UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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| In the Matter of | ) | |
| | ) | |
| UNION ELECTRIC COMPANY | ) | |
| | ) | Docket No. STN 50-483-OL |
| (Callaway Plant, Unit 1) | ) | |

JOINT INTERVENORS' FIRST SET
OF INTERROGATORIES TO UNION ELECTRIC

Joint Intervenors Coalition for the Environment St. Louis Region, Missourians for Safe Energy and Crawdad Alliance request that the attached interrogatories be answered fully, in writing and under oath by employees or agents of Union Electric Company who have personal knowledge thereof or are the closest to having personal knowledge thereof.

Unless otherwise stated all of the attached interrogatories relate to Union Electric Company's Callaway Plant Unit One. Nuclear Regulatory Commission is sometimes abbreviated "NRC". Union Electric Company is sometimes abbreviated "UE".

"Identify" or "Identification", when used with reference to a document or documents requires, in addition to whatever information is specifically requested, identification of the NRC document number (if applicable), a statement of the date of the document, the general nature and description of the subject matter and contents of the document, and the name(s) of the person(s) who prepared the document.

"Identify" or "Identification", when used with respect to a person or persons requires, in addition to whatever information is specifically requested, a statement of the full name, current or last known address and telephone number, employment and position as of the time period(s) relevant to the subject interrogatory, and

current employment and position.

Respectfully submitted,

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THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, I. SUBSTANDARD REINFORCED CONCRETE CONSTRUCTION, A. EMBEDDED PLATES.

1. Were one or more Stop Work Orders issued on June 9, 1977 suspending the use of safety related embedments in concrete pours pending an inspection of all the safety related embedments onsite? If the answer is in the affirmative, please state:

(a) The exact terms of each Stop Work Order;

(b) The reasons why each Stop Work Order was issued.

2. During the process of evaluating after June 9, 1977 whether the embedded plates presented a safety-significant problem, did Union Electric determine that some exceptions to structural welding code standards would be permissible? If so, please state fully:

(a) What exception(s) would be permissible;

(b) For each exception in (a), the reason(s) for the determination that the exception was permissible;

(c) The identity and location of any documents in your possession relating to the determination that exceptions were permissible.

3. Regarding those embedded plates fabricated on or before June 9, 1977 for use at the Callaway Plant, which have stud anchors attached by automatically-timed stud welding equipment (mechanically-welded embeds), provide the following information, separately for each fabricator:

(a) The name and address;

(b) The date(s) the embeds were shipped and the number in each shipment;

(c) Identify all documents which reflect the information provided in answer to this interrogatory.

4. Regarding the mechanically-welded embeds fabricated by the Cives Steel Company and received at the Callaway Plant site on or before June 9, 1977, provide the following information:

(a) State the number of mechanically-welded embeds in each shipment to the Callaway plant site, and the date of each shipment;

(b) State the number installed on or before June 9, 1977, in each Seismic Class I structure and system;

(c) Describe the function(s) of the embeds in each such structure and system;

(d) State separately with respect to each of the functions in each structure and system identified in response to paragraph (c) of this interrogatory, what would result if an embed were to fail after construction of the plant is completed.

5. Regarding those embedded plates fabricated on or before June 9, 1977, for use at the Callaway Plant, which have rod anchors or studs attached manually (manually-welded embeds), provide the following information for each fabricator:

(a) The name and address;

(b) A description of the types of embeds fabricated, including whether the studs are threaded; and the number of each type;

(c) the date(s) the embeds were shipped; and the number in each shipment;

(d) Identify all documents which reflect the information provided in the answer to this interrogatory.

6. Regarding the manually-welded embeds fabricated by the Cives Steel Company and received at the Callaway plant site on or before June 9, 1977, provide the following information:

(a) State whether all studs on the manually-welded embeds were threaded; if the answer is negative:

(i) Describe those plates with studs not threaded;

(ii) State the number of each (threaded and not threaded) at the Callaway plant site;

(b) State the number of manually-welded embeds in each shipment to the Callaway plant site, and the date of each shipment;

(c) State the number installed on or before June 9, 1977, in each Seismic Class I structure and system;

(d) Describe the function(s) of the embeds in each such structure and system; state in each case whether the embed studs were threaded or not;

(e) State separately with respect to each of the functions in each structure and system identified in response to paragraph (d) of this interrogatory, what would result if an embed were to fail after construction of the plant is completed.

7. With respect to the period on and after June 9, 1977, please describe fully any inspection or test done by Union Electric or anyone else of the following embeds fabricated by Cives:

(a) Those installed in the Callaway Plant prior to the issuance of the Stop Work Orders on June 9, 1977;

(b) Those onsite at the Callaway Plant but not yet installed when the Stop Work Orders were issued on June 9, 1977;

(c) Any embedments that had been fabricated for the Callaway Plant, but were not yet received at the plant site by the time the Stop Work Orders were issued.

8. With respect to the preceding interrogatory and separately with respect to each subpart thereof, please describe fully:

(a) The results of any such inspections or tests;

(b) If no inspection was done, the reasons why no inspection was done;

(c) Any repairs, replacements, or other remedial or precautionary measures that were taken with respect to embeds, including an enumeration of the following:

(i) the number of manually welded embeds repaired on site;

(ii) the number of manually welded embeds returned to the fabricator for repair or replacement;

(iii) the number of mechanically welded embeds repaired on site;

(iv) the number of mechanically welded embeds returned to the fabricator for repair or replacement

(d) The identity and location of any documents relating to any of the measures specified in answer to this interrogatory.

9. State whether any embeds were cut out of wooden forms for inspection after June 9, 1977. If answer is in the affirmative:

(a) State how many embeds were cut out;

(b) Identify all documents which pertain to such inspections.

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, I. SUBSTANDARD REINFORCED CONCRETE, B. CRACKS IN CONCRETE.

