the phrase "in areas further from the plant." Define precisely the area included in your definition of such areas, and further define the level of deposition to which you believe such area will be potentially subject.

ANSWER: Petitioner is unable to define precisely the areas involved. It is the responsibility of Joint Applicants and the NRC to make these determinations; Petitioner's comments on the accuracy of these determinations are contained in the experts'

reports. Petitioner will be able to respond further to this question after it conducts discovery in this matter and sees the results of Joint Applicants' crop studies.

173. The memorandum report of Dr. Edward A. Davis, attached to your Petition as Exhibit "A," states on page 1, that "[t]here are several indications that the model used for the Palo Verde study underpredicts salt deposition." Define each and every "indication" referred to in that statement which leads you to the conclusion that the Palo Verde model underpredicts salt deposition. For each "indication" listed, state the following:

(a) Each and every fact, theory, premise or conclusion upon which you rely to support the alleged indication.

(b) The source of such indication.

(c) Each and every study, test, or other such report which supports, verifies, or lends credence to the facts set forth in response to this interrogatory.

ANSWER: The allegations and facts in which Petitioner relies are fully set forth in the Davis Report and in the answers to these interrogatories.

174. Dr. Davis' report, at page 6, states that Dr. Davis reviewed pertinent sections of NRC, APS and related documents [references 1-4 of the report] in order to evaluate the modeling of the drift deposition. For each separate document reviewed in connection with such evaluation, state the specific "pertinent sections" of the document which were reviewed and relied upon by Dr. Davis in reaching his conclusions.

ANSWER: Davis Ref. 1: The entire report was scanned, especially Volumes 3 and 4. Chapters 3, 5, and 6 were studied in detail.

Ref. 2: The report was scanned for pertinent material not included in Ref. 3, e.g., site meteorology (section 2.6 and 6.1.2). The section (3.6.2) on drift was studied.

Ref. 3: All material relevant to the cooling system and its effects were studied: Chapters 4 and 5.

Ref. 4: The entire memorandum report was studied to understand the FOG model.

175. Dr. Davis' report at page 6, further indicates that "several persons connected with the project have been contacted to discuss various details of the model." With reference to that statement, identify the following:

(a) Each person contacted.

(b) The individual who contacted each person, if other than Dr. Davis.

(c) The manner in which and the place at which each person was contacted.

(d) The substance of each and every conversation held with each individual listed in response to subpart (a) hereof.

(e) Whether or not any notes, memorandum or other written memorializations were made regarding the conversations referred to above. If your answer to subpart (e) hereof is in the affirmative, identify the custodian of such reports, notes, or other memorialization.

ANSWER: (a) Mr. George Fisher, author of Davis Report, ref. 4.

(b) N/A.

(c) By telephone.

(d) In the one conversation, various questions in relation to Davis Report Ref. 4 were discussed. The details of model rise for PVNGS were not known by Mr. Fisher.

(e) Brief notes were made and are held by Dr. Davis.

176. Dr. Davis' report, at page 7, states that he was provided with certain information regarding modeling parameters from individuals connected with the Marley Company. Dr. Davis further states that "the values provided are considerably different than those used in the APS Environmental Report on Palo Verde." With regard to that allegation, state:

(a) A description of the values provided by Marley.

(b) The specific values in the APS Environmental Report to which the Marley data was compared.

(c) The precise extent of the difference referred to in Dr. Davis' Report, at page 7.

(d) The significance of the difference which Dr. Davis alleges exists between the Marley and the APS data.

ANSWER: (a) See Davis Report, p. 23.

(b) See Davis Report, p. 23.

(c) See Davis Report, p. 23 and the discussion of these values on pp. 11-12.

(d) Neglect of droplets above 180 microns could lead to underestimates of salt deposition at locations just off the PVNGS site. See p. 11, item 1.

177. Dr. Davis' report states at page 8, that drift from the spray ponds is emitted from a much lower height and could cause more off-site salt deposition than the towers, depending on the cooling water salinity. Identify each and every fact, theory, premise or conclusion upon which West Valley relies to support that statement, including specifically, but not limited to, the level of cooling water salinity, the height of release, and the drift droplet size distribution upon which the truth of the statement is dependent.

ANSWER: See Davis Report.

178. Dr. Davis' report at page 8, further states that in relation to potential dust blowoff from the evaporation ponds, "rough estimates based on information in references 7 and 8 indicate that this source could exceed the cooling tower as its salt source as the ponds grow in size." Appendix 11A of Dr. Davis' report purports to provide details of this estimate. With specific reference to Appendix IIA, state the following:

(a) The identity of the individual who developed, or the source of, the mathematical equation set forth in Appendix IIA.

(b) The manner in which the "threshold value of 12 mph" for wind speed was determined, calculated or otherwise arrived at.

(c) The manner in which the "typical value of erodibility" 50 to 200 tons/acre-year was determined, calculated or otherwise determined.

ANSWER: (a) See Davis Report, ref. 8, pp. 3-40. The equation and its basis is given.

(b) See Davis Report, Ref. 8, pp. 3-40. This value is based on observations of dust being blown off open exposed areas.

(c) See Davis Report, Ref. 8, pp. 4-10. The range of values is given on p. 74 of C. Cowherd, ., C.M. Maxwell, and D.W. Nelson, "Quantification of Dust Entrainment from Paved Roadways," Midwest Research Institute for U.S. Environmental Protection Agency, EPA-450/3-77-027, July 1977.

(d) Wind speed distributions at selected locations may be found in various references (e.g., Climatic Atlas). For the rough estimate in Appendix IIA a reasonable value to use was 20%.

179. List each and every communication relating in any way to the matters or allegations referred to in Contention I, between any West Valley member, agent, investigator, or attorney and the Applicant or its agents or employees, stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention I to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: (a) See Davis Report pp. 6-7 for references.

(b) See answer to (a).

(c) See answer to (a). The addresses of Joint Applicants' agents are not known to Petitioner but are known to Joint Applicants.

(d) See answer to (c).

(e) See answer to (a).

(f) See KB.

(g)(1) All by telephone.

(2) Professor Edward Davis was the only person associated with Joint Applicants who was present during the conversation.

(3) See answer to (a).

180. List each and every communication relating in any way to the matters or allegations referred to in Contention II,

between any West Valley member, agent, investigator, or attorney and the Applicant or its agents or employees, stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention II to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: Dr. Mulchi and Mr. Pavich may have had communications, however, they did not initiate any, and cannot identify the meaning of "agents."

181. List each and every communication relating in any way to the matters or allegations referred to in Contention III, between any West Valley member, agent, investigator, or attorney

and the Applicant or its agents or employees, stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention III to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: All conversations relating to agriculture, and thus the subject of both Contentions II and III are listed in interrogatory 180.

182. List each and every communication relating in any way to the matters or allegations set forth in Contention I, between any West Valley members and/or any West Valley member and

any agent of West Valley (excluding only its attorney), stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention I to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER:

183. List each and every communication relating in any way to the matters or allegations set forth in Contention II, between any West Valley members and/or any West Valley member and any agent of West Valley (excluding only its attorney), stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention II to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: The Petitioner objects to this contention on the ground that if is oppressive and burdensome and not likely to lead to the discovery of relevant or admissible evidence. West Valley members engage in dozens of conversations every week about the subject matter of this lawsuit, particularly the allegations set forth in Contention II.

184. List each and every communication relating in any way to the matters or allegations set forth in Contention III, between any West Valley members and/or any West Valley member and

any agent of West Valley (excluding only its attorney), stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention III to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: See answer to interrogatory 183.

185. List each and every communication relating in any way to the matters or allegations set forth in Contention I, between any West Valley members and/or any West Valley member and any agent of West Valley (excluding only its attorney), stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention I to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: See answer to interrogatory 182.

186. List each and every communication relating in any way to the matters or allegations referred to in Contention II, between any West Valley member or agent of West Valley, and any person not referred to in Interrogatories Nos. 180 or 183, stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention II to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: See answer to interrogatories 183 and 185.

187. List each and every communication relating in any way to the matters or allegations referred to in Contention III, between any West Valley member or agent of West Valley, and any person not referred to in Interrogatories Nos. 181 or 184, stating for each such communication:

(a) The date it occurred.

(b) Whether it was verbal or written.

(c) The name and last known address of the person initiating the communication.

(d) The name and last known address of the person receiving the communication.

(e) The substance of the conversation and the particular allegation(s) of Contention III to which it related.

(f) If written, the name and address of the present custodian of a copy of each such communication.

(g) If verbal:

(1) Whether by personal conversation or by telephone.

(2) The names of any persons present during the communications.

(3) Whether any notice or memos were made of the communication and, if so, by whom and the name and address of the present custodian of each such record.

ANSWER: See answer to interrogatories 183 and 185.

188. List the names, addresses, official titles (if any), and other identification of all witnesses, including expert witnesses, who, it is contemplated, will be called upon to testify in support of your contentions in this action, indicating the nature and substance of the testimony which is expected to be given and the relationship of each such witness if any to West Valley.

ANSWER: At this point in time, Petitioner expects to call Professors Davis, Mulchi, and Golay as expert witnesses but Petitioner is unable to indicate the nature and substance of the experts' testimony until discovery is reasonably complete. At that time, Petitioner will supplement this answer. All experts have been retained by Petitioner.