10. Regarding Nuclear Regulatory Commission (NRC) Report No. 50-483/78-01, what was the width of the crack mentioned on p. 20, entry 13a, in the "plant" north wall of the Control Building?

11. Regarding Nuclear Regulatory Commission (NRC) Report No. 50-483/78-01, state the number of the "other cracks" referred to on page 20 of this report.

12. State the location, length, width and shape of each crack counted in the answer to the preceding interrogatory.

13. State the reason or reasons why the cracks referred to on page 20 of NRC Report No. 50-480/78-01 are described as a "recurring problem," that is, why are such cracks recurrent?

14. What, in the opinion of Union Electric, is the cause of

(a) the twelve foot long crack described on page 20, entry 13a of NRC Report No. 50-483/78-01;

(b) the "other cracks" described on page 20, entry 13a of NRC Report No. 50-483/78-01. Each crack should be separately addressed if there are different causes for different cracks.

15. What reason or reasons does Union Electric have to believe that concrete such as that described on page 20, entry 13a of NRC Report No. 50-483/78-01 will not develop additional cracks?

16. What reason(s) does Union Electric have to believe that the cracks described on page 20, entry 13a of the NRC Report No. 50-483/78-01 will not increase in size.

17. Have any employees, agents or affiliates (including contractors and subcontractors) of Union Electric measured any of the cracks described on page 20, entry 13a of NRC Report No. 50-483/78-01 subsequent to the filing of Report No. 50-483/78-01? If so, state the following:

(a) identify all documents in the possession or control of Union Electric in which there is reference to the subsequently measured cracks;

(b) identify personnel who made the subsequent measurements;

(c) summarize Union Electric's assessment of the subsequent measurements.

18. Are the cracks described on page 20, entry 13a of NRC Report No. 50-483/78-01 still accessible to visual or instrument inspection?

19. Regarding Nuclear Regulatory Commission (NRC) Report No. 50-483/78-03, what is meant on page 3 by the statement that NCR 2-2081-C-A was "superceded" by NCR 2-2173-C-A?

20. State Union Electric's assessment of the safety significance of the twelve foot crack in the Control Building wall, referred to on page 3 of NRC Report No. 50-483/78-03 and on page 20 of the NRC Report No. 50-483/78-01.

21. Regarding Nuclear Regulatory Commission (NRC) Report No. 50-483/77-06, and the circumferential concrete crack in the Reactor Containment Building referred to on pp. 20-21, state the following:

(a) the length of the crack;

(b) the depth of the crack;

(c) the width of the crack;

(d) the proximity of the crack to reinforcing steel and other embedded materials.

22. Identify any documents in the control or possession of Union Electric which make reference to the circumferential crack in the reactor cavity moat area, approximately 42 inches from cavity liner and extending through 270 degrees arc, referred to on pp. 20-21 of NRC Report No. 50-483/77-06.

23. Summarize separately the content of each document listed in answer to the preceding interrogatory.

24. This interrogatory applies to the following sentence in NRC Report No. 50-483/77-06, pp. 20-21: "It was reported by licensee by telephone on May 10, 1977. . . <u>that an investigation had been initiated</u> to determine the safety related significance of the crack [in the reactor cavity moat area]" (emphasis added):

(a) State the names and titles of all persons involved in the investigation here referred to;

(b) Summarize the result of the investigation here referred to.

25. Describe in detail the repairs made to the circumferential crack in the reactor cavity moat area, as further described in NRC Report No. 50-483/77-06, pp. 20-21.

26. Identify all documents which relate to acceptance of the repair of the circumferential crack in the reactor cavity moat area by quality control personnel.

27. State the cause of the circumferential crack in the reactor cavity moat area.

28. Identify all documents which establish a reporting standard for cracks in permanent concrete at the Callaway Plant.

29. Summarize the reporting standards set forth in the documents listed in the answer to the preceding interrogatory.

30. How many recurrences of cracks, as anticipated by NRC Report No. 50-483/78-01, page 20, have occurred since the date of that report?

31. Provide nonconformance report (NCR) numbers for any cracks counted in the answer to the preceding interrogatory.

(a) Describe any procedures, modifications of materials, modifications in design, implemented subsequent to NRC Report No. 50-483/78-01, which are intended to detect, lessen or eliminate the problem of concrete cracks at the Callaway Plant.

(b) State the dates on which items listed in the answer to paragraph (a) of this interrogatory were effective.

30. How many recurrences of cracks, as anticipated by NRC Report No. 50-483/78-01, page 20, have occurred since the date of that report?

31. Provide nonconformance report (NCR) numbers for any cracks counted in the answer to the preceding interrogatory.

(a) Describe any procedures, modifications of materials, modifications in design, implemented subsequent to NRC Report No. 50-483/78-01, which are intended to detect, lessen or eliminate the problem of concrete cracks at the Callaway Plant.

(b) State the dates on which items listed in the answer to paragraph (a) of this interrogatory were effective.

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, I. SUBSTANDARD REINFORCED CONCRETE CONSTRUCTION, C. HONEYCOMBING, REACTOR BASE MAT.

32. State separately for each reportable void repaired in the tendon access gallery ceiling its depth, width, length, location and shape:

(a) at the time of initial discovery;

(b) after the chipping operation.

33. Regarding NRC Report No. 50-483/78-02, p. 4, and the statement that technical specification C-103(Q) was revised to differentiate major from minor defects which require approval prior to repair:

(a) summarize the differentiation between major and minor defects, as established by the revision of C-103(Q);

(b) state whether major and minor concrete defects were undifferentiated for purposes of repair approval prior to the January 23, 1978 revision of C-103(Q).

34. State whether, in Union Electric's opinion, the honeycombing in the base mat resulted, in whole or in part, from the congestion of trumplate wall dowels, main steel, rebar supports, or form ties, or any or all of these singly or in combination, so that adequate vibration of the concrete mat was hampered.

35. Are there any areas of the base mat which are less marked than other areas by congestion as described in the preceding interrogatory, and, if the answer is affirmative, describe the differences in congestion by specific area.

36. State Union Electric's conclusion as to the cause of honeycombing in the tendon access gallery concrete, attributing

relative weight and probability to each cause if more than one cause is named. Also state:

(a) What actions were taken by Union Electric subsequent to NCR 2-0856-C-A to prevent the recurrence of voids in concrete such as those in the tendon access gallery, as described in NCR 2-0856-C-A;

(b) Whether Union Electric believes the preventive actions described in the answer to paragraph (a) of this interrogatory are adequate;

(c) The basis for Union Electric's conclusion as to the adequacy o preventive actions named in the answer to paragraph (a) of this interrogatory.

37. How often is vibrator frequency checked during concrete placements at the Callaway Plant?

38. How often is vibrator frequency checked during concrete placements when vibrators are used continuously in concrete placement extending beyond one twelve-hour shift?

39. Have technical specifications, quality control procedures or work control procedures relating to the checking of vibrator frequency been changed or modified during construction at Callaway Unit 1, and, if the answer is affirmative, state:

(a) the nature of the change or modification;

(b) the reason for the change or modification;

(c) the effective date of the change or modification;

(d) identify the document(s) effecting the change or modification.

40. Is Union Electric aware of any cold joining (improper bonding) in the concrete of the reactor base mat due to the drying (setting up) of concrete in certain areas before additional concrete was poured on top? If so, provide the following information:

(a) State how it was discovered;

(b) State the number of areas and describe the location of each such area.

(c) Does such a condition affect the strength of the concrete and, if so, describe how the strength is affected.

(d) Identify the document(s) which refer, in whole or part, to such conditions.

41. The following interrogatory applies to the following sentence in NRC Report No. 50-4831 77-07, p. 4: "WP-109. . . does not identify either 'vibration', 'consolidation', or 'densification,' clarification of the procedural requirements is required."

(a) State the implications for safety and quality assurance in the lack of clarification of procedural requirements as herein referred to;

(b) State whether the clarification herein referred to has been provided;

(c) Summarize separately the nature of each clarification which has been provided for vibration, consolidation, and/or densification, respectively;

(d) Identify the documents containing the clarification referred to in the answer to the preceding paragraph of this interrogatory, and the effective date of each clarification.

42. Did repairs of the honeycombing in the tendon access gallery conform to the repair procedure suggested by Daniel International, as described in NCR 2-0856-C-A, and if the answer is negative:

(a) State the nature of deviations from the suggested procedure;

(b) State the reason(s) for deviations from the suggested procedure;

(c) Identify all documents relating to repairs and summarize their contents.

43. Regarding NRC Report No. 50-483/77-06, p. 22, state whether repair of the honeycombing therein referred to was hampered by limited mobility of work crews due to the trumplate wall dowels, the main steel, rebar supports and form ties.

44. If the answer to the preceding interrogatory is in the negative, describe the repair procedures utilized and the reason(s) why work crew and equipment mobility was not an impediment in these repairs.

45. Regarding the reference to a "chipping operation" in NRC Report No. 59-483/77-06, p. 22, describe the chipping operation in the tendon access gallery, the chipping tool(s) used and the reason why "minor rebar damage" resulted from the operation.

46. Regarding the statement in NRC Report No. 50-483/77-07, p. 13, that "dry-pack grout was not being tested as required. . . because. . . Specification C-191. . . failed to include such a test," state whether the untested dry-pack grout herein referred to, or the repairs involving this grout, have been tested subsequent to NRC Report No. 50-483/77-07.

47. If the answer to the preceding interrogatory is in the affirmative, identify all documents which refer to test of the dry-pack grout, and summarize separately the contents of each such document. If the answer is in the negative, state the reason why no tests have been performed.

48. Does Union Electric believe that after repairs of voids in the tendon access gallery, the condition of the base slab has no adverse safety implications?

49. State the bases for Union Electric's conclusion as to the preceding interrogatory.

50. Explain if the word "trumplate" as used in NRC Report 50-483/77-06, p. 21 is synonymous with "bearing plate" as used in Figure 3.8-15 FSAR-SNUPPS. If not, define "trumplate."

51. State the tensile force in the vertical tendons of the Reactor Building:

(a) Under normal operating conditions;

(b) Under the 60 psig "design accident pressure load" condition.

52. State the compression stress in the concrete above the bearing trumplates in the ceiling of the tendon access gallery:

(a) Under normal operating conditions;

(b) Under the 60 psig "design accident pressure load" condition.

53. Regarding the report on the soniscopic study of the base slab by Wiss, Janey, Estner and Associates, Inc., dated August 1, 1977, state the following:

(a) The identity of the NRC inspector, referred to on page 13 of NRC Report #50-843/77-07, who inspected this report.

(b) The manufacturer, model number and specifications of the soniscope instrument;

(c) The minimum volume of a detectable air void, and the maximum depth in concrete at which a void is detectable;

(d) The qualifications and training of the personnel operating the device;

(e) Whether the transducer frequency utilized was the optimal for detecting the size voids anticipated. If the answer is in the affirmative, explain the basis for the answer.

(f) Whether the technique is capable of detecting an air void directly underneath a shallower void.

(g) Whether the soniscope instrument was used in the tendon access gallery or on the mat floor above the gallery.

(h) At what other specific locations of the base mat soniscope testing was performed.

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, I. SUBSTANDARD REINFORCED CONCRETE CONSTRUCTION, C. HONEYCOMBING, 2. REACTOR BUILDING DOME.