189. Do you or your attorneys, have in your possession, or know the existence of, any written or recorded statements from

any of the persons identified in your answer to Interrogatory No. 188, or from any other person or entity who has any knowledge or the facts and events related to the issues in this proceeding?

ANSWER: Petitioner objects to this question on the ground set forth in general objection 1. Petitioner has already produced each expert's report to Joint Applicants.

190. If your answer to the preceding interrogatory is in the affirmative, please state the following:

(a) The name of the person who made this statement or recording.

(b) The date the statement or recording was made.

(c) The name of the person who obtained the statement or recording.

(d) The name of the person or persons having custody or possession of the original and all copies of the statement or recording.

ANSWER: See answer to interrogatory 189.

191. Describe and identify by title, author, date of preparation, recipient and subject matter, each and every document and or exhibit which you intend to use or which you may use as evidence at the hearing in this proceeding. Include in your answer, the name of the person, firm or corporation presently in possession of the original and of any copy of each such document.

ANSWER: Petitioner is unable at this point in time to specify the documents it intends to use in the hearing.

192. Have you employed, or do you intend to employ or use, any technician or expert witness for the purposes of

supporting your allegations and contentions in this proceeding and/or for the purposes of testifying on behalf of West Valley at the hearing in this proceeding?

ANSWER: All the witnesses identified in interrogatory 188 are expert witnesses.

193. If the answer to the preceding interrogatory is in the affirmative, please state, for each such technician or expert, the following:

(a) His name or other means of identification, last known address and telephone number.

(b) His profession, job title or occupation and the field in which he is an expert.

(c) Whether you intend to call him as a witness during the hearing in this proceeding.

(d) A summary of his formal education in his field.

(e) The name and address of each school where he received any special education or training in his field and a description of the training.

(f) The name or description of each degree he has received, including the date each was received, and the name of the school from which he received such degree.

ANSWER: (1) Professor Mulchi: See Mulchi Report;

(2) (a) Professor Edward Davis, John Hopkins University, Applied Physics Laboratory, John Hopkins Road, Building 9, Room 130, Columbia, MD 20707, (301) 953-7100;

(b) See Davis Report;

(c) Not known at this time;

(d) B.A., Physics, Rice University, 1955. M.A., Physics, Rice University, 1956. Ph.D., Physics, Rice University, 1961; and

(e) Rice University, Houston, Texas.

(3) (a) Professor Michael Golay, 6 Oakland Street, Lexington, MA 02173, (617) 253-5824;

(b) See Golay Report;

(c) Not known at this time; and

(d) B. Mech. Eng., Georgia Institute of Technology, April 1964. Ph.D. (Nucl. Eng.), University of Florida, Gainesville, Florida, and Cornell University, Ithaca, New York, June 1969.

194. Do any of the persons listed in your answer to Interrogatory No. 193 have any special expertise as a result of any experience or employment?

ANSWER: Petitioner objects to this interrogatory on the ground that it is so vague that it cannot be answered. The complete background of each expert is summarized in these interrogatory answers and in their reports.

195. If your answer to the preceding interrogatory is in the affirmative, please state the following as to each such person:

(a) The training, employment or experience he has received.

(b) The name and address of the school or place where he received his training, experience or was employed.

(c) The date he received his training, experience or when employed.

(d) The name of each professional and or trade association of which he is a member.

ANSWER: See answer to interrogatory 194.

196. Have any of the persons listed in your answer to Interrogatory No. 193 written or co-authored any books, papers, treatises or articles on the subjects in their field of expertise?

ANSWER: Yes.

197. If your answer to the preceding interrogatory is in the affirmative, for each person and each such book, paper, treatise or article, please state:

(a) The title and subject matter.

(b) The name and address of the publisher.

(c) The date of publication.

ANSWER: See Mulchi, Davis and Golay Reports; Petitioner will amend this Answer to include additional publications by these experts.

198. For each person listed in your answer to Interrogatory No. 193, please state whether each such person has practiced, worked or been involved in his particular field of expertise during the past ten years.

ANSWER: Yes. Each such person has practiced in his field during the past ten years.

199. For each person identified in response to the preceding interrogatory, please state:

(a) Whether he was self-employed, employed by someone else, or associated with any other persons in any manner.

(b) Each address where he has practiced or been employed.

(c) The dates he was with such employer.

(d) The type of duties he performed with each employer.

ANSWER: Professor Mulchi: See Mulchi Report;

Professor Davis: (a) Employed by the Johns Hopkins University Applied Physics Laboratory, acting as a private consultant to the West Valley Agricultural Protection Council.

(b) 1. U.S. Army, Nuclear Power Office, Ft. Belvoir, Virginia.

2. Texaco Research Laboratories, Houston, Texas.

3. Oklahoma City University, Oklahoma City, Oklahoma.

4. Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland.

(c) 1. 1957-1958

2. 1961-1963

3. 1963-1964

4. 1964-present

(d) 1. Project Officer on various R&D programs.