54. State separately for each void or imperfection which has occurred in the Reactor Building dome, including but not necessarily limited to the seven areas of imperfection referred to in NRC Report No. 50-483/80-30, pp. 3-4, the depth, width, length, location and shape of each such imperfection.

55. State whether, in the opinion of Union Electric, the imperfections and voids in the concrete of the dome, described in NRC Report 50-483/80-30, pp. 3-4, are attributable to the same cause(s) as the voids in the base mat.

56. State the bases for the conclusion in the preceding interrogatory.

57. State Union Electric's conclusion as to the cause(s) of honeycombing in the Reactor Building dome described in NRC Report No. 50-483/80-30, pp. 3-4, attibuting relative weight and probability to each cause if more than one cause is named.

58. What is the basis in NCR 2SN-2790-C for specifying the imperfections in the concrete of the dome unreportable?

59. Identify the design specifications governing the thickness of the exterior walls of Callaway Unit 1 Reactor Building dome.

60. How thick are the exterior walls of the dome according to the design specifications listed in the answer to the preceding interrogatory.

61. In the opinion of Union Electric, how extensive can honeycombing be before the integrity of the containment building dome of Callaway Unit 1 is compromised?

62. This interrogatory pertains to the following sentence in NRC Report No. 50-483/80-30, p. 4: "[L]icensee personnel attributed the occurrence of the imperfections to the complex nature of those portions of the dome slab where the imperfections had occurred". (emphasis added). State separately for each portion of the dome where an imperfection occurred the nature of the "complexity" here referred to.

63. Why have actions taken by Union Electric subsequent to the discovery of voids in the tendon access gallery, and designed to prevent recurrence of voids in concrete, proved inadequate to prevent voids in the dome?

64. State any and all reasons Union Electric has to believe that imperfections in the concrete of the dome are limited to areas identified in NRC Report No. 50-483/80-30, pp. 3-4, and identify all documents and tests which form a basis for this conclusion.

65. By what testing methods did Union Electric determine the extent of imperfections in the concrete of the dome?

66. State whether ice was used in lieu of water in the Reactor Building dome concrete mix. If so, provide the following additional information:

(a) Explain why ice was used;

(b) Describe how ice was used;

(c) State the duration of the pour;

(d) State during which hours ice was used.

(e) State whether the use of ice in lieu of water in concrete mix violates any procedures, regulations, or requirements applicable to construction at Callaway Unit 1?

(f) Identify all procedures, regulations, or requirements which form a basis for the answer to paragraph(e) of this interrogatory, and summarize separately the content of each item listed.

67. This interrogatory applies to the following sentence in NRC Report No. 50-483/80-30, p. 5: "The licensee has committed to and undertaken actions to address the reactor dome concrete imperfection issue." (emphasis added)

(a) State separately the nature of each action referred to;

(b) State the date of each action undertaken or anticipated;

(c) State the extent to which each action listed in the answer to paragraph (a) of this interrogatory has resolved the dome concrete imperfection issue.

68. Regarding NRC Report No. 50-483/80-27, p. 21, state the cause of "flaking" on a concrete repair therein referred to.

69. State whether the matter of flaking concrete, referred to in the preceding interrogatory, has been closed by subsequent inspection, and if the answer is affirmative, identify and state the number of the closing Nuclear Regulatory Commission Report.

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, I. SUBSTANDARD REINFORCED CONCRETE CONSTRUCTION, D. CONCRETE COVER.

70. Identify by number, date and relevant pages all documents which pertain, in whole or in part, to nonconformance with concrete cover requirements through the fifth lift of the Reactor Building and as to each report listed, further state:

(a) the nature of the nonconformance;

(b) the location of the nonconformance;

(c) the date on which conformance was achieved or explain other disposition of the nonconformance;

(d) identify documents which verify conformance.

71. State the date on which Union Electric first communicated with the NRC Staff regarding the NRC interpretation of concrete cover requirements with regard to the Reactor Building wall at Callaway Unit 1, and further describe in detail the communication.

72. This interrogatory pertains to the following sentence in NRC Report 50-483/77-11, p. 4: "[At 340 degrees azimuth of the third lift of the Reactor Building] concrete cover was less than that required by NRC interpretation of the <u>concrete cover requirements</u>. but within the concrete cover requirements as interpreted by the licensee and contractors." (emphasis added):

(a) Describe the relationship and location of the reinforcing steel and concrete cover in dispute;

(b) Identify all documents setting forth the "concrete cover requirements" referred to in the above sentence, and summarize separately the contents of each document;

(c) Identify all documents setting forth the NRC's interpretation of the concrete cover requirements referred to in the above sentence, and summarize separately the contents of each document;

(d) Identify all documents setting forth the licensee's and contractors' interpretation of the above-mentioned concrete cover requirements, and summarize separately the contents of each document.

73. Regarding the conflict between the NRC's interpretation of concrete cover requirements at 340 degrees azimuth and the licensee/contractors' interpretation, as indicated in NRC Report No. 50-483/77-11, p. 4, state which interpretation prevailed at 340 degrees azimuth.

74. This interrogatory applies to the following sentence in NRC Report 50-483/77-11, p. 4: "This matter [of concrete cover requirements] will be resolved by the sixth lift of the reactor containment wall." State:

(a) The estimated additional construction costs which would have been incurred in adhering to the NRC interpretation of maximum and minimum concrete cover requirements starting with the third lift, had such adherence been required as of the date of NRC Report No. 50-483/77-11;

(b) The repair process which would have been involved in adhering to the NRC interpretation of concrete cover requirements starting with the third lift, had such adherence been required as of the date of NRC Report No. 50-483/77-11;

(c) The estimated additional construction costs which would have been incurred in changing the first and second lifts to conform to the NRC interpretation.

75. This interrogatory applies to the following sentence in NRC Report 50-483/77-11, p. 10: "Bechtel Power Corporation personnel repeated that their interpretation of the cover requirements was that the two-inch cover requirement can be reduced to an absolute minimum of an inch and one third per a provision of the specifications which allows reduction of the specified cover by one-third". (emphasis added):

(a) Identify the provision which allows reduction of the specified cover by one-third, and summarize its contents;

(b) State whether Union Electric believes the one-third reduction can be utilized without adverse safety implications, and the basis for Union Electric's belief.

76. Provide identifying information regarding "a draft Code case" involving the matter of concrete cover, as referred to on page 10 of NRC Report No. 50-483/77-11; and state whether the Code change under consideration was implemented.

77. This interrogatory applies to the following sentence in NRC Report No. 50-483/77-11, p. 11: "[A] two-inch minimum concrete cover will be required for the sixth and subsequent lifts, utilizing the fifth lift as a transition area." Explain what is meant by utilizing the fifth lift as a transition area.

78. NRC Report No. 50-483/77-11, at p. 11, indicates that "Union Electric is evaluating" the requirement that the company comply with concrete cover requirements at the sixth and subsequent lifts:

(a) State the outcome of Union Electric's evaluation;

(b) Identify documents which pertain to Union Electric's evaluation, and summarize separately the contents of each document.

79. Identify, and provide report numbers and dates, for all nonconformance reports pertaining, in whole or in part, to concrete placement in the third lift area, including but not necessarily limited to the 23 reports mentioned in NRC Report No. 50-483/77-10, at p. 19, and summarize separately the contents of each report.

80. Insofar as NRC Report No. 50-483/77-10 mentions 23 nonconformance reports on the third lift concrete pour and describes this as "an unusually large number," explain any and all factors which could be considered to have contributed to such a large number of reports.

81. Identify the ten nonconformance reports pertaining to the third lift of the Reactor Building wall which were still outstanding the evening of November 21, 1977.

82. This interrogatory applies to information in item 3. a. (8), page 8-9 of NRC Report No. 50-483/78-01, where "several areas" of concrete cover are mentioned as "less than two inches as specified on placement drawings."

(a) Describe the location and size of each of the "several areas" and describe the location of rebar within each area;

(b) Summarize the discussion at the January 23, 1978 meeting between Union Electric and the NRC in Bethesda, Maryland, as to the areas of nonconforming concrete cover described in item 3.a.(8);

(c) State the decision reached at the January 23, 1978 meeting as to whether the two inch cover required by Bechtel Topical Report BC-TOP-5, Section CC-3533.1 of Appendix C could be reduced by one-third pursuant to specification No. C-112.

83. This interrogatory applies to information in item 3.a.(7), page 8, of NRC Report No. 50-483/78-01, involving "several areas" of "concrete cover. . . of 12 to 13 inches which appeared to be more than permitted."

(a) Describe the location and size of the "several areas" herein referred to;

(b) Summarize the discussion in the January 23, 1978 meeting between Union Electric and the NRC in Bethesda, Maryland, as to the areas of nonconformance described in item 3.a.(7);

(c) State the decision which was reached in the January 23, 1978 meeting as to the areas in which concrete cover exceeded the maximum allowed by BC-TOP-5, Section CC-3534 of Appendix C.

84. Regarding variations beneath the sixth lift of the Reactor Building from the two-inch concrete cover requirement established by Section CC-3533.1 of Appendix C to BC-TOP-5 for #6 through #18 reinforcing steel, state the following:

(a) The number of variations from Section CC-3533.1 of Appendix C to BC-TOP-5 for #6 through #18 reinforcing steel, beneath the sixth lift;

(b) The location of each such variation;

(c) The safety implications of such variations when considered cumulatively.

85. This interrogatory applies to a 1 1/2 inch placement tolerance described in NRC Report No. 50-483/78-01, item 3.b.(14), p. 11, and to NCR 2-2055-C-A which was "dispositioned 'use as is' by Bechtel prior to concrete placement":

(a) State the basis for Bechtel's "use as is" disposition in NCR 2-2055-C-A;

(b) State Union Electric's conclusion as to the safety implications of the "use as is" disposition of NCR 2-2055-C-A, and the basis for this conclusion.

86. State whether Union Electric, Bechtel Power Corporation, Daniel International Corporation, or SNUPPS, alone or in concert, have objected to the requirement at the Callaway Plant of a minimum concrete cover of two inches over reinforcing steel on the outer face of the reactor containment with no placement tolerance on that minimum dimension at or above the sixth lift, and if the answer is affirmative, further state:

(a) The bases for objection to the requirement;

(b) The details of any alternative requirement proposed by any of the above parties;

(c) The reasons set forth by the proposing party for adoption of any alternative requirement named in answer to the preceding paragraph of this interrogatory.

87. State whether Union Electric, Bechtel Power Corporation, Daniel International Corporation, or SNUPPS, alone or in concert, have objected to the requirement at the Callaway Plant of a maximum

concrete cover on face reinforcing steel of ten inches at or above the sixth lift, and if the answer is affirmative, further state:

(a) The bases for objection to the requirement;

(b) The details of any alternative requirement proposed by any of the above parties;

(c) The reasons set forth by the proposing party for adoption of any alternative requirement named in answer to the preceding paragraph of this interrogatory.

88. State to what extent Union Electric believes that a reduction in the two-inch minimum concrete cover on reinforcing steel in the lower five lifts of the Callaway Reactor Building exterior wall may have reduced or compromised the following properties of the structural system:

(a) Protection against corrosion of the steel if exposed to weather;

(b) Protection against excessive heat;

(c) Assurance of adequate bond for rebar development.

89. State to what extent Union Electric believes that exceeding the ten-inch maximum concrete cover on reinforcing steel below the sixth lift of the Reactor Building may have reduced or compromised the structural system's ability to control cracking.