2. Research Physicist: experimental and theoretical work in exploring for oil.

3. Teach physics courses.

4. Math modeling and scientific analysis of a large variety of problems. Teach applied probability. Supervisor of environmental dispersion modeling.

Professor Golay: (a) Associate Professor, Massachusetts Institute of Technology, 1975-Present;

(b) 1. Teaching Assistant, Department of Nuclear Science - Cornell University, 9/65-6/67.

2. Research Associate, Rensselaer Polytechnic Institute, 1/69-9/71.

3. Assistant Professor, Massachusetts Institute of Technology, 1971-1975.

4. Assistant Professor, Massachusetts Institute of Technology, Department of Nuclear Engineering, 9/71-6/75.

200. As to each person listed in your answer to the preceding interrogatory who has not practiced or worked in his field of expertise during the past ten years, list and identify each person's employment or vocation during that period of time.

ANSWER: No answer necessary.

201. What experience, other than that stated above has each person listed in your answer to Interrogatory No. 193 had to qualify him as an expert or technician in his field or which may give rise to his capacity as a witness at the hearing in this proceeding?

ANSWER: No answer necessary.

202. Has any expert or technician conducted any tests, examinations, or inspections in connection with this proceeding? Yes. If your answer to this interrogatory is in the affirmative, please identify each such person.

ANSWER: Professors Golay, Davis, and Mulchi.

203. If your answer to the preceding interrogatory is in the affirmative, did such expert or technician make a record or report of his findings?

ANSWER: Yes.

204. If your answer to the preceding interrogatory is in the affirmative, please state:

(a) The date each such report was submitted.

(b) The name or other identification, address and telephone number of the person to whom each such report was submitted.

(c) The name, last known address and telephone number of each person who has present custody of each such report.

(d) The subject matter and finding of each such report.

ANSWER: (a) Each such report is attached to Petitioner's Motion to Intervene.

(b) Petitioner.

(c) No answer is necessary.

(d) See each report.

205. Is any expert or technician to be compensated for his work and efforts in connection with this action?

ANSWER: Yes.

206. If your answer to the preceding interrogatory is in the affirmative, state as to each such expert or technician the amount he is to be paid and on what basis his compensation is to be determined.

ANSWER: Each expert is to be compensated on an hourly basis at a rate of approximately $40 per hour.

207. For each expert you may call to testify at the hearing on this proceeding, specify and state with particularity by expert, the subject matter on which he is expected to testify.

ANSWER: Petitioner is unable to answer this question at this point in time.

208. State, by expert, the substance of the facts and opinions to which each such expert is expected to testify.

ANSWER: See answer to interrogatory 207.

209. Set forth, by expert, a summary of the grounds for each opinion which may be given by each such expert at the hearing on this proceeding.

ANSWER: See answer to interrogatory 207.

210. List specifically and in detail each and every exhibit you propose to utilize at the hearing in this proceeding or which you may utilize at the hearing on this proceeding.

ANSWER: See answer to interrogatory 207.

211. With reference to the exhibits listed in answer to the preceding interrogatory, state the source of the exhibit, the nature of the exhibit (i.e., whether said exhibit is documentary, a picture or other); who prepared each exhibit; and the date upon which each exhibit was prepared.

ANSWER: See answer to interrogatory 210.

Dated: April 18, 1983
Washington, D.C.

By _____

Kenneth Berlin
Attorney for Petitioner
2550 M Street, N.W.
Washington, D.C. 20037
202/429-8501

Washington, D.C.):

I, KENNETH BERLIN, being duly sworn, depose and say that I am Counsel for Petitioner in the referenced action; that I have read the foregoing answers to Interrogatories; that the information contained therein was gathered under my supervision; that said answers are based on information provided by Petitioner's experts; and that they are true to the best of my knowledge and to the best of the knowledge of the persons who helped in their compilation.

KENNETH BERLIN

SUBSCRIBED AND SWORN to before me this 18th day of April, 1983.

Lynda Wasko

NOTARY PUBLIC

4-18-83

My commission expires:

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ARIZONA PUBLIC SERVICE COMPANY	)	Docket Nos. STN 50-529
	)	STN 50-530
(Palo Verde Nuclear Generating Station, Units 2 and 3	)	
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the attached Petitioner West Valley Agricultural Protection Council, Inc.'s Response to Joint Applicants' First Set of Interrogatories, dated April 18, 1983, have been served upon the following listed persons by deposit in the United States mail, properly addressed and with postage prepaid.

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Administrative Judge
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Comm.
Washington, D.C. 20555

Dr. Richard F. Cole
Administrative Judge
Atomic Safety & Licensing Board
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Dated: April 19, 1983

Kenneth Berlin

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West Valley Agricultural
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