90. State whether Union Electric made any changes in its minimum and maximum concrete cover requirements or procedures for reinforcing steel in outside faces of buildings other than the Reactor Building following the NRC meeting of January 23, 1978. If the answer is affirmative, cite specific changes and identify relevant documents.

91. For the 23 NCRs regarding the third lift referred to in NRC Report No. 50-483/77-10, page 19, state on what day and what hour each was resolved or closed out.

92. State separately for each of the first six lifts of the Reactor Building exterior wall how many days were spent installing the reinforcing steel.

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION ONE, II. SUBSTANDARD PIPING.

93. With respect to NRC Report No. 50-483/80-10 and the allegations, investigations, and inspections upon which it is based, provide the following information:

(a) Who was the vendor of the spool piece which was the subject of NRC Report No. 50-483/80-10?

(b) Who manufactured and supplied the pipe to the vendor?

(c) When was the pipe manufactured?

94. Are fusion welded tubular products, other than SA 312, intended for use in safety-related systems at Callaway? (i.e., Pipe made in accordance with SA 249, SA 333, SA 334 and fittings made in accordance with SA 403.)

95. Were defective welds found in preassembled piping formations manufactured by Gulf & Western (G&W), fabricated, delivered, and in some cases installed at Callaway Unit One as indicated in SNUPPS letter SLNRC 79-20 dated Nov. 29, 1979 and the report referenced therein? If affirmative, state the following:

(a) Who made the visual examination of the preassembly Formation A-9-111 in March, 1979 at the Wolf Creek job site?

(b) Was this a required examination?

(c) How many G&W preassembled piping formations were delivered to the Callaway Plant prior to November 2, 1979?

(d) State how many such formations were installed at the Callaway Plant prior to November 2, 1979, describe individually each formation installed and state where in the plant (including identification of systems and service) each formation was installed.

(e) State whether any of the subject formations were inspected upon receipt at the Callaway Plant site. If so, state the number inspected, method(s) of inspection and by whom the inspection(s) were made;

(f) How many of the subject formations delivered to the Callaway Plant site were found to have defective welds?

(g) How many of the subject formations delivered to the Callaway Plant site were reworked?

96. With regard to SNUPPS FSAR, Section 6.3.2.1, page 6.3-2, the statement, ". . . a minimum of three accumulators. . .ensure adequate core cooling in the event of a design basis LOCA as to provide boration in the event of a steam or feedwater break accident," provide the following information:

(a) Does the SNUPPS design call for four accumulators?

(b) Should one of the four accumulators become inoperable, are the remaining three sufficient? If not, please explain the quoted statement.

97. What is the sequence of use of the four accumulators during an event for which they would be used?

98. If the accumulators work in sequence, in the event of malfunction of one accumulator what is the delay time until a second accumulator would be brought into use?

99. What inspection procedure will be used to insure that the welds and pipes in the accumulator system do not weaken over time?

100. After discharge of accumulators during a design basis LOCA or a steam or feedwater break accident, when will the accumulators be refilled?

101. What pressure is normally expected in the section of pipe coming from the accumulator to the Reactor Cooling System cold leg loop between the motorized control valves and the check valve when the plant is operating?

THE FOLLOWING INTERROGATORIES RELATE TO CONTENTION TWO.

102. If hafnium is used in the control rods instead of silver, indium and cadmium, what changes in the fission, activation, and corrosion products might be expected?

103. At what Westinghouse reactors has there been experience with hafnium control rods?

104. Has Union Electric or has anyone in its behalf made any calculations of releases of radioactive materials in gaseous and liquid effluents other than calculations based on the PWR-GALE Code-NUREG-0017 and/or Regulatory Guide 1.21 and/or Regulatory Guide 1.112? If so, identify all reports of such calculations by title and date, and state who presently has such report in his custody or possession.

105. Explain the reasons for the change from an expected failure rate of 0.25 percent of the fuel rods (Final Environmental Statement-NUREG 75/011, p. 3-10) to 0.12 percent (FSAR-SNUPPS, Table 11.1 A-1).

106. What will be the amount (curies per year) of tritium released each year in the liquid effluent? How is this figure derived?

(a) How much of this figure will be produced by fission?

(b) How much by activation?

(c) Of the amount produced by fission, describe fully the liquid pathway whereby the tritium will be released into liquid effluent.

107. State the derivation of the estimate of 410 curies of tritium as the average release per year in the liquid effluent of a 1000-megawatt pressurized water reactor using zirconium-alloy-clad

fuel rods. Include an account of the amount of boric acid estimated to be used per year in the reactor vessel.

108. Has any estimate or study been prepared which concludes that the operation of the Callaway Plant or a plant like the Callaway Plant could produce in edible fish in the Missouri River (or any river) an amount of radionuclides that could be dangerous to the health of a person eating the fish? If so, identify the study or estimate by title, author and date and state who now has such report in his possession or custody.

109. Are there any noble gases at all such as xenon-127, xenon-133, krypton-81 or krypton-85 released from a pressurized water reactor such as Callaway Plant Unit One? If so, state which gases and the amount released in terms of curies per year in (a) the liquid effluent and (b) gaseous emissions.

110. Will any of the radionuclides to be released from the Callaway Plant Unit One be released in particulate form as opposed to fully dissolved form? If so, please identify such radionuclides and the amount to be released in terms of curies per year:

(a) With the liquid effluent.

(b) To the atmosphere.

111. Will the amount of tritium produced by the Callaway Plant per year increase as the plant gets older? If so, estimate the amount or rate of increase and state the bases for the estimate.

112. In what way, if any, is cooling tower blowdown water treated prior to discharge? What is the treatment designed to accomplish and how is it performed?

113. List all alpha emitting radionuclides that will be released in the liquid effluent and give the estimated single reactor amount per year of such emmission in terms of curies per year.

114. State the following information regarding the liquid effluent for the Callaway Plant Unit One:

(a) How many gallons of liquid effluent will be released each day of reactor operation which contain radioactive isotopes including tritium and dissolved and entrained noble gasses.

(b) How much of the total liquid effluent containing such radioactive materials will be cooling tower blowdown water?

(c) How much will be domestic sanitary wastes?

(d) How much will be demineralized water system regenerant wastes?

(e) How much will be "process" or "processed" water other than demineralized water system regenerant wastes.

(f) What will be the source or sources of this other processed water?

115. To what extent has Union Electric assessed the impact of reduced flow of the Missouri River by reason of drought or ice jams or by reason of future diversion projects (e.g., irrigation or major industrial sites) with respect to the potential for dilution of the Callaway radioactive discharge?

116. In making projections of future Missouri River low flows in SNUPPS FSAR Callaway Site Addendum pp. 2.4-37 and 2.4-38, why was not the more conservative model developed by MRBCS used, rather

than the model of the U.S. Corps of Engineers, especially since the latter predicts low flows greater than those already obtained at Hermann, Missouri? Do these models take into account the anticipated construction of a coal gasification plant at Yates, Missouri?

117. What are the nature and degree of reliability of the high and low-level monitors in the Missouri River "provided to give sufficient notice to the main control room operators to allow an orderly reduction or shutdown of plant operation" (SNUPPS FSAR CALLAWAY Site Addendum p. 2.4-40)? How often are these monitors inspected, checked for obstructions, etc.?

118. Do Corps regulations require a minimum Missouri River flow of 6000 cfs at Kansas City? What would the flow at Hermann, Missouri be under these minimum conditions?

119. What is the flow of water required for radwaste dilution of tritium waste to dilute it below the recommended EPA levels of 20,000 pCi/l per year? Are the approximately 10,000 GPM currently allocated for radwaste dilution (SNUPPS FSAR Callaway Site Addendum Fig. 2.4-15) sufficient to achieve both tritium and other isotopic radwaste dilution to meet EPA/NRC maximum levels?

120. Considering that the intake and discharge pipes to and from the Callaway reactor are approximately 5 miles long, what precautions are being taken to assure minimum flow through the pipes?

121. What will be the amount (curies per year) of tritium released each year in gaseous emissions? How is this figure derived?

(a) How much of this figure will be produced by fission?

(b) How much by activation?

(c) Of the amount produced by fission, describe fully the pathway whereby the tritium is released to the environment.

122. State the dispersion characteristics of solid particulates which may be released from a pressurized water reactor such as Callaway Unit One during a short term accident.

123. Describe the model assumed in answering the previous interrogatory.

124. Regarding SNUPPS FSAR, Section 12.2.2, explain the bases for using data on in-plant radioactive contamination obtained at the Fort Calhoun nuclear plant to estimate in-plant contamination at Callaway.

125. This interrogatory pertains to Environmental Report Operating License Stage, Volume II, Section 6.1.3.2.1 Radiological Dispersion Models. Equations [6.1.3-8], [6.1.3-9] and [6.1.3-10] predict infinite concentrations at the plume centerline if the wind speed at the 10-meter level is zero. State the ground-level relative concentrations at the plume centerline during a short-term accident at a time of no detectable air motion.

126. Environmental Report, Page 6.1-23, last paragraph states, "For calm conditions, a wind speed is assigned equal to the vane or anemometer starting speed, whichever is higher". State the basis for assigning the higher starting speed as the wind speed rather than the lower.

127. State whether the "starting speeds" referred to in the preceding interrogatory are the "threshold" speeds of Table 6.1-6, Environmental Report Operating License Stage Vol. II.

128. Explain the term "spatial variations in stability", as used in Environmental Report, Page 6.1-29, top line.

129. Describe the annual average concentration at the exclusion area boundary to be expected if effluents are released into the atmosphere at two discrete positions within the plant site.

130. Regarding Environmental Report, p. 6.1-30, paragraph 2; explain the criteria used to judge when a puff can no longer make a "significant" contribution to the concentration.

131. This interrogatory pertains to "Environmental Report Operating License Stage Vol. I" pg. 2.3-7. In light of the precipitation measuring equipment's malfunction at the Callaway plant site, state the precise correlation coefficient between the average monthly rainfall at Columbia and that at the plant site.

132. This interrogatory pertains to SNUPPS, Callaway Site Addendum, Section 11.3.3.4.1. NRC Regulatory Guide 1.111 states "Deposition of radionuclides over large bodies of water is not considered in this guide. Such deposition will be analyzed on a case-by-case basis". Provide this analysis for the Callaway Unit I impact on the Missouri River.

133. Clarify the discrepency between what Table 6.1-10 is stated to contain in the first sentence of paragraph 3, pg. 6.1-37 and the title of the table, "Water Quality Parameters Measured in Samples Taken During Intake/Discharge and Barge Slip Construction" (SNUPPS FSAR).

134. Regarding SNUPPS FSAR, pg. 6.1-17, paragraph 3, state the limitations imposed on the quality and completeness of the Callaway meterological data caused by the malfunction of the digital data acquisition.

135. Explain the term "qualitative agreement" in the second sentence of paragraph 1, page 2.3-11, Environmental Report Operating License Stage Vol. I.

136. State the longest period that the critically limiting conditions described on page 2.3-10 of the Environmental Report continuously occurred.

137. Explain the choice of 1960-64 as the basis for arriving at a typical number for the frequency of occurrence of episode days (Environmental Report).

138. List all alpha emitting radionuclides that will be released in the gaseous emission and give the estimated single reactor amount per year of such emission in terms of curies per year.

139. Will there be any tritium in the spent fuel pool? If so, how much will be added (curies per year) in each year of the normal expected or planned operation of the Callaway Plant? Will such additions increase as the plant gets older? If so, estimate the amount or rate of increase and the bases for the estimate.

140. Referring to the parameters and assumptions listed under Table 12.2-11 (SNUPPS, FSAR, Vol. 9), state whether Union Electric believes longer fuel storage and compacting of fuel assemblies in the spent fuel pool will change the estimated rate of evaporation and airborne radioactive concentrations.

141. References to temporary storage of spent fuel are made in Sections 9.1.4.2.1 (p. 9.1-28), 9.1.4.2.3 (p. 9.1-38), 9.1.4.2.3.1. Phase V (p.9.1-46) and 12.2.1.7 (p. 12.2-5) (SNUPPS, FSAR Vols. 6 and 9). State what changes in design parameters will be required if storage time is increased beyond the estimated temporary storage time in the spent fuel pools.

142. Referring to Table 9.1-4 (SNUPPS FSAR Vol. 6) "Fuel Pool Cooling and Cleanup System Design Parameters," state how evaporation rates can be controlled and whether any changes in the evaporation rate are to be expected due to longer storage time of spent fuel.

143. State whether there will be any monitoring of the amount of tritium being formed when neutrons from the spent fuel react with boron in the spent fuel pool.

144. State the expected uranium, transuranic, and fission product leaching rates from exposed fuel pellets resulting from increased fuel rod cladding failure caused by long-term storage in spent fuel pools.

145. State the time periods that Union Electric estimates spent fuel rods can be stored in spent fuel pools before degradation of cladding and structural parts and increased compacting provide an increased risk of a criticality incident.

146. State what percentage of fuel cladding is expected to fail after one year's storage in the spent fuel pool; after five years' storage; after thirty years' storage.

147. State how frequently the water of the spent fuel pool will be monitored and for what specific radioactive isotopes it will be monitored.

148. State which radioactive isotopes are expected to be released to the liquid waste effluent from the spent fuel pool.

149. Identify the amount of fuel expected to be held in the spent fuel pool and the assumed duration of time on which the estimates in Table 12.2-11 were based (SNUPPS, FSAR, Vol. 9).

150. State what provisions have been made by Union Electric to insure adequate pool water quality during extended fuel storage periods.

151. State what design parameters have been included in the fuel storage racks to prevent swelling due to build up of hydrogen gas, subsequent jamming of the fuel assemblies, and rupturing of the fuel rods.

152. Are radioactive particles readily adsorbed on suspended river sediment, which in turn is carried by the river many miles downstream?

153. Why were not each of the following potential pathways of exposure to 'man' from radionuclides in liquid effluents considered in Section 5.2, Vol. II Environmental Report Operating License Stage?

(a) Crop irrigation;

(b) River dredging;

(c) Use of gravel and sand for construction and other purposes;

(d) Domestic use for drinking, cooking, cleaning and bathing;

(e) Water purification plants, i.e., retention and accumulation of radioactive material in filters, ion exchange columns, sludge settling basins during water and sewage treatment processes.

154. Have the Union Electric estimates of levels of radioactivity in 'man' due to fish consumption taken into account:

(a) that some fish feed at the bottom of rivers, where radioactive isotopes in the sediment may be much more concentrated than closer to the surface?

(b) That specific radioactive materials (e.g., $Cs^{137}$ and $Sr^{90}$ may become highly concentrated in shellfish, fish and waterfowl?

(c) If the answer to either or both of the above paragraphs is in the negative, explain why this was not taken into account.

(d) If the answer to either or both paragraph (a) and (b) of this interrogatory is affirmative, explain how

152. Are radioactive particles readily adsorbed on suspended river sediment, which in turn is carried by the river many miles downstream?

153. Why were not each of the following potential pathways of exposure to 'man' from radionuclides in liquid effluents considered in Section 5.2, Vol. II Environmental Report Operating License Stage?

(a) Crop irrigation;

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154. Have the Union Electric estimates of levels of radioactivity in 'man' due to fish consumption taken into account:

(a) that some fish feed at the bottom of rivers, where radioactive isotopes in the sediment may be much more concentrated than closer to the surface?

(b) That specific radioactive materials (e.g., $Cs^{137}$ and Sr90 may become highly concentrate

(a) that some fish feed at the bottom of rivers, where radioactive isotopes in the sediment may be much more concentrated than closer to thessurface?

it was taken into account and identify all documents which reflect its consideration.

155. Is nickel present as a corrosion product in nuclear reactors?

156. Why, in Table 11.1-2 (SNUPPS FSAR) are radioactive isotopes of Nickel (e.g., $Ni^{59}$ and $Ni^{63}$) not listed among the "corrosion and activation products"?

157. Regarding SNUPPS, Callaway Site Addendum: p. 2.3-66, state the bases for the choice of 2.26 days and 8 days as the half-lives used in the PUFF model calculations.

THE FOLLOWING ARE GENERAL INTERROGATORIES RELATING TO ALL CONTENTIONS OF THE JOINT INTERVENORS.

158. Identify all expert witnesses that are expected to testify for Union Electric at each hearing on Joint Intervenors' Contentions in this matter, and state separately for each person identified:

(a) The subject matter on which the expert is expected to testify;

(b) The substance of the facts and opinions to which the expert is expected to testify;

(c) A summary of the grounds for each opinion.

159. Identify separately for each of the above interrogatories and the subparts thereof, the person(s) providing the answer.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| UNION ELECTRIC COMPANY | ) | |
| | ) | Docket No. STN 50-483-OL |
| (Callaway Plant, Unit 1) | ) | |

CERTIFICATE OF SERVICE

I hereby certify that copies of Joint Intervenors' First Set of Interrogatories to Union Electric, and Joint Intervenors' First Request for Production of Documents to Union Electric have been served on the following by deposit in the United States mail this 2nd day of June, 1981.

